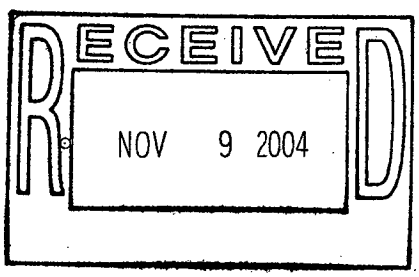
# ANNUAL UPDATE

*August 1, 2003, Through October 1, 2004*

# Historical Release Report

*Rocky Flats Environmental Technology Site*




ADMIN RECORD
SW-A-005018

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## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

| | |
|---|---|
| AAESE | Accelerated Action Ecological Screening Evaluation |
| ACM | asbestos-containing material |
| AL | action level |
| ALF | Action Level and Standards Framework for Surface Water, Ground Water and Soil |
| AOC | Area of Concern |
| AST | aboveground storage tank |
| bgs | below ground surface |
| BMP | best management practice |
| BZ | Buffer Zone |
| BZCR | Buffer Zone Contamination Report |
| BZSAP | Buffer Zone Sampling and Analysis Plan |
| CAD/ROD | Corrective Action Decision/Record of Decision |
| CCR | Code of Colorado Regulations |
| CDH | Colorado Department of Health |
| CDPHE | Colorado Department of Public Health and Environment |
| CEARP | Comprehensive Environmental Assessment and Response Program |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CHWA | Colorado Hazardous Waste Act |
| Ci | curie |
| CMS/FS | Corrective Measures Study/Feasibility Study |
| COC | contaminant of concern |
| CPIR | Contingency Plan Implementation Report |
| cpm | counts per minute |
| CRA | Comprehensive Risk Assessment |
| CSV | Central Storage Vault |
| CWTS | Caustic Waste Treatment System |
| cy | cubic yard |
| D&D | Decontamination and Decommissioning |
| DCHP | dicesium hexachloroplutonate |
| DOE | U.S. Department of Energy |
| DOP | Decommissioning Operations Plan |
| DOT | U.S. Department of Transportation |
| dpm | disintegrations per minute |
| dpm/100 $cm^2$ | disintegrations per minute per 100 square centimeters |
| dpm/g | disintegrations per minute per gram |
| dpm/kg | disintegrations per minute per kilogram |
| dpm/L | disintegrations per minute per liter |
| dpm/$m^2$ | disintegrations per minute per square meter |
| dpm/pCi | disintegrations per minute per picocurie |
| DU | depleted uranium |
| EG&G | EG&G Rocky Flats, Inc. |
| EP | Extraction Procedure |
| EPA | U.S. Environmental Protection Agency |

## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

| | |
|---|---|
| ER | Environmental Restoration |
| ER RSOP | Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation |
| ERM | Environmental Restoration Management |
| FIDLER | Field Instrument for the Detection of Low-Energy Radiation |
| FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| ft | foot |
| $ft^2$ | square foot |
| $ft^3$ | cubic foot |
| FY | Fiscal Year |
| GI | Government Issue |
| GIS | Geographic Information System |
| GPR | Ground-Penetrating Radar |
| HAER | Historic American Engineering Record |
| HEPA | high-efficiency particulate air |
| HEUN | highly enriched uranium |
| HF | hydrofluoric |
| HI | Hazard Index |
| $HNO_3$ | nitric acid |
| HPGe | high-purity germanium |
| HQ | Headquarters |
| HRR | Historical Release Report |
| HVAC | heating, ventilation, and air conditioning |
| IA | Industrial Area |
| IAG | Interagency Agreement |
| IASAP | Industrial Area Sampling and Analysis Plan |
| IHSS | Individual Hazardous Substance Site |
| IM/IRA | Interim Measure/Interim Remedial Action |
| IRIS | Integrated Risk Information System |
| ITPH | Interceptor Trench Pump House |
| IWCP | Integrated Work Control Program |
| K-H | Kaiser-Hill Company, L.L.C. |
| kg | kilogram |
| KOH | potassium hydroxide |
| LANL | Los Alamos National Laboratory |
| LLW | low-level waste |
| LLMW | low-level mixed waste |
| µCi | microcurie |
| µCi/g | microcuries per gram |
| µg | microgram |
| $\mu g/cm^2$ | microgams per square centimeter |
| $\mu g/m^3$ | micrograms per cubic meter |
| µg/kg | micrograms per kilogram (ppb) |
| µg/L | micrograms per liter (ppb) |

## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

| | |
|---|---|
| mCi | millicuries |
| MDL | method detection limit |
| mg/100 cm | milligrams per 100 centimeters |
| mg/kg | milligrams per kilogram (ppm) |
| mg/kg/day | milligrams per kilogram per day |
| mg/L | milligrams per liter (ppm) |
| MPL | maximum permissible limit |
| mrem | millirem |
| mr/hr | millirems per hour |
| MSDS | Material Safety Data Sheet |
| NA | not applicable |
| MRI | Midwest Research Institute |
| NaI | sodium iodide |
| NaOH | Sodium hydroxide |
| nCi/g | nanocuries per gram |
| NCR | no carbon required |
| NFA | No Further Action |
| NFAA | No Further Accelerated Action |
| $NH_3$ | ammonia |
| $NH_4$ | ammonium |
| NPDES | National Pollutant Discharge Elimination System |
| NPWL | New Process Waste Lines |
| OPWL | Original Process Waste Lines |
| OSHA | Occupational Health and Safety Administration |
| OU | Operable Unit |
| PA | Protected Area |
| PAC | Potential Area of Concern |
| PAH | polyaromatic hydrocarbon |
| PAM | Proposed Action Memorandum |
| PCB | polychlorinated biphenyl |
| pCi/g | picocuries per gram |
| pCi/L | picocuries per liter |
| PCOC | potential contaminant of concern |
| $pCi/m^3$ | picocuries per cubic meter |
| pCi/ml | picocuries per milliliter |
| pg/g | picograms per gram |
| PIC | Potential Incident of Concern |
| PMJM | Preble's meadow jumping mouse |
| POC | Point of Compliance |
| POE | Point of Evaluation |
| ppb | parts per billion |
| PPE | personal protective equipment |
| ppm | parts per million |
| ppt | parts per trillion |

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## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

| | |
|---|---|
| PRG | preliminary remediation goal |
| PSZ | Perimeter Security Zone |
| Pu | plutonium |
| PU&D | Property Utilization and Disposal |
| PVC | polyvinyl chloride |
| RAO | remedial action objective |
| R&D | research and development |
| RCIP | RCRA Contingency Implementation Plan |
| RCRA | Resource Conservation and Recovery Act |
| RCT | Radiological Control Technician |
| RFCA | Rocky Flats Cleanup Agreement |
| RFETS or Site | Rocky Flats Environmental Technology Site |
| RFFO | Rocky Flats Field Office |
| RFI/RI | RCRA Facility Investigation/Remedial Investigation |
| RFP | Rocky Flats Plant |
| RI | Remedial Investigation |
| RISS | Remediation and Industrial Site Services |
| RL | reporting limit |
| RMRS | Rocky Mountain Remediation Services, L.L.C. |
| RSAL | radionuclide soil action level |
| RSOP | RFCA Standard Operating Protocol |
| SAP | Sampling and Analysis Plan |
| SEP | Solar Evaporation Ponds |
| SID | South Interceptor Ditch |
| Site | Rocky Flats Environmental Technology Site |
| SNM | special nuclear material |
| SOE | Stationary Operating Engineer |
| SOP | standard operating procedure |
| SOR | sum of ratios |
| SSRS | Subsurface Soil Risk Screen |
| STP | Sewage Treatment Plant |
| SVOC | semivolatile organic compound |
| S&W | Swinerton & Walberg |
| SWMU | Solid Waste Management Unit |
| TAL | Target Analyte List |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TDEM | time-domain electromagnetic |
| TDS | total dissolved solids |
| TEF | toxicity equivalent factor |
| TEQ | toxicity equivalent |
| TRU | transuranic |
| TSCA | Toxic Substances Control Act |
| UBC | Under Building Contamination |
| UCL | upper confidence limit |

## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

| | |
|---|---|
| UST | underground storage tank |
| VOC | volatile organic compound |
| WARP | Well Abandonment and Replacement Program |
| WHO | World Health Organization |
| WRW | wildlife refuge worker |
| WSRIC | Waste Stream and Residue Identification and Characterization |

# SECTION 1.0
# INTRODUCTION

## 1.0 INTRODUCTION

The Rocky Flats Environmental Technology Site (RFETS or the Site) began operation in 1951. Since 1951, materials defined as hazardous substances, pollutants, and contaminants by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and materials defined as hazardous waste and hazardous constituents by the Resource Conservation and Recovery Act (RCRA) and/or the Colorado Hazardous Waste Act (CHWA), have been produced, purchased, stored, consumed, disposed, and released at various locations at RFETS. Contaminants remain within some facility tank and pipe systems. Certain contaminants have been detected and remain in groundwater, sediment, surface water, and soil at the Site and may pose potential human health and environmental risks.

RCRA regulations require that all Solid Waste Management Units (SWMUs) be identified. SWMUs were initially identified in 1985 by the U.S. Department of Energy (DOE) Los Alamos Operations Office and are presented in the Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment. The study consisted of a records search, open literature survey, interviews with RFETS employees, and inspections at each site. The SWMU terminology is a RCRA designation consisting of inactive waste disposal sites, accidentally contaminated sites, and sites found to pose environmental concern due to past or current waste management practices. In addition, the State of Colorado and the regional office of the U.S. Environmental Protection Agency (EPA) provided guidance indicating SWMUs were areas where environmental releases may have occurred, including hazardous waste and nonhazardous waste-related releases. Also included were single-release areas and long-term waste management areas where waste storage may (or is known to) have occurred. The first identification of RFETS SWMUs, consistent with the guidance provided by the State of Colorado and the regional EPA, was presented as an appendix to the November 1986 RCRA Part B Permit Application, which was prepared pursuant to the Compliance Agreement signed on July 31, 1986.

Formal efforts to document the extent of Site contamination were established with the signing of the Interagency Agreement (IAG) in 1991. At that time, SWMUs at RFETS were renamed Individual Hazardous Substance Sites (IHSSs). IHSS is a term defined in the IAG as "locations associated with a release or threat of release of hazardous substances that may cause harm to human health/or the environment." The term IHSS is used today at RFETS. The IAG grouped IHSSs by similar contaminant or geographic location into 16 larger Operable Units (OUs), and schedules were set for further characterization. In accordance with the IAG, a Historical Release Report (HRR) was developed. The original intent of the HRR was to capture existing information on historical incidents and Plant practices involving hazardous substances at RFETS. Additionally, the IAG prescribed that the HRR reporting process continue quarterly for reporting of new or newly identified releases of hazardous substances to the environment (now identified as Potential Areas of Concern [PACs]).

In 1996, the Rocky Flats Cleanup Agreement (RFCA) superseded the IAG. RFCA incorporated the earlier IAG requirements for updating the HRR; however, it was agreed that reporting would be required annually instead of quarterly. The first Annual Update was submitted in September 1996.

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The 16 OUs designated in the IAG were consolidated into 10 OUs during the RFCA negotiation process to reduce field and administrative requirements. The consolidation of former OUs is presented in Table 1.1.

**Table 1.1**
**RFCA Consolidation of Former OUs**

| IAG OU Designation | RFCA OU Designation |
|---|---|
| OU 1 | Closed under CAD/ROD |
| OU 2 | Incorporated into BZ OU |
| OU 3 | Closed under CAD/ROD |
| OU 4 | Incorporated into IA OU |
| OU 5 | Incorporated into BZ OU |
| OU 6 | Incorporated into BZ OU |
| OU 7 | Incorporated into BZ OU |
| OU 8 | Incorporated into IA OU |
| OU 9 | Incorporated into IA OU |
| OU 10 | Incorporated into IA OU |
| OU 11 | Closed Under CAD/ROD |
| OU 12 | Incorporated into IA OU |
| OU 13 | Incorporated into IA OU |
| OU 14 | Incorporated into IA OU |
| OU 15 | Closed under CAD/ROD |
| OU 16 | Closed under CAD/ROD |

At that time, Corrective Action Decisions/Record of Decisions (CADs/RODs) for OUs 11, 15, and 16 were already complete and CADs/RODs for OUs 1, 3, 5, 6, and 7 were in process or expected. For this reason these OUs retained their IAG designations. The Buffer Zone (BZ) OU incorporates all IHSSs from OU 2; IHSSs 170, 174A, and 174B from the former OU 10; and all PACs within those IHSSs and the BZ. The Industrial Area (IA) OU incorporates all IHSSs from OUs 4, 8, 9, 12, 13, and 14; IHSSs 115 and 196 from OU 5; IHSSs 143 and 165 from OU6; all IHSSs from OU 10 with the exception of 170, 174A, and 174B; and all PACs and Under Building Contamination (UBC) Sites located within the IA. OUs 5, 6, and 7 IHSSs and PACs were consolidated into the BZ OU by RFCA modification approved in 2004.

For purposes of the HRR process and mapping clarity, original IHSS locations were designated a unique "PAC area" prefix number based upon geographic location. For example, IHSS 123.1 is designated as PAC 700-123.1. An area where there has been a recent release or finding of a hazardous substance in the environment (post-1992) is also assigned a PAC area prefix number, followed by the next numerically highest PAC reference number for that area. These areas are referred to as PACs and are equivalent to IHSSs in that they are CERCLA sites requiring disposition through the HRR and CERCLA reporting process. PAC prefixes are selected according to 14 geographic subdivisions, as illustrated on Figure 1.1. Large PAC areas (that is, PACs that cross geographic PAC boundaries), such as the Original Process Waste Lines (OPWL); (PAC 000-121) and the Central Avenue Ditch (PAC 000-172), have been assigned a 000 prefix because of their boundary extent.

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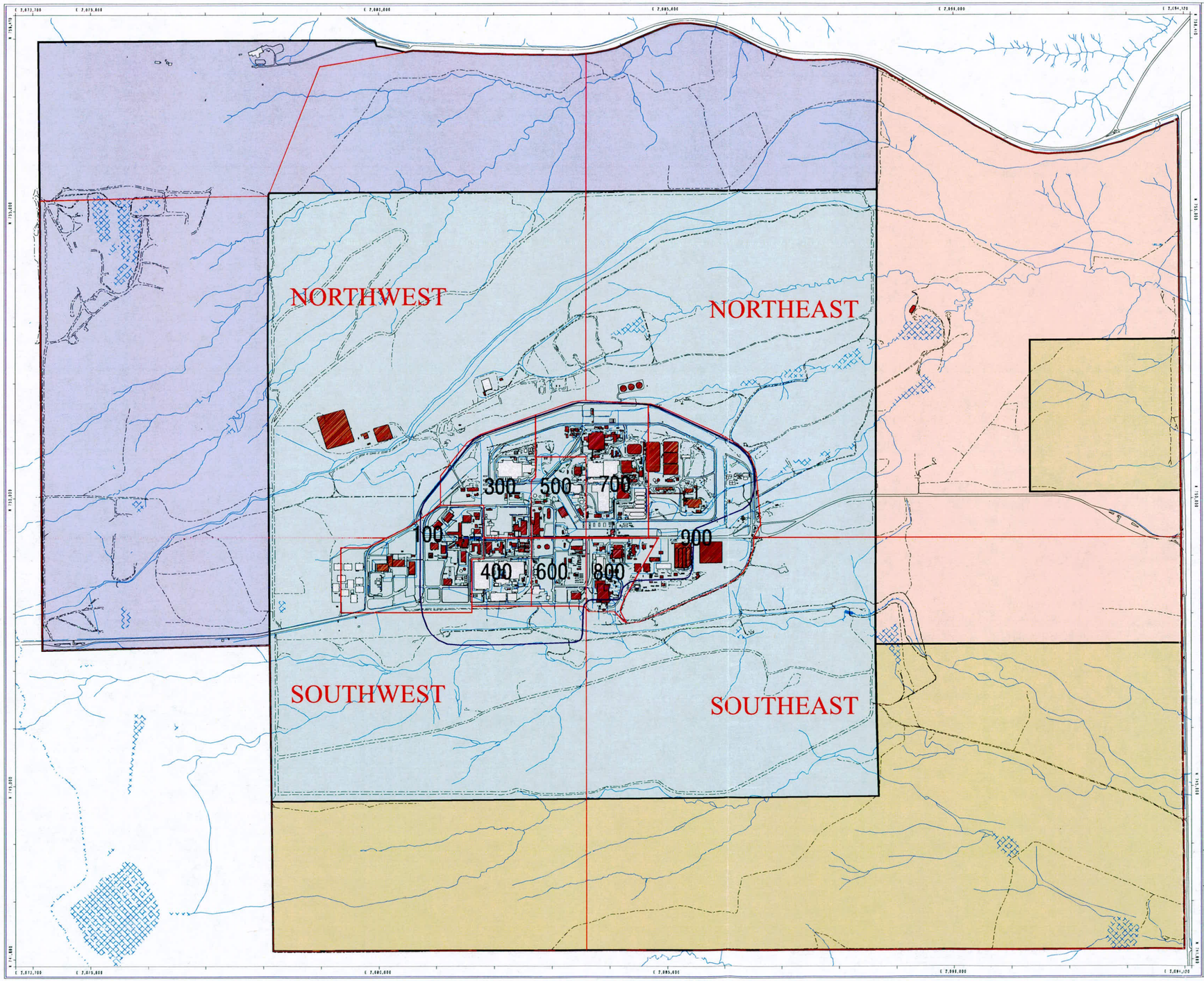


# Figure 1.1

## Historical Release Report

## PAC Area Boundaries

**EXPLANATION**

- PAC Area Designation Boundary
- Industrial Area Boundary
- Property Purchase Boundary
- 1951 Purchase (2,558 Acres)
- 1974 Purchase
- 1975 Purchase (3,936 Acres)
- 1976 Purchase

**Standard Map Features**

- Buildings and other structures
- Removed Buildings
- Lakes and ponds
- Streams, ditches, or other drainage features
- Paved roads
- Dirt roads

*DATA SOURCE BASE FEATURES:*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSI, Las Vegas.*
*Digitized from the orthophotographs, 1/95*

NOTES:
All IHSS and PAC's Boundaries are Approximate. For more detail, please contact Nick Demos (X4505) for the following document:

Historical Release Report (HRR) September 2001 Annual Update

Scale = 1 : 21330
1 inch represents approximately 1778 feet

500 0 1000 2000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER-HILL COMPANY

November 03, 2004

NT Svr w:/projects/fy2001/01-0916/pac_bdy_prop_bdy_fig1-1.aml

In addition to the 14 geographic areas, potential UBC Sites were also discussed in the original HRR (DOE 1992). UBC areas were necessary because of the potential contamination of soil under specific buildings from broken process waste lines or other potential sources related to the building histories. Appendix 4, Plate #4, Potential Areas of Concern, shows the UBC locations identified at RFETS.

## 1.1 2004 Annual Update to the HRR

Beginning in Fiscal Year (FY) 2003 (03), the No Further Action (NFA) designation was changed to No Further Accelerated Action (NFAA) to denote that other actions as determined in the CAD/ROD may be conducted. This Annual Update includes new information gathered to update previous IHSS, PAC, or UBC Site descriptions and DOE Rocky Flats Project Office (RFFO) recommendations for NFAA. These recommendations are based on process knowledge, analytical data from characterization and/or verification sampling, conservative risk-based screens, or formally conducted personal interviews. Where the IHSS, PAC, or UBC Site has already been granted NFAA status, the date of NFAA approval and the reference to the Closeout or Data Summary Report is included. The updated IHSSs, PACs, and UBC Sites presented herein are identified in Table 1.2.

**Table 1.2**
**HRR Sites with Updates Contained in This Annual Report**

| IHSS | IHSS Group | OU | PAC | Site Description | Previous Updates | Data Summary Report (DS) or Closeout Report (C) for IHSS Group | Regulatory Agency NFAA Approval Date |
|---|---|---|---|---|---|---|---|
| 142.10 | NA | BZ | SE-142.10 | Pond C-1 | Annual 1997 | See Footnote 1 | 06-17-04 |
| 133.5 | SW-1 | BZ | SW-133.5 | Incinerator Facility | Annual 1997<br>Annual 2001 | C for SW-1 | 12-18-03 |
| 133.6 | SW-1 | BZ | SW-133.6 | Concrete Wash Pad | Annual 1997<br>Annual 2001 | C for SW-1 | 12-18-03 |
| 121 | 400-3 (Tanks 4,5,6)<br>700-4 (Tanks 8, 12, 13, 14, 15, 16, 17, 36, 37)<br>800-1 (OPWL in IHSS Group 800-1),<br>400-8 (Tanks 2, 3) | IA | 000-121 | OPWL | Annual 1996 | DS for 400-3 (Tanks 4, 5, 6);<br>C for 700-4 (Tanks 8,12, 13, 14, 15, 16, 17, 36, 37);<br>C for 800-1 (OPWL in IHSS Group 800-1);<br>C for 400-8 (Tanks 2, 3) | 400-3 (Tanks 4, 5, 6) 12-18-03<br>700-4 (Tanks 8, 12, 13, 14, 15, 16, 17, 36, 37) 02-06-04<br>800-1 (OPWL in IHSS Group 800-1) 03-19-04<br>400-8 (Tanks 2, 3) 03-19-04 |
| 190 | 000-3 | IA | 000-190 | Caustic Leak | | See Footnote1 | 07-09-04 |
| NA | 800-1 (NPWL in IHSS Group 800-1) | IA | 000-504 | New Process Waste Lines | Annual 1999 | C for 800-1 (NPWL in IHSS Group 800-1) | 800-1 (NPWL in IHSS Group 800-1) 03-19-04 |
| 186 | 500-1 | IA | 300-186 | Valve Vault 12 | | DS for 500-1 | 09-29-04 |
| NA | NA | IA | 300-708 | Transformers North of Building 371 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 300-709 | Transformer Leak – 334-1 | Annual 1996 | See Footnote 2 | 05-06-04 |
| 116.1 | 400-3 | IA | 400-116.1 | West Loading Dock, Building 447 (IAG Name: West Loading Dock Area) | | DS for 400-3 | 12-18-03 |
| 116.2 | 400-3 | IA | 400-116.2 | South Loading Dock, Building 444 (IAG Name: South Loading Dock Area) | | DS for 400-3 | 12-18-03 |

| IHSS | IHSS Group | OU | PAC | Site Description | Previous Updates | Data Summary Report (DS) or Closeout Report (C) for IHSS Group | Regulatory Agency NFAA Approval Date |
|---|---|---|---|---|---|---|---|
| 136.1 | 400-3 | IA | 400-136.1 | Cooling Tower Pond West of Building 444 (IAG Name: Cooling Tower Pond Northeast Corner of Building 460) | | DS for 400-3 | 12-18-03 |
| 136.2 | 400-3 | IA | 400-136.2 | Cooling Tower Pond East of Building 444 (IAG Name: Cooling Tower Pond West of Building 460) | | DS for 400-3 | 12-18-03 |
| 157.2 | 400-6 | IA | 400-157.2 | Radioactive Site South Area | | DS for 400-6 | 09-29-04 |
| 182 | 400-3 | IA | 400-182 | Buildings 444/453 Drum Storage Area | | DS for 400-3 | 12-18-03 |
| 207 | 400-3 | IA | 400-207 | Inactive 444 Acid Dumpster | | DS for 400-3 | 12-18-03 |
| 208 | 400-3 | IA | 400-208 | Inactive 444/447 Waste Storage Area | | DS for 400-3 | 12-18-03 |
| NA | 400-3 | IA | 400-801 | Transformer, Roof of Building 447 | | DS for 400-3 | 12-18-03 |
| NA | 400-4 | IA | 400-803 | Miscellaneous Dumping, Building 460 Storm Drain | | DS for 400-4 | 08-23-04 |
| NA | 400-4 | IA | 400-804 | Road North of Building 460 | | DS for 400-3 | 08-23-04 |
| NA | 400-3 | IA | 400-810 | Beryllium Fire - Building 444 | | DS for 400-3 | 12-18-03 |
| 122 | 400-8 | IA | 400-122 | Underground Concrete Tank | Annual 1996 (000-121) | C for 400-8 | 03-19-04 |
| 117.1 | 500-1 | IA | 500-117.1 | North Site Chemical Storage | | DS for 500-1 | 09-29-04 |
| 117.2 | 500-4 | IA | 500-117.2 | Middle Site Chemical Storage | | DS for 500-4 | 06-18-04 |
| 158 | 500-2 | IA | 500-158 | Radioactive Site – Building 551 | | C for 500-2 | 06-18-04 |
| 169 | NA | IA | 500-169 | Waste Drum Peroxide Burial | Annual 1998 Annual 2000 | See Footnote 2 | 02-20-04 |
| 197 | 500-1 | IA | 500-197 | Scrap Metal Sites | | DS for 500-1 | 09-29-04 |
| NA | NA | IA | 500-900 | Transformer Leak – 515/516 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 500-901 | Transformer - 555 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 500-902 | Transformer Leak – 559 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | 500-5 | IA | 500-904 | Transformer Leak 223-1/223-2 | | DS for 500-5 | 05-17-04 |
| NA | NA | IA | 500-905 | Transformer – 558-1 | Annual 1996 | See Footnote 2 | 05-06-04 |
| 120.1 | 600-3 | IA | 600-120.1 | Fiberglass Area North of Building 664 | | DS for 600-3 | 05-12-04 |
| NA | NA | IA | 600-1000 | Transformer Storage Outside Building 662 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 600-1002 | Transformer Storage – West of Building 666 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 600-1003 | Transformers North and South of 661/675 Substation | Annual 1996 | See Footnote 2 | 05-06-04 |

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| IHSS | IHSS Group | OU | PAC | Site Description | Previous Updates | Data Summary Report (DS) or Closeout Report (C) for IHSS Group | Regulatory Agency NFAA Approval Date |
|---|---|---|---|---|---|---|---|
| NA | 600-5 | IA | 600-1004 | Central Avenue Ditch Cleaning Incident | Quarterly 7 | DS for 600-5 | 06-18-04 |
| 124.1 | 700-4 | IA | 700-124.1 | 30,000-Gallon Tank (Tank #68) | Annual 1996 (000-121) | C for 700-4 | 02-06-04 |
| 124.2 | 700-4 | IA | 700-124.2 | 14,000 Gallon Tank (Tank #66) | Annual 1996 (000-121) | C for 700-4 | 02-06-04 |
| 124.3 | 700-4 | IA | 700-124.3 | 14,000 Gallon Tank (Tank #67) | Annual 1996 (000-121) | C for 700-4 | 02-06-04 |
| 125 | 700-4 | IA | 700-125 | Holding Tank (Tank #66) | | C for 700-4 | 02-06-04 |
| 126.1 | 700-4 | IA | 700-126.1 | Westernmost Out-of-Service Waste Tank | | C for 700-4 | 02-06-04 |
| 137 | 700-6 | IA | 700-137 | Cooling Tower Blowdown Buildings 712 and 713 | | C for 700-6 | 09-29-04 |
| 138 | 700-7 | IA | 700-138 | Cooling Tower Blowdown Building 779 | | C for 700-7 | 10-01-04 |
| 139.1N(b) | 700-4 | IA | 700-139.1N(b) | Caustic/Acid Spills Hydroxide Tank Area | | C for 700-4 | 02-06-04 |
| 139.1(S) | 700-6 | IA | 700-139.1(S) | Caustic/Acid Spills Hydroxide Tank Area | | C for 700-6 | 09-29-04 |
| 139.2 | 700-4 | IA | 700-139.2 | Caustic/Acid Spills Hydrofluoric Acid Tanks | | C for 700-4 | 02-06-04 |
| 143 | NA | IA | 700-143 | Bldg. 771 Outfall | Annual 1997 | See Footnote 1 | 09-07-04 |
| 146.1 | 700-4 | IA | 700-146.1 | Concrete Process Waste Tanks 7,500-Gallon Tank (31) | | C for 700-4 | 02-06-04 |
| 146.2 | 700-4 | IA | 700-146.2 | Concrete Process Waste Tanks 7,500-Gallon Tank (32) | | C for 700-4 | 02-06-04 |
| 146.3 | 700-4 | IA | 700-146.3 | Concrete Process Waste Tanks 7,500-Gallon Tank (34W) | | C for 700-4 | 02-06-04 |
| 146.4 | 700-4 | IA | 700-146.4 | Concrete Process Waste Tanks 7,500-Gallon Tank (34E) | | C for 700-4 | 02-06-04 |
| 146.5 | 700-4 | IA | 700-146.5 | Concrete Process Waste Tanks 3,750-Gallon Tank (30) | | C for 700-4 | 02-06-04 |
| 146.6 | 700-4 | IA | 700-146.6 | Concrete Process Waste Tanks 3,750-Gallon Tank (33) | | C for 700-4 | 02-06-04 |
| 150.1 | 700-4 | IA | 700-150.1 | Radioactive Site North of Building 771 (IAG Name: Radioactive Leak North of Building 771) | | C for 700-4 | 02-06-04 |
| 150.2 | 700-4 | IA | 700-150.2 | Radioactive Site West of Buildings 771 and 776 (IAG Name: Radioactive Leak West of Building 771) | | C for 700-4 | 02-06-04 |

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| IHSS | IHSS Group | OU | PAC | Site Description | Previous Updates | Data Summary Report (DS) or Closeout Report (C) for IHSS Group | Regulatory Agency NFAA Approval Date |
|---|---|---|---|---|---|---|---|
| 150.3 | 700-4 | IA | 700-150.3 | Radioactive Site Between Buildings 771 and 774 (IAG Name: Radioactive Leak Between Buildings 771 and 774) | | C for 700-4 | 02-06-04 |
| 163.1 | 700-4 | IA | 700-163.1 | Radioactive Site 700 Area Site No.3 Wash Area | | C for 700-4 | 02-06-04 |
| 215 | 700-4 | IA | 700-215 | Process Waste Tank Unit 55.13 | | C for 700-4 | 02-06-04 |
| NA | 700-10 | IA | 700-1101 | Laundry Tank Overflow - Building 732 | | DS for 700-10 | 09-21-04 |
| NA | NA | IA | 700-1102 | Transformer Leak – 776-4 | Annual 2001 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 700-1103 | Leaking Transformers – Building 707 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 700-1104 | Leaking Transformer – Building 708 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | 700-7 | IA | 700-1105 | Transformer Leak - 779-1/779-2 | | C for 700-7 | 10-01-04 |
| NA | NA | IA | 700-1111 | Leaking Transformer – Building 750 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 700-1112 | Leaking Transformer – Building 776-5 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | 700-1 | IA | 700-1115 | Identification of Diesel Fuel in Subsurface Soils | | DS for 700-1 | 09-14-04 |
| NA | 800-1 | IA | 800-1204 | Building 866 Spill | | C for 800-1 | 03-19-04 |
| NA | NA | IA | 800-1207 | Transformer – 883-4 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 800-1208 | Transformer – 881-4 | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | NA | IA | 800-1209 | Leaking Transformers, 800 Area | Annual 1996 | See Footnote 2 | 05-06-04 |
| NA | 800-1 | IA | 800-1210 | Transformers 865-1 and 865-2 | Annual 1996 | C for 800-1 | 03-19-04 |
| NA | 800-1 | IA | 800-1212 | Building 866 Sump Spill | | C for 800-1 | 03-19-04 |
| 177 | 800-5 | IA | 800-177 | Building 885 Drum Storage and Paint Storage | | DS for 800-5 | 06-21-04 |
| 173 | 900-1 | IA | 900-173 | Radioactive Site Building 991 | | C for 900-1 | 03-31-04 |
| 184 | 900-1 | IA | 900-184 | Radioactive Site 991 Steam Cleaning Area | | C for 900-1 | 03-31-04 |
| NA | 900-1 | IA | 900-1301 | Building 991 Enclosed Area | | C for 900-1 | 03-31-04 |
| NA | NA | IA | 900-1306 | Transformers 991-1 and 991-2 | Annual 1996 | NA | 05-06-04 |
| NA | 900-1 | IA | 900-1307 | Explosive Bonding Pit | Annual 1999 | C for 900-1 | 03-31-04 |
| 213 | 900-3 | IA | 900-213 | Unit 15, 904 Pad Pondcrete Storage | | DS for 900-3 | 12-17-03 |
| NA | 400-1 | IA | UBC 439 | Building 439 | | DS for 400-1 | 08-23-04 |
| NA | 400-2 | IA | UBC 440 | Building 440 | | DS for 400-2 | 09-27-04 |
| NA | 800-4 | IA | UBC 441 | Building 441 | | DS for 800-4 | 03-19-04 |
| NA | 400-3 | IA | UBC 444 | Building 444 | | C for 700-4 | 12-18-03 |



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| IHSS | IHSS Group | OU | PAC | Site Description | Previous Updates | Data Summary Report (DS) or Closeout Report (C) for IHSS Group | Regulatory Agency NFAA Approval Date |
|---|---|---|---|---|---|---|---|
| NA | 400-3 | IA | UBC 447 | Building 447 | | C for 700-4 | 12-18-03 |
| NA | 700-5 | IA | UBC 770 | Building 770 | | DS for 700-5 | 09-07-04 |
| NA | 700-7 | IA | UBC 779 | Building 779 | | C for 700-4 | 10-01-04 |
| NA | 700-7 | IA | UBC 771 | Building 771 | Annual 2001 | C for 700-7 | 02-06-04 |
| NA | 800-1 | IA | UBC 865 | Building 865 | | C for 800-1 | 03-19-04 |
| NA | 800-5 | IA | UBC 887 | Building 887 | | DS for 800-5 | 06-21-04 |
| NA | 900-1 | IA | UBC -991 | Building 991 | Annual 2003 | C for 900-1 | 03-31-04 |

1. NFAA evaluation based on historical data.
2. A white paper was prepared by DOE (DOE 2004) and submitted to CDPHE that demonstrated cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA. The paper was written in light of recent studies showing that a few PCB congeners have dioxin-like properties, which was a concern to CDPHE.

In addition, 13 Potential Incidents of Concern (PICs) were dispositioned in FY04 as not warranting an action. The original HRR identified 61 PICs at RFETS. A PIC is an operation or occurrence that appears to meet the HRR definition of a release but which cannot be accurately located based on available information. In some cases, the location of a PIC can be estimated within a general area but the dimensions cannot be identified and it cannot be mapped. In 2002, information on the PICs was reviewed, and it was agreed in an agency meeting held on April 3, 2002, that 48 of the 61 PICs required no further action. The remaining PICs (4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57) required further discussion and/or investigation. In the spring of 2004, DOE further researched these remaining PICs and summarized the findings in a document entitled "Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations." For all of these remaining PICs, a "no action warranted" recommendation was made. In a letter dated April 30, 2004, from Steven H. Gunderson to Mr. Joseph Legare, CDPHE concurred with the recommendations.

This document has been prepared in accordance with Part 9, Subpart B, paragraph 119 (l) of RFCA (DOE et al. 1996), Notification of Spills, Releases, or Findings, and is presented in the format described below. For this reporting period, August 1, 2003, through October 1, 2004, there were no additional HRR reportable spills, releases, or findings of contaminants identified at RFETS.

RFCA defines the NFAA remedy selection as the determination that accelerated actions are not currently warranted; however, such decisions are subject to revisitation at the time of the Final CAD/ROD. The Agency Acceptance Form included in past Quarterly and Annual Updates to the HRR was discontinued in the FY00 Annual Update. As such, the current IHSS, PAC, and UBC Site regulatory status will be determined as part of an ongoing process between RFETS personnel and regulatory agencies.

Table 1.3 is an up-to-date account of (1) the number of geographic areas (that is, IHSSs, PACs, and UBC Sites) accepted as proposed NFAA, either by written concurrence from the regulatory agencies or through the CAD/ROD process, (2) the number of geographic areas "proposed" for NFAA since the 1992 HRR, for which concurrence has not been received from the regulatory agencies, and (3) the number of total geographic areas warranting further research, investigation, or action.

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**Table 1.3 HRR Site Tracking and Status Through August 2004**

| HRR Site Status | IHSSs, PACS, and UBC Sites | PICs |
|---|---|---|
| Proposed NFAA Accepted (CAD/ROD Process or other approval) | 287 | 61 |
| Proposed NFAA (pending agency review) | 0 | 0 |
| Potential Further Investigation or Action Warranted | 73 | 0 |
| **Total** | 360 | 61 |

## 1.2 2004 Annual Update Organization

This Annual Update is divided into three sections and four appendices. Section 1.0 is a historical summary of the HRR process and identifies the contents of this document. Section 2.0 provides revised PAC/UBC Site narratives and incorporates new information regarding previously designated HRR sites. The revised narratives include the following types of information:

- Additional information or findings related to previously designated CERCLA sites, such as new data, boundary changes, corrections identified, and so forth;
- NFAA status based on process knowledge, historical analytical data, new analytical data collected in accordance with the IA Sampling and Analysis (SAP) (IASAP) or BZSAP Addenda, and accelerated actions conducted in accordance with the Environmental Restoration (ER) RFCA Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) Notifications;
- NFAA status based on remediation conducted in accordance with agency-approved decision documents, such as Proposed Action Memoranda (PAMs) and Interim Measure/Interim Remedial Action (IM/IRA) Plans;
- Additional information requested by the regulatory agencies during the comment and response period to meet the proposed NFAA criteria; and
- Approved NFAA status based upon final CAD/ROD or other authorizing documentation, such as letters from the regulatory agencies.

Section 3.0 briefly describes events for some ongoing environmental projects at the Site that are considered significant.

Appendix 1 provides a listing of all IHSSs, PACs, and UBC Sites, as welll as Potential Incidents of Concern (PICs) identified in the original HRR, Quarterly Updates, and Annual Updates. For each site, the table includes the IHSS number, PAC number, OU, HRR document where the site was identified, HRR document(s) where the site information was updated, HRR document(s) where the site was proposed for NFAA, and date of agency approval of the NFAA justification, as applicable.

Appendix 2 provides specific HRR correspondence from the regulatory agencies. The letters document acceptance of proposed NFAA status, request additional information or data for some PACs or IHSSs



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that were proposed for NFAA, or specify nonconcurrence with the PAC/IHSS or UBC Site proposed for NFAA in the HRR reporting process.

Appendix 3 provides notification and documentation for replacement/movement of soil that has undergone a hazardous and radiological constituent analysis (that is, comparison to RFCA wildlife refuge worker [WRW] action levels [ALs]). This reporting is consistent with RFCA Attachment 5 or the RSOP for Asphalt and Soil Management. Reporting and documentation include a summary of the movement activity, volumes, origination, receiving sites, and contamination type(s). This appendix is identified as a "place-keeper" to describe and map such locations. If an accelerated action was conducted and soil was returned as part of the action, the information is included in the associated Closeout Report. No excavated soil exceeding the RFCA WRW ALs was relocated to locations outside the originating IHSS, PAC, or UBC Site during this reporting period.

Appendix 4 contains four plates and presents the most current and accurate IHSS, PAC, and UBC Site boundaries and status. The RFCA Consolidated OU Map presented in RFCA and the original HRR PAC Area format are combined and illustrated as Plate #1. Plate #1 only illustrates IHSSs for which further investigation or action is warranted (as proposed in the HRR reporting process). Final NFAA and proposed NFAA IHSSs, PACs, and UBC Sites are illustrated on a separate coverage (Plate #2), thereby easily delineating between the HRR sites that require further action and progress made toward Site remediation. In addition, because of the complex nature of the original and new process waste transfer systems (IHSS 121 and PAC 000-504, respectively) and associated IHSSs resulting from these lines, an additional map (Plate #3) illustrates these areas on a separate coverage. Plate #3 was revised in FY00 to show areas of known or suspected leaks within the waste transfer system piping, and specific line section numbers. This plate also identifies the type of material used for piping, results of pressure tests, and whether the pipe is to be removed, has been removed, is to be abandoned in place, or whether it never existed (that is, field activities indicate the pipe is not present as shown on drawings). Several upgrades were made relevant to the process waste line coverage during this reporting period. The PAC and UBC Site map (Plate #4) is consistent with past HRR Update Reports and shows PAC and UBC Sites that require further investigation.

## 1.3 Summary

This report is intended to provide a comprehensive compilation of historical information updated to reflect present conditions and response actions at RFETS with regard to environmental releases or significant events. It is not the intention of this Annual Update or past updates to change or amend researched information in the original HRR, but rather to provide additional facts for specific areas as they become available.

## 1.4 References

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Golden, Colorado, June.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, April 15.

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DOE, EPA, and CDPHE, 1996, Rocky Flats Cleanup Agreement, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

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# SECTION 2.0
# REVISED PAC NARRATIVES

*Note that all acronyms used in the following narratives are defined in the Abbreviations, Acronyms, and Initialisms list beginning on page v.*

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## PAC REFERENCE NUMBER: SE-142.10

IHSS Reference Number: 142.10

Operable Unit: Buffer Zone

IHSS Group: NE-1

Unit Name: Retention Pond C-1

Approximate Location: N747,000; E2,088,000

Date(s) of Operation or Occurrence

1955 - Present

Description of Operation or Occurrence

Individual Hazardous Substance Site (IHSS) 142.10 (Potential Area of Concern [PAC] SE-142.10) (Pond C-1) at the Rocky Flats Environmental Technology Site (RFETS or Site). Pond C-1 was constructed in 1955 to provide temporary holding and monitoring of Woman Creek waters, including discharge from Ponds 6, 7, and 8. (Pond C-1 was also referred to as Pond 9 prior to the early 1970s.) The first discharge from Pond C-1 was observed on March 29, 1955. Figure 2.1 shows the location of Pond C-1 (IHSS-142.10).

Ponds 6, 7, and 8 were located adjacent to Woman Creek upstream from Pond C-1. Pond 6 (PAC SW-196) received water treatment plant backwash, Pond 7 (PAC SE-1600) received steam condensate from the Building 881 cooling towers and could have received sewage lift station overflows, and Pond 8 (PAC SE-1601) probably received Building 881 cooling tower overflow/blowdown. See Historical Release Report (HRR) descriptions for PACs SW-196, SE-1600, SE-1601.1, and SE-1601.2 for a more complete discussion of these ponds (DOE 1992). It is believed that Pond 6 was a multipurpose pond, given that the following materials were placed in the pond in October 1954: ashes from the Plant incinerator, graphite, used caustic drums, and general trash. Pond 6 is currently filled in and is located within the boundaries of the Original Landfill. Pond 6 is being addressed as part of the Original Landfill Interim Measure/Interim Remedial Action (IM/IRA). Ponds 7 and 8 (PACs SE-1600 and –SE-1601) were approved for No Further Accelerated Action (NFAA) in 2002. Ponds 6, 7, and 8 no longer exist and never received an alphanumeric designation like Pond 9 (now Pond C-1). The numeric pond numbering system at RFETS was replaced by an alphanumeric system in the early 1970s.

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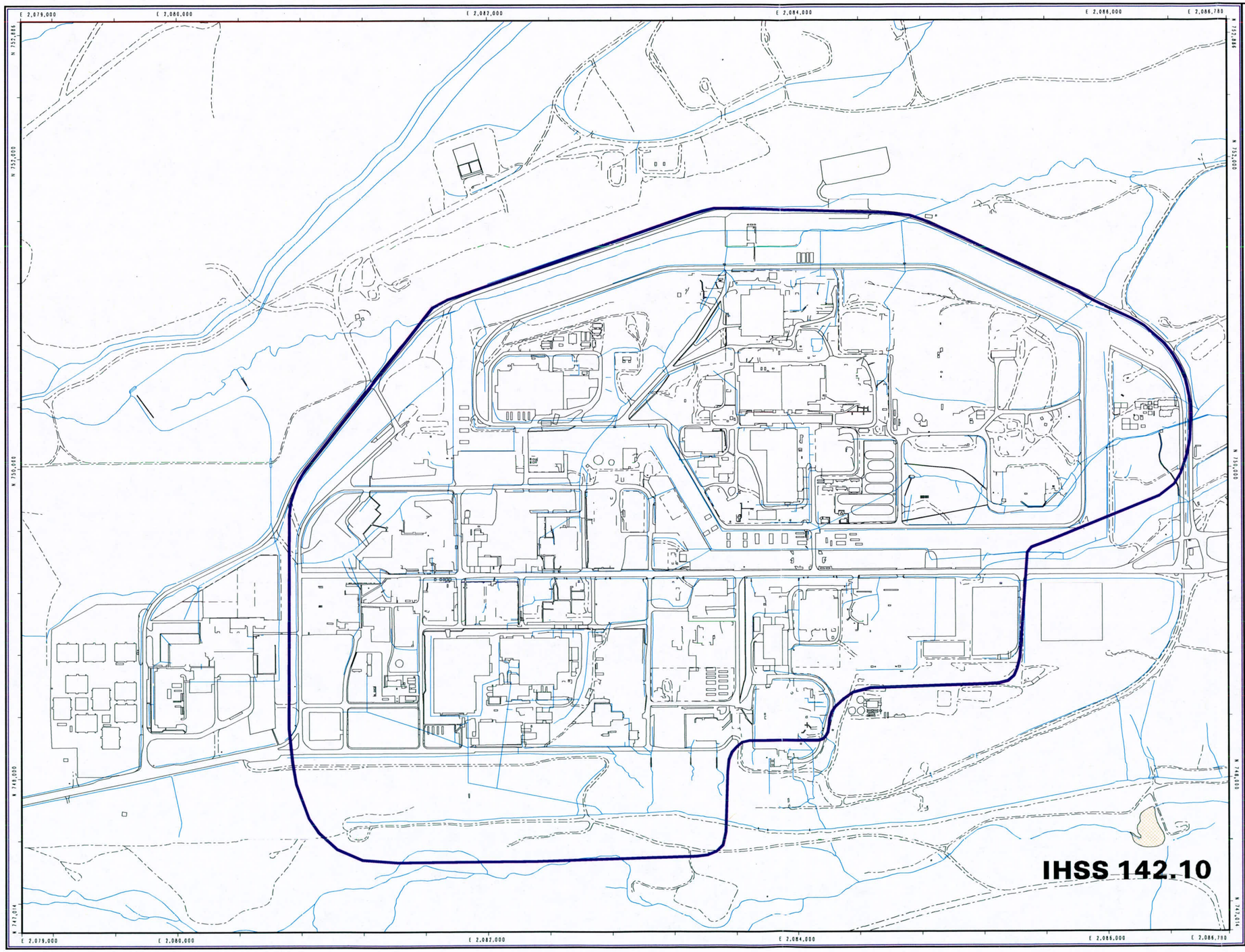
# Figure 2.1
## IHSS 142.10 Location




**EXPLANATION**

- IHSS 142.10

**Standard Map Features**

- Buildings and other structures
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- Industrial Area Operable Unit Boundary

*DATA SOURCE BASE FEATURES:*
*IHSs*
*Historical Release Report (HRR)*
*2nd Annual Update*
*Sept. 30, 1997*
*Individual Hazardous Substance Sites (IHSS)*
*DOE, 1992, HRR Report and Subsequent Updates.*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.*
*Digitized from the orthophotographs. 1/95*

Scale = 1 : 7580
1 inch represents approximately 632 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER-HILL

October 05, 2004

NT_Sv: w:/projects/fy2004/04-0121/ihss_142-10_f2-1_location.aml

The South Interceptor Ditch (SID) was constructed in 1979 to reroute runoff from the southern portions of the RFETS main manufacturing area to Pond C-2 (PAC SE-142.11). Water from the SID is the only input to Pond C-2, allowing Pond C-2 to serve as a surface water retention and spill control pond. Woman Creek flow enters Pond C-1, which serves as a flow-through temporary detention pond. Discharges from Pond C-1 are routed around Pond C-2 and back into the natural Woman Creek channel (DOE 1992).

Problems or releases that are known to have occurred in Woman Creek, as summarized in the HRR (DOE 1992), are as follows.

- Sanitary sewer overflow and discharge of untreated sanitary sewage were released to Woman Creek. Discharges ceased on February 21, 1955.
- A release of 2,700 gallons of steam condensate from Building 881 to Pond 7 occurred due to a break in the process waste line leading to Building 774. The break occurred on September 27, 1955.
- Pond C-1, its drainage, and the general area near Pond C-1 (and Pond C-2) may have been impacted by resuspended soil and runoff from the 903 Pad area (PACs 900-112 and 900-155).
- An armored vehicle turned over into Woman Creek upstream of Pond C-1 on October 19, 1975 (PAC SW-1700). An oil slick was observed on the C-Series drainage west of the clay pits during the week of October 20, 1975. This oil slick was not observed at Pond C-1 or where the C-Series drainage passed beneath Indiana Street. The source of this oil slick is believed to be from the overturned vehicle (PAC SW-1700).
- Leakage from the SID Ditch to Woman Creek near the outfall of the Building 881 footing drain was observed during the week ending March 12, 1982. Repairs to the SID were requested. It is unknown whether repairs were made at that time; however, it is known that sloughing in the Building 881 area of the ditch had greatly reduced its capacity, and, accordingly, temporary sandbags were placed along the embankments in the early 1990s to provide for additional capacity.

Physical/Chemical Description of Constituents Released

Monitoring of effluent discharged off site from the Woman Creek drainage has routinely taken place since the first discharge from Pond C-1. In 1955, these analyses consisted of daily composite samples for pH, nitrate, and radionuclide activity, with a detailed mineral analysis on a monthly composite. More recently, the analytes that have been monitored in off site discharges from the C-Series drainage have consisted of pH, nitrate as nitrogen, and nonvolatile suspended solids. Pond C-1 sediments are known to contain low levels of plutonium, americium, and uranium contamination (DOE 1992).

Some data are available on the characteristics of the backwash and sludge blowdown waters from the water treatment plant. The 1953 data indicate that the water discharged from the water

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treatment plant was very turbid, slightly basic, and had a slightly higher concentration of dissolved chemicals than the raw water treated by the water treatment plant (DOE 1992).

Responses to Operation or Occurrence

Discharges of cooling tower wastes (Building 881 steam condensate and overflow/blowdown) to Woman Creek ceased when the Plant operators directed these flows to the sanitary wastewater treatment system. This rerouting of flows probably occurred in the mid-1970s (DOE 1992).

The water treatment plant backwash waters were discharged to the Woman Creek drainage until a sludge drying bed system was installed for these waters at the water treatment plant. This recycling system was probably installed in the mid-1970s (DOE 1992).

Fate of Constituents Released to Environment

Pond C-1 has been characterized based on sediment data collected for the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) for the Woman Creek Priority Drainage (Operable Unit [OU] 5) (DOE 1996a), sediment data collected in accordance with the Sampling and Analysis Plan for Characterization of Pond C-1 (IHSS 142.10),[1] and surface water data collected by the Site operators from 1991 through 1996. Figure 2.2 shows the sampling locations, and Table 2.1 summarizes the sampling and analysis program. Sediment samples were analyzed for metals, radionuclides, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs) and water quality parameters (WQPs). Surface water samples were analyzed for all analytical suites except PCBs. Although PCBs were not analyzed in surface water, they are relatively insoluble, and there are no Rocky Flats Cleanup Agreement (RFCA) Attachment 5 surface water action levels (ALs) for PCBs (DOE et al. 2003). Surface water was sampled frequently between 1991 and 1996 for total radionuclides. In 1991, several samples were collected for dissolved radionuclides, and total and dissolved metals, as well as organics. Surface water sampling and analysis for Pond C-1 ceased after 1996 in accordance with the Integrated Monitoring Plan (IMP) (DOE 1997).

The sediment and surface water data are summarized in Tables 2.2 and 2.3, respectively. These tables present analytes that were detected above background (see discussion below). In these tables, the following decision rules were applied to the calculation of summary statistics:

- Data rejected during validation were eliminated from the data set before computing statistics.

[1] Samples (CR- series) were collected by URS to characterize the Pond C-1 sediments in the event that excavation and disposal of sediments were required for the final disposition of the pond. Samples were analyzed for radionuclides (gamma spectrometry) and metals (x-ray fluorescence [SW-846 Method 6200]).

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- The maximum value was the highest detected value observed.

## Table 2.1
## Pond C-1 Analytical Program

| Location Code | Sample Type | Start Depth (ft) | End Depth ft) | ANALYTE CLASS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Rads | Diss Rads | Tot Metals | Diss Metals | VOCs | SVOCs | Pesticides | PCBs | Herbicides | Dioxins | WQPs |
| C1 | SED | 0 | 0.5 | | | | | | | X | X | | | X |
| GR31-000 | SED | 0 | 0.5 | X | | X | | | | | | | | |
| GR31-001 | SED | 0 | 0.5 | X | | X | | | | | | | | |
| GR31-002 | SED | 0 | 0.5 | X | | X | | | | | | | | |
| GR31-003 | SED | 0 | 0.5 | X | | X | | | | | | | | |
| GR32-001 | SED | 0 | 1* | X | | X | | X | X | | | | | |
| SED509 | SED | 0 | 0.83 | X | | X | | X | X | | | | | X |
| SED509 | SED | 0.5 | 1 | X | | | | | | | | | | |
| SED510 | SED | 0 | 0.92 | X | | X | | X | X | X | X | | | X |
| SED510 | SED | 0.5 | 1 | X | | | | | | | | | | |
| GR31-000 | SED | 0.5 | 1.5 | X | | X | | | | | | | | |
| GR31-000 | SED | 1.5 | 2.5* | X | | X | | | | | | | | |
| GR31-001 | SED | 0.5 | 1.5 | X | | X | | | | | | | | |
| GR31-001 | SED | 1.5 | 2* | X | | X | | | | | | | | |
| C1 | SW | | | X[1] | X[2] | X[2] | X[2] | X[2] | X[2] | X[2] | | X[2] | X[2] | X[2] |

[1] More than 100 samples were collected between 1991 and 1996.
[2] Less than 15 samples were collected, all in 1991.

* Sampling field notes indicate the end depth is at the base of the sediments.

## Table 2.2
## Summary of Sediment Contamination at Pond C-1

| Analyte | Total Number of Samples Analyzed | Detection Frequency | Average Concentration | Maximum Concentration | Background Mean Plus 2SD | Wildlife Refuge Worker Action Level | Unit |
|---|---|---|---|---|---|---|---|
| Arsenic | 11 | 55% | 10.8 | 14.5 | 7.24 | 22.2 | mg/kg |
| Barium | 11 | 100% | 690.8 | 880 | 188.17 | 26400 | mg/kg |
| Benzoic Acid | 3 | 67% | 300.0 | 410 | - | 1000000000 | ug/kg |
| Chromium | 11 | 82% | 40.5 | 45.3 | 23.23 | 268 | mg/kg |
| Copper | 11 | 91% | 54.1 | 83.5 | 27.27 | 40900 | mg/kg |
| Di-n-butylphthalate | 2 | 50% | 110.0 | 110 | - | 73700000 | ug/kg |
| Iron | 11 | 91% | 35710.0 | 43400 | 21379.01 | 307000 | mg/kg |
| Manganese | 11 | 18% | 747.0 | 749 | 659.22 | 3480 | mg/kg |
| Mercury | 2 | 100% | 1.5 | 1.6 | 0.34 | 25200 | mg/kg |
| Naphthalene | 3 | 33% | 2.0 | 2 | - | 3090000 | ug/kg |
| Nickel | 11 | 91% | 39.4 | 49.4 | 17.89 | 20400 | mg/kg |
| Nitrite | 2 | 100% | 1.2 | 1.3 | 0.72 | 102000 | mg/kg |
| Plutonium-239/240 | 13 | 8% | 1.4 | 1.4 | 1.35 | 50 | pCi/g |
| Selenium | 10 | 60% | 2.8 | 3.93 | 1.55 | 5110 | mg/kg |
| Strontium | 11 | 73% | 255.3 | 378 | 201.44 | 613000 | mg/kg |
| Tetrachloroethene | 2 | 50% | 1.0 | 1 | - | 615000 | ug/kg |
| Toluene | 3 | 67% | 450.0 | 520 | - | 31300000 | ug/kg |
| Uranium-234 | 13 | 62% | 8.2 | 13 | 3.98 | 300 | pCi/g |
| Uranium-235 | 13 | 62% | 0.5 | 0.59 | 0.15 | 8 | pCi/g |
| Uranium-238 | 13 | 69% | 7.7 | 13 | 3.46 | 351 | pCi/g |
| Vanadium | 11 | 82% | 147.6 | 198 | 46.83 | 7150 | mg/kg |
| Zinc | 11 | 91% | 139.5 | 176 | 104.4 | 307000 | mg/kg |
| | Above the Wildlife Refuge Worker Action Level | | | | | | |

## Table 2.3
## Summary of Chemicals Above Background in Pond C-1 Surface Water

| Analyte | Total Number of Samples Analyzed | Detection Frequency | Maximum Concentration | Surface Water Action Level | Unit |
|---|---|---|---|---|---|
| Acetone | 7 | 29% | 45 | 3650 | ug/L |
| Americium-241 | 261 | 6% | 2.565 | 0.15 | pCi/L |
| Barium | 13 | 8% | 0.132 | 0.490 | mg/L |
| bis(2-Ethylhexyl)phthalate | 10 | 20% | 1 | 1.8 | ug/L |
| Diethylphthalate | 10 | 10% | 2 | 5600 | ug/L |
| Methylene chloride | 17 | 12% | 18 | 4.7 | ug/L |
| Nitrite | 31 | 10% | 0.14 | 0.5 | mg/L |
| Plutonium-239/240 | 277 | 13% | 0.23 | 0.15 | pCi/L |
| Tritium | 295 | 2 | 941 | 20,000 | pCi/L |
| Uranium-total | 218 | 15% | 331.9 | 11 | pCi/L |
| | Above the Surface Water Action Level | | | | |

# Figure 2.2
## IHSS 142.10
## Sampling Locations

**EXPLANATION**

IHSS 142.10

**Standard Map Features**

Streams, ditches, or other drainage features

Fences and other barriers

Dirt roads

*DATA SOURCE BASE FEATURES:*
*PACs:*
*Historical Release Report (HRR)*
*2nd Annual Update*
*Sept. 30, 1997*
*Individual Hazardous Substance Sites (IHSS)*
*DOE, 1992, HRR Report and Subsequent Updates.*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.*
*Digitized from the orthophotographs, 1/95*

Scale = 1 : 890
1 inch represents approximately 74 feet

25 0 50 100ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: KAISER-HILL COMPANY

Prepared for: KAISER-HILL COMPANY

October 05, 2004

N:_Svr w:/projects/fy2004/04-0121/ihss_142-10_f2-2_sample_location.aml

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| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0.5 | 1.5 | FT | Arsenic | 14.5 | mg/kg | 22.2 | 21.6 | 7.24 |
| 1.5 | 2 | FT | Arsenic | 12.9 | mg/kg | 22.2 | 21.6 | 7.24 |
| 0 | 0.5 | FT | Barium | 857 | mg/kg | 26400 | - | 188.17 |
| 0.5 | 1.5 | FT | Barium | 757 | mg/kg | 26400 | - | 188.17 |
| 1.5 | 2 | FT | Barium | 754 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.5 | FT | Chromium | 45.3 | mg/kg | 268 | - | 23.23 |
| 0.5 | 1.5 | FT | Chromium | 36.6 | mg/kg | 268 | - | 23.23 |
| 1.5 | 2 | FT | Chromium | 40.2 | mg/kg | 268 | - | 23.23 |
| 0 | 0.5 | FT | Copper | 71 | mg/kg | 40900 | - | 27.27 |
| 0.5 | 1.5 | FT | Copper | 59.3 | mg/kg | 40900 | - | 27.27 |
| 1.5 | 2 | FT | Copper | 47 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.5 | FT | Iron | 36800 | mg/kg | 307000 | - | 21379.01 |
| 0.5 | 1.5 | FT | Iron | 36100 | mg/kg | 307000 | - | 21379.01 |
| 1.5 | 2 | FT | Iron | 34800 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.5 | FT | Nickel | 39.2 | mg/kg | 20400 | - | 17.89 |
| 0.5 | 1.5 | FT | Nickel | 46 | mg/kg | 20400 | - | 17.89 |
| 1.5 | 2 | FT | Nickel | 41.2 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.5 | FT | Selenium | 3.93 | mg/kg | 5110 | - | 1.55 |
| 0.5 | 1.5 | FT | Selenium | 1.82 | mg/kg | 5110 | - | 1.55 |
| 0 | 0.5 | FT | Strontium | 368 | mg/kg | 613000 | - | 201.44 |
| 0.5 | 1.5 | FT | Strontium | 205 | mg/kg | 613000 | - | 201.44 |
| 1.5 | 2 | FT | Strontium | 207 | mg/kg | 613000 | - | 201.44 |
| 0 | 0.5 | FT | Uranium-234 | 8.9 | pCi/g | 300 | 1800 | 3.98 |
| 0.5 | 1.5 | FT | Uranium-234 | 11 | pCi/g | 300 | 1800 | 3.98 |
| 1.5 | 2 | FT | Uranium-234 | 5.7 | pCi/g | 300 | 1800 | 3.98 |
| 0 | 0.5 | FT | Uranium-235 | 0.48 | pCi/g | 8 | 1900 | 0.15 |
| 0.5 | 1.5 | FT | Uranium-235 | 0.5 | pCi/g | 8 | 1900 | 0.15 |
| 1.5 | 2 | FT | Uranium-235 | 0.47 | pCi/g | 8 | 1900 | 0.15 |
| 0 | 0.5 | FT | Uranium-238 | 8.9 | pCi/g | 351 | 1600 | 3.46 |
| 0.5 | 1.5 | FT | Uranium-238 | 11 | pCi/g | 351 | 1600 | 3.46 |
| 1.5 | 2 | FT | Uranium-238 | 5.7 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 0.5 | FT | Vanadium | 147 | mg/kg | 7150 | 433 | 46.83 |
| 0.5 | 1.5 | FT | Vanadium | 150 | mg/kg | 7150 | 433 | 46.83 |
| 1.5 | 2 | FT | Vanadium | 155 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 0.5 | FT | Zinc | 152 | mg/kg | 307000 | - | 104.4 |
| 0.5 | 1.5 | FT | Zinc | 157 | mg/kg | 307000 | - | 104.4 |
| 1.5 | 2 | FT | Zinc | 135 | mg/kg | 307000 | - | 104.4 |

| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | FT | Arsenic | 9.35 | mg/kg | 22.2 | 21.6 | 7.24 |
| 0 | 1 | FT | Barium | 754 | mg/kg | 26400 | - | 188.17 |
| 0 | 1 | FT | Chromium | 41.4 | mg/kg | 268 | - | 23.23 |
| 0 | 1 | FT | Copper | 46 | mg/kg | 40900 | - | 27.27 |
| 0 | 1 | FT | Iron | 34200 | mg/kg | 307000 | - | 21379.01 |
| 0 | 1 | FT | Naphthalene | 2 | ug/kg | 3090000 | - | - |
| 0 | 1 | FT | Nickel | 41.5 | mg/kg | 20400 | - | 17.89 |
| 0 | 1 | FT | Tetrachloroethene | 1 | ug/kg | 615000 | 37500 | - |
| 0 | 1 | FT | Uranium-235 | 0.27 | pCi/g | 8 | 1900 | 0.15 |
| 0 | 1 | FT | Uranium-238 | 3.8 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 1 | FT | Vanadium | 156 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 1 | FT | Zinc | 121 | mg/kg | 307000 | - | 104.4 |
| 0 | 0.5 | FT | Barium | 769 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.5 | FT | Chromium | 41.6 | mg/kg | 268 | - | 23.23 |
| 0 | 0.5 | FT | Copper | 54.1 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.5 | FT | Iron | 36000 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.5 | FT | Manganese | 1200 | mg/kg | 3480 | - | 659.22 |
| 0 | 0.5 | FT | Nickel | 34.3 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.5 | FT | Selenium | 1.77 | mg/kg | 5110 | - | 1.55 |
| 0 | 0.5 | FT | Strontium | 214 | mg/kg | 613000 | - | 201.44 |
| 0 | 0.5 | FT | Uranium-234 | 4.3 | pCi/g | 300 | 1800 | 3.98 |
| 0 | 0.5 | FT | Uranium-235 | 0.2 | pCi/g | 8 | 1900 | 0.15 |
| 0 | 0.5 | FT | Uranium-238 | 4.3 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 0.5 | FT | Vanadium | 137 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 0.5 | FT | Zinc | 108 | mg/kg | 307000 | - | 104.4 |

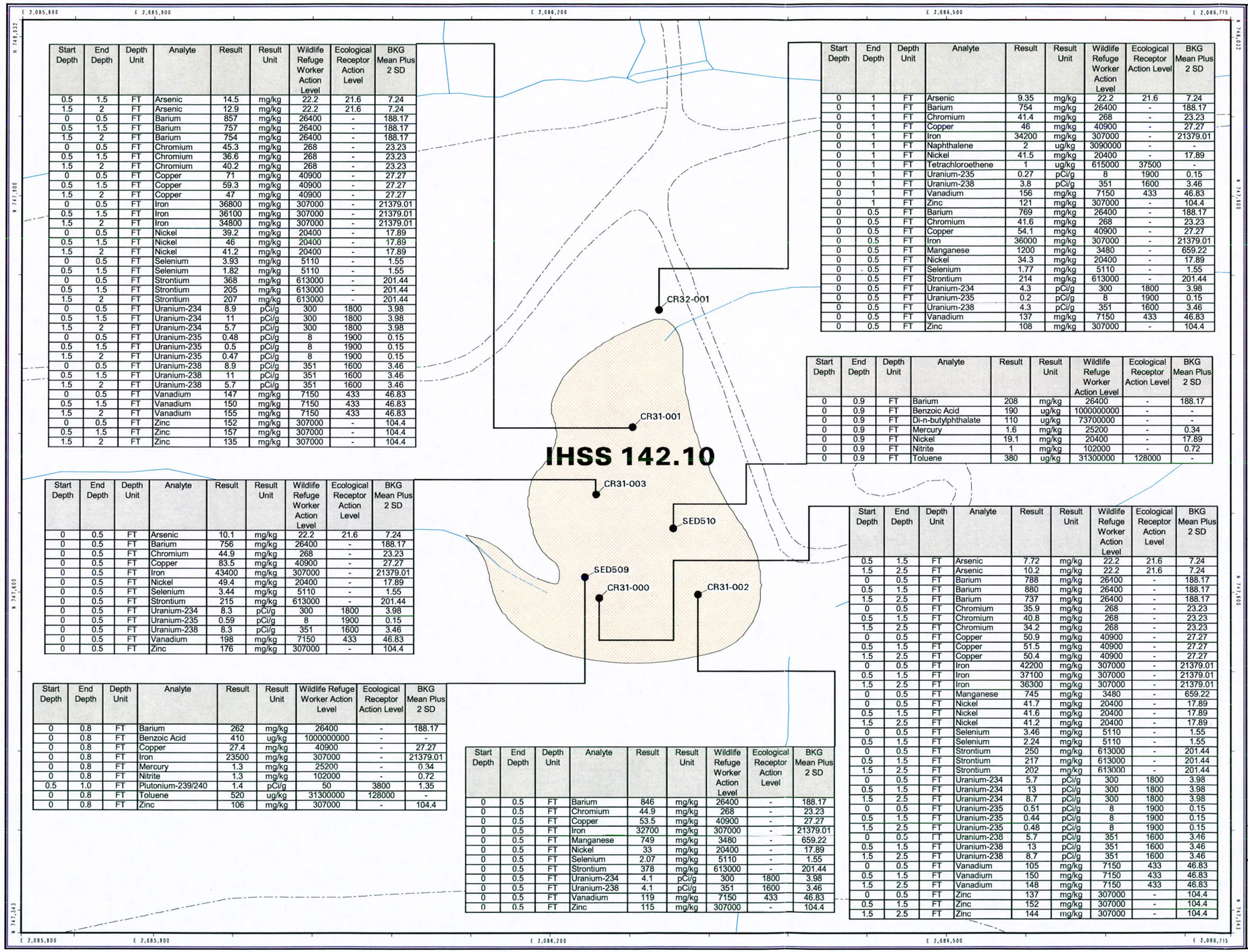
| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.9 | FT | Barium | 208 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.9 | FT | Benzoic Acid | 190 | ug/kg | 1000000000 | - | - |
| 0 | 0.9 | FT | Di-n-butylphthalate | 110 | ug/kg | 73700000 | - | - |
| 0 | 0.9 | FT | Mercury | 1.6 | mg/kg | 25200 | - | 0.34 |
| 0 | 0.9 | FT | Nickel | 19.1 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.9 | FT | Nitrite | 1 | mg/kg | 102000 | - | 0.72 |
| 0 | 0.9 | FT | Toluene | 380 | ug/kg | 31300000 | 128000 | - |

| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.5 | FT | Arsenic | 10.1 | mg/kg | 22.2 | 21.6 | 7.24 |
| 0 | 0.5 | FT | Barium | 756 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.5 | FT | Chromium | 44.9 | mg/kg | 268 | - | 23.23 |
| 0 | 0.5 | FT | Copper | 83.5 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.5 | FT | Iron | 43400 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.5 | FT | Nickel | 49.4 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.5 | FT | Selenium | 3.44 | mg/kg | 5110 | - | 1.55 |
| 0 | 0.5 | FT | Strontium | 215 | mg/kg | 613000 | - | 201.44 |
| 0 | 0.5 | FT | Uranium-234 | 8.3 | pCi/g | 300 | 1800 | 3.98 |
| 0 | 0.5 | FT | Uranium-235 | 0.59 | pCi/g | 8 | 1900 | 0.15 |
| 0 | 0.5 | FT | Uranium-238 | 8.3 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 0.5 | FT | Vanadium | 198 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 0.5 | FT | Zinc | 176 | mg/kg | 307000 | - | 104.4 |

| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.8 | FT | Barium | 262 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.8 | FT | Benzoic Acid | 410 | ug/kg | 1000000000 | - | - |
| 0 | 0.8 | FT | Copper | 27.4 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.8 | FT | Iron | 23500 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.8 | FT | Mercury | 1.3 | mg/kg | 25200 | - | 0.34 |
| 0 | 0.8 | FT | Nitrite | 1.3 | mg/kg | 102000 | - | 0.72 |
| 0.5 | 1.0 | FT | Plutonium-239/240 | 1.4 | pCi/g | 50 | 3800 | 1.35 |
| 0 | 0.8 | FT | Toluene | 520 | ug/kg | 31300000 | 128000 | - |
| 0 | 0.8 | FT | Zinc | 106 | mg/kg | 307000 | - | 104.4 |

| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.5 | FT | Barium | 846 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.5 | FT | Chromium | 44.9 | mg/kg | 268 | - | 23.23 |
| 0 | 0.5 | FT | Copper | 53.5 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.5 | FT | Iron | 32700 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.5 | FT | Manganese | 749 | mg/kg | 3480 | - | 659.22 |
| 0 | 0.5 | FT | Nickel | 33 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.5 | FT | Selenium | 2.07 | mg/kg | 5110 | - | 1.55 |
| 0 | 0.5 | FT | Strontium | 378 | mg/kg | 613000 | - | 201.44 |
| 0 | 0.5 | FT | Uranium-234 | 4.1 | pCi/g | 300 | 1800 | 3.98 |
| 0 | 0.5 | FT | Uranium-238 | 4.1 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 0.5 | FT | Vanadium | 119 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 0.5 | FT | Zinc | 115 | mg/kg | 307000 | - | 104.4 |

| Start Depth | End Depth | Depth Unit | Analyte | Result | Result Unit | Wildlife Refuge Worker Action Level | Ecological Receptor Action Level | BKG Mean Plus 2 SD |
|---|---|---|---|---|---|---|---|---|
| 0.5 | 1.5 | FT | Arsenic | 7.72 | mg/kg | 22.2 | 21.6 | 7.24 |
| 1.5 | 2.5 | FT | Arsenic | 10.2 | mg/kg | 22.2 | 21.6 | 7.24 |
| 0 | 0.5 | FT | Barium | 788 | mg/kg | 26400 | - | 188.17 |
| 0.5 | 1.5 | FT | Barium | 880 | mg/kg | 26400 | - | 188.17 |
| 1.5 | 2.5 | FT | Barium | 737 | mg/kg | 26400 | - | 188.17 |
| 0 | 0.5 | FT | Chromium | 35.9 | mg/kg | 268 | - | 23.23 |
| 0.5 | 1.5 | FT | Chromium | 40.8 | mg/kg | 268 | - | 23.23 |
| 1.5 | 2.5 | FT | Chromium | 34.2 | mg/kg | 268 | - | 23.23 |
| 0 | 0.5 | FT | Copper | 50.9 | mg/kg | 40900 | - | 27.27 |
| 0.5 | 1.5 | FT | Copper | 51.5 | mg/kg | 40900 | - | 27.27 |
| 1.5 | 2.5 | FT | Copper | 50.4 | mg/kg | 40900 | - | 27.27 |
| 0 | 0.5 | FT | Iron | 42200 | mg/kg | 307000 | - | 21379.01 |
| 0.5 | 1.5 | FT | Iron | 37100 | mg/kg | 307000 | - | 21379.01 |
| 1.5 | 2.5 | FT | Iron | 36300 | mg/kg | 307000 | - | 21379.01 |
| 0 | 0.5 | FT | Manganese | 745 | mg/kg | 3480 | - | 659.22 |
| 0 | 0.5 | FT | Nickel | 41.7 | mg/kg | 20400 | - | 17.89 |
| 0.5 | 1.5 | FT | Nickel | 41.6 | mg/kg | 20400 | - | 17.89 |
| 1.5 | 2.5 | FT | Nickel | 41.2 | mg/kg | 20400 | - | 17.89 |
| 0 | 0.5 | FT | Selenium | 3.46 | mg/kg | 5110 | - | 1.55 |
| 0.5 | 1.5 | FT | Selenium | 2.24 | mg/kg | 5110 | - | 1.55 |
| 0 | 0.5 | FT | Strontium | 250 | mg/kg | 613000 | - | 201.44 |
| 0.5 | 1.5 | FT | Strontium | 217 | mg/kg | 613000 | - | 201.44 |
| 1.5 | 2.5 | FT | Strontium | 202 | mg/kg | 613000 | - | 201.44 |
| 0 | 0.5 | FT | Uranium-234 | 5.7 | pCi/g | 300 | 1800 | 3.98 |
| 0.5 | 1.5 | FT | Uranium-234 | 13 | pCi/g | 300 | 1800 | 3.98 |
| 1.5 | 2.5 | FT | Uranium-234 | 8.7 | pCi/g | 300 | 1800 | 3.98 |
| 0 | 0.5 | FT | Uranium-235 | 0.51 | pCi/g | 8 | 1900 | 0.15 |
| 0.5 | 1.5 | FT | Uranium-235 | 0.44 | pCi/g | 8 | 1900 | 0.15 |
| 1.5 | 2.5 | FT | Uranium-235 | 0.48 | pCi/g | 8 | 1900 | 0.15 |
| 0 | 0.5 | FT | Uranium-238 | 5.7 | pCi/g | 351 | 1600 | 3.46 |
| 0.5 | 1.5 | FT | Uranium-238 | 13 | pCi/g | 351 | 1600 | 3.46 |
| 1.5 | 2.5 | FT | Uranium-238 | 8.7 | pCi/g | 351 | 1600 | 3.46 |
| 0 | 0.5 | FT | Vanadium | 105 | mg/kg | 7150 | 433 | 46.83 |
| 0.5 | 1.5 | FT | Vanadium | 150 | mg/kg | 7150 | 433 | 46.83 |
| 1.5 | 2.5 | FT | Vanadium | 148 | mg/kg | 7150 | 433 | 46.83 |
| 0 | 0.5 | FT | Zinc | 137 | mg/kg | 307000 | - | 104.4 |
| 0.5 | 1.5 | FT | Zinc | 152 | mg/kg | 307000 | - | 104.4 |
| 1.5 | 2.5 | FT | Zinc | 144 | mg/kg | 307000 | - | 104.4 |




# Figure 2.3
## IHSS 142.10 Sediment Distribution of Constituents Above Background

**EXPLANATION**

IHSS 142.10

**Standard Map Features**

Streams, ditches, or other drainage features

Fences and other barriers

Dirt roads

*DATA SOURCE BASE FEATURES:*
*PACs*
*Historical Release Report (HRR)*
*2nd Annual Update*
*Sept. 30, 1987*
*Individual Hazardous Substance Sites (IHSS)*
*DOE, 1992, HRR Report and Subsequent Updates.*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.*
*Digitized from the orthophotographs, 1/95*

Scale = 1 : 890
1 inch represents approximately 74 feet

25 0 50 100ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER-HILL

October 05, 2004

NT_Svr w:/projects/fy2004/04-0121/ihss_142-10_f2-3_sediment_cont_dist.aml

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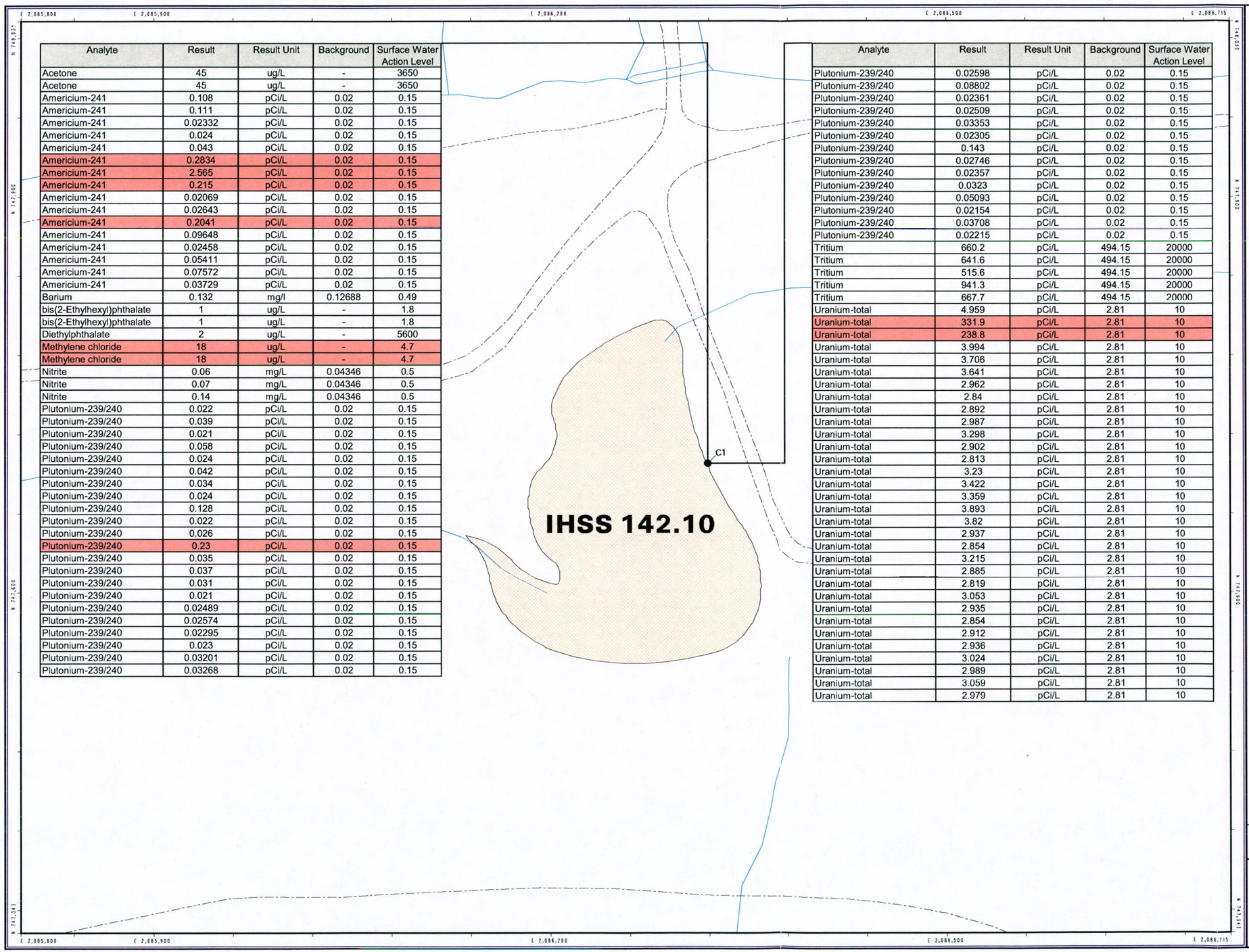
| Analyte | Result | Result Unit | Background | Surface Water Action Level |
|---|---|---|---|---|
| Acetone | 45 | ug/L | - | 3650 |
| Acetone | 45 | ug/L | - | 3650 |
| Americium-241 | 0.108 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.111 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.02332 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.024 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.043 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.2834 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 2.565 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.215 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.02069 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.02643 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.2041 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.09648 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.02458 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.05411 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.07572 | pCi/L | 0.02 | 0.15 |
| Americium-241 | 0.03729 | pCi/L | 0.02 | 0.15 |
| Barium | 0.132 | mg/l | 0.12688 | 0.49 |
| bis(2-Ethylhexyl)phthalate | 1 | ug/L | - | 1.8 |
| bis(2-Ethylhexyl)phthalate | 1 | ug/L | - | 1.8 |
| Diethylphthalate | 2 | ug/L | - | 5600 |
| Methylene chloride | 18 | ug/L | - | 4.7 |
| Methylene chloride | 18 | ug/L | - | 4.7 |
| Nitrite | 0.06 | mg/L | 0.04346 | 0.5 |
| Nitrite | 0.07 | mg/L | 0.04346 | 0.5 |
| Nitrite | 0.14 | mg/L | 0.04346 | 0.5 |
| Plutonium-239/240 | 0.022 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.039 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.021 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.058 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.024 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.042 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.034 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.024 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.128 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.022 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.026 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.23 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.035 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.037 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.031 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.021 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02489 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02574 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02295 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.023 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.03201 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.03268 | pCi/L | 0.02 | 0.15 |

| Analyte | Result | Result Unit | Background | Surface Water Action Level |
|---|---|---|---|---|
| Plutonium-239/240 | 0.02598 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.08802 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02361 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02509 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.03353 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02305 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.143 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02746 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02357 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.0323 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.05093 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02154 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.03708 | pCi/L | 0.02 | 0.15 |
| Plutonium-239/240 | 0.02215 | pCi/L | 0.02 | 0.15 |
| Tritium | 660.2 | pCi/L | 494.15 | 20000 |
| Tritium | 641.6 | pCi/L | 494.15 | 20000 |
| Tritium | 515.6 | pCi/L | 494.15 | 20000 |
| Tritium | 941.3 | pCi/L | 494.15 | 20000 |
| Tritium | 667.7 | pCi/L | 494.15 | 20000 |
| Uranium-total | 4.959 | pCi/L | 2.81 | 10 |
| Uranium-total | 331.9 | pCi/L | 2.81 | 10 |
| Uranium-total | 238.8 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.994 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.706 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.641 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.962 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.84 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.892 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.987 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.298 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.902 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.813 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.23 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.422 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.359 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.893 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.82 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.937 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.854 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.215 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.885 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.819 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.053 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.935 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.854 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.912 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.936 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.024 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.989 | pCi/L | 2.81 | 10 |
| Uranium-total | 3.059 | pCi/L | 2.81 | 10 |
| Uranium-total | 2.979 | pCi/L | 2.81 | 10 |




# Figure 2.4

## IHSS 142.10 Surface Water Distribution of Constituents Above Background

**EXPLANATION**

IHSS 142.10

**Standard Map Features**

Streams, ditches, or other drainage features

Fences and other barriers

Dirt roads

*DATA SOURCE BASE FEATURES:*
*PACs*
*Historical Release Report (HRR)*
*2nd Annual Update*
*Sept. 30, 1997*
*Individual Hazardous Substance Sites (IHSS)*
*DOE, 1992, HRR Report and Subsequent Updates.*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.*
*Digitized from the orthophotographs. 1/95*

N

Scale = 1 : 890
1 inch represents approximately 74 feet

25 0 50 100ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER-HILL

October 05, 2004

NT_Svr w:/projects/fy2004/04-0121/ihss_142-10_f2-4_sw_cort_dist.aml

- The average was computed using only data that are above background concentrations.

Figures 2.3 and 2.4 present all the data for sediment and surface water, respectively, that were detected above background, and that have a RFCA AL (wildlife refuge worker [WRW] soil/sediment AL or surface water AL). The ALs are from RFCA Attachment 5, dated June 5, 2003 (DOE et al. 2003). Background levels for inorganic constituents for surface water and sediment are from the Background Geochemical Characterization Report (DOE 1993). All background values used for comparison are the mean background values plus two standard deviations. Any detection of an organic compound is considered an above-background-level observation.

Sediment Assessment

As shown in Table 2.2 and on Figure 2.3, the sediments in Pond C-1 contain above background concentrations of several metals, radionuclides, and nitrite. In addition, a few VOCs and SVOCs were detected. The inorganic constituent concentrations, although above background levels, were of the same order of magnitude as the background levels. Both the inorganic and organic constituent concentrations were well below the WRW ALs.

Application Of The Subsurface Soil Risk Screen

**Screen 1 – Are contaminant of concern (COC) concentrations below RFCA Attachment 5 Table 3 WRW Soil ALs?**

Yes. Subsurface soil concentrations do not exceed the WRW ALs (see Figure 2.3). In accordance with Figure 3 of RFCA Attachment 5, Screen 4 is performed next given a "yes" response to Screen 1.

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

No. Pond C-1 is a flow-through pond on Woman Creek and, therefore, erosion is a potentially significant pathway whereby surface water could become contaminated by the sediments. However, the concentrations of the constituents above background in the sediment are relatively low (Table 2.2 and Figure 2.3). The few organic compounds that were detected at low levels in the sediment have never been detected in Pond C-1 surface water (Tables 2.2 and 2.3).

Although the focus of Screen 4 is soil contamination and its potential to impact surface water, because IHSS 142.10 contains surface water some of the time, the quality of the water was examined. As shown on Figure 2.4, radionuclides and, to a much lesser extent, organics and nitrite have been detected above background levels in Pond C-1 water. Of the organics and nitrite, only methylene chloride was above the surface water AL. However, the two samples where methylene chloride concentrations were above the AL were the only detections of methylene chloride out of a total of 17 samples that were collected for VOC analysis. (All of these samples were collected in 1991, and no additional samples have been collected since that time for VOC analysis.) The concentrations were relatively low, and methylene chloride was

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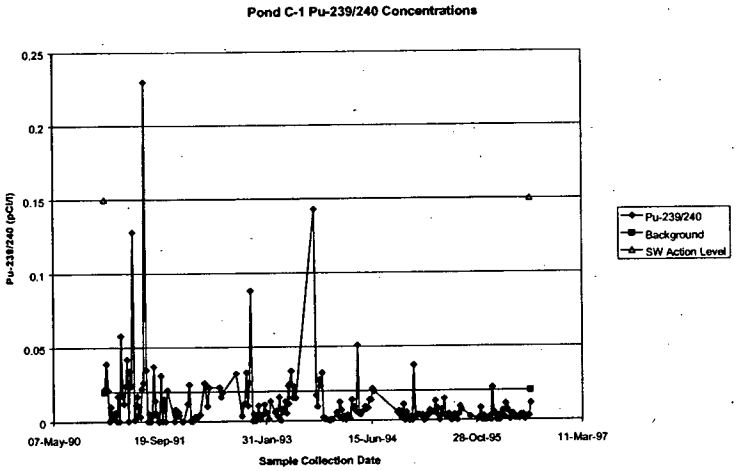
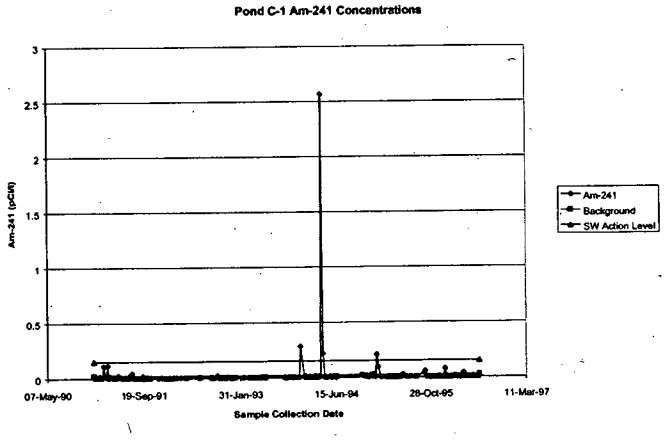
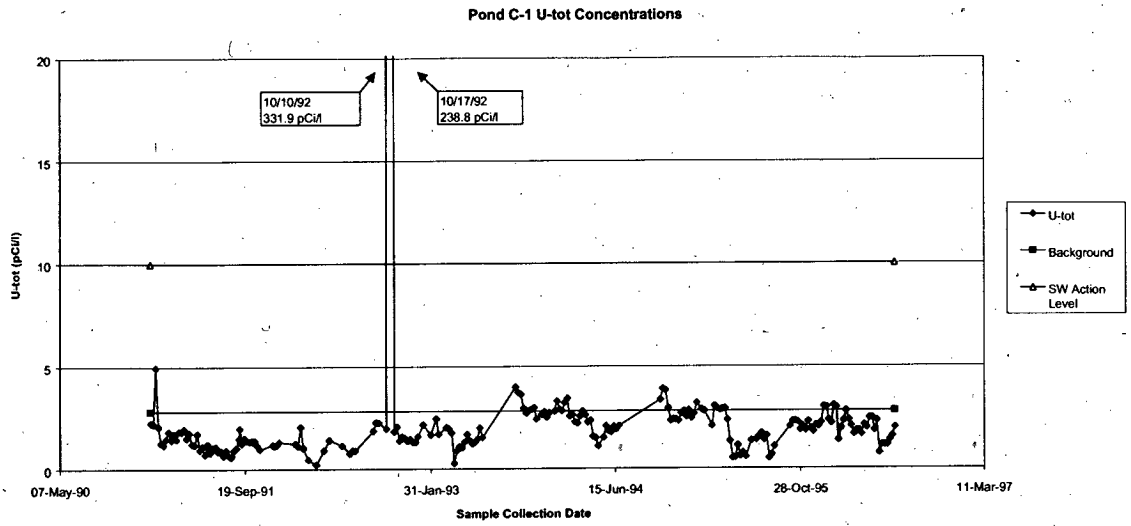
detected in the laboratory blanks. That is, the presence of methylene chloride in the surface water samples appears to be an artifact, because this compound is a common laboratory contaminant.

With respect to the radionuclides, Table 2.3 and Figure 2.4 indicate plutonium-239,240, americium-241, and uranium-total concentrations have been above background in Pond C-1 surface water samples, and occasionally above the surface water ALs. However, as shown in the following concentration versus time graphs, concentrations above the surface water ALs were very infrequent. Indeed, the data indicate that most of the radionuclide concentrations are below or only slightly above the background levels. This indicates the water is rarely impacted if at all (see discussion below).






In the cases where radionuclide concentrations are above the surface water ALs, replicate data for these samples recorded in the Soil Water Database (SWD) are at much lower concentrations below the surface water ALs (Table 2.4).[2] These replicate data are more representative of the balance of the data for these radionuclides in Pond C-1 surface water. Therefore, it is concluded that reported concentrations above the surface water ALs are suspect based on both the replicate data and the data as a whole.

As a final note regarding surface water quality, under RFCA, surface water compliance monitoring is conducted at several locations on Site, including where Woman Creek crosses Indiana Street. Pond C-1 is a flow-through retention basin and the water ultimately discharges off the Site in Woman Creek at Indiana Street (compliance monitoring station GS01) if there is adequate flow.[3] At GS01, plutonium and americium concentrations have been monitored since October 1996, total uranium concentrations since February 2003, and tritium concentrations from October 1996 through June 2003. (As of June 2003, tritium is no longer an analyte of interest [AoI].) The monitoring data (DOE 2000, 2001, 2002) indicate there have never been AoIs at concentrations above the surface water standards ("reportable values") based on 30-day running averages, which is the metric used for assessing compliance (DOE 1997).

[2] For surface water data recorded in SWD, approximately 10 percent of the data have multiple entries for a given sample and collection date. The figures in this document portray the highest concentration of these replicates. With few exceptions, the data are very similar in magnitude and SWD does not indicate that any of the replicate data have been rejected in the validation process or that some of the replicates are quality control samples. The replicate data shown in Table 4 are all valid results in SWD; however, in these cases, there is considerable variance in the replicate results.

[3] Flow in Woman Creek at Indiana Street is likely a mixture of Pond C-1 outflow and runoff from within the Woman Creek drainage downstream of Pond C-1.

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**Table 2.4**
**Replicate Surface Water Results Reported in SWD for Radionuclide Samples Exceeding the Action Level**

| Analyte | Sample Collection Date | Results (pCi/L) |
|---|---|---|
| Americium-241 | 12/11/93 | **0.2834**<br>0.01213<br>0.001329<br>0.001329 |
| | 4/2/94 | 0.00682<br>**2.565** |
| | 4/9/94 | **0.215**<br>0.002064<br>0.01384 |
| | 1/14/95 | -0.0002966<br>**0.2041** |
| Plutonium-239/240 | 7/15/91 | **0.23** |
| Uranium-total | 10/10/92 | **331.9**<br>2.2 |
| | 10/17/92 | **238.8**<br>1.9 |

Bold face indicates concentration exceeds the surface water AL.

NFAA Summary

IHSS 142.10 is proposed for NFAA. The Subsurface Soil Risk Screen (SSRS) and ALs in RFCA Attachment 5 (DOE et al. 2003) have been applied to the characterization data for this IHSS. The risk screen does not indicate that soil or sediment removal is necessary. Sediment contaminant concentrations are well below the WRW ALs. Data indicating concentrations above the surface water ALs appear to be suspect results. In addition, the monitoring data for GS01 on Woman Creek at Indiana Street indicate there have never been AoIs at concentrations above the surface water standards based on 30-day running averages, which is the metric used for assessing compliance. Therefore, it is concluded that NFAA is required at IHSS 142.10. Ecological effects will be evaluated in the Accelerated Action Ecological Screening Evaluation (AAESE) and the ecological portion of the Sitewide Comprehensive Risk Assessment (CRA). The final configuration for Pond C-1 is being determined by the U.S. Department of Energy (DOE), Kaiser-Hill Company, L.L.C., and the U.S. Fish and Wildlife Service.

After review of the NFAA justification by the regulatory agencies, DOE received concurrence from EPA (lead regulatory agency) of the NFAA status for IHSS 700-143 on June 17, 2004 (EPA 2004).

References

DOE, 1991, Final Phase I RFI/RI Work Plan, Rocky Flats Plant Woman Creek Priority Drainage (Operable Unit No. 5), Rocky Flats Plant, Golden, Colorado, October.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

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DOE, 1993, Background Geochemical Characterization Report, Golden, Colorado, September.

DOE, 1996a, Final Phase I RFI/RI Report Woman Creek Priority Drainage, Operable Unit 5, RF/ER-96-0012.UN, Rev 0. Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, 1996b, Final Rocky Flats Cleanup Agreement, U.S. Department of Energy, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE 1997, Integrated Monitoring Plan Background Document, Department of Energy, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2000, RFETS Automated Surface-Water Monitoring Report: Water Years 1997-2000, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2001, RFETS Automated Surface-Water Monitoring Report: Water Year 2001, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2002, RFETS Automated Surface-Water Monitoring Report: Water Year 2002, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, CDPHE, and EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

EPA, 2004, Correspondence to J. Legare, DOE RFO; from M. Aguilar; EPA, RE: No Further Accelerated Action Justification for Retention Pond C-1 (PAC Reference Number: SE-142.10, June 17, 2004.

## PAC REFERENCE NUMBER: SW-133.5

IHSS Number: SW-133.5

Operable Unit: 5

IHSS Group: SW-1

Unit Name: Incinerator Facility

Approximate Location: N747,500; E2,079,500

Date(s) of Operation or Occurrence

1952 - 1968

Description of Operation or Occurrence

An Incinerator (Facility 219 or Building 219) was located south of the West Access Road near the original RFETS western boundary. It was located on the side of a hill that slopes to the south towards Woman Creek. The Incinerator was approximately 24 ft high and constructed of concrete walls (with rebar) on a concrete slab. The slab was approximately 12 ft by 16 ft. The Incinerator was flanked with concrete wing walls. It was in operation from 1952 through August 1968 and was used to burn office wastes. In 1960, it was necessary to reline the firebox and stack with a plastic refractory. Between 1960 and 1968, the fire box and stack continued to deteriorate until operations ceased in 1968, at which time disposal of trash in some other manner was necessary. The Present Landfill (PAC NW-114) was constructed as a substitute for the Incinerator, and waste disposal at the Present Landfill began on August 14, 1968. A review of aerial photographs shows that the Incinerator was present August 7, 1969, and was partially dismantled by August 6, 1971. However, no documentation was found that describes the dismantling of the Incinerator. Records indicate that the area around the Incinerator may have been backfilled with ash (DOE 1992). As discussed under Responses to Operation or Occurrence, the buried Incinerator was discovered in April 2003.

Physical/Chemical Description of Constituents Released

Until 1959, ash and noncombustible material were placed around the Incinerator and to the south near the Concrete Wash Pad Area (IHSS SW-133.6). After 1959, the ash was placed in trenches to the south, southeast, and east of the incinerator (IHSSs SW-133.1 through 133.4 and PACs SW-1701 and 1702). An unknown quantity of contaminated material, estimated to contain at least 100 g of depleted uranium, was burned in the Incinerator (DOE 1992). Residual ash was sampled and found to be radioactive. A monthly ash sampling program was initiated in January 1962; data are available in the monthly History Reports by the Waste Disposal Coordination Group (DOE 1992).

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Responses to Operation or Occurrence

Air emission samples were collected during burning operations in September 1956. Smear surveys of the Incinerator before and after burning of contaminated waste showed no increase in contamination. Air sampling of the Incinerator continued in 1958 during combustion of radioactively contaminated trash from Buildings 444 and 447; however, no sample results could be located (DOE 1992). An "ash dump" south of the Plant was monitored in May 1959 and found to contain up to 4,000 cpm alpha activity and 20 mr/hr beta activity. Low-angle oblique photographs of the Incinerator show fill material almost to the height of the Incinerator roof. The unvegetated fill material is clearly non-native soil; however, it is unclear whether the fill material is ash (DOE 1992).

The existence of the buried Incinerator was confirmed in April 2003 during removal of concrete overburden at SW-133.5. Notification of the planned accelerated action for the Incinerator was provided in ER RSOP Notification #03-09 (DOE 2003a), which was approved by EPA, Region 8 on September 4, 2003 (EPA 2003a). Accelerated action activities took place from April 2003 to November 2003 and included removal of the IHSS SW-133.5 Incinerator; soot-covered concrete rubble, concrete slabs, potential ACM, two drum carcasses, and ash-like material and laboratory debris mixed with clean fill (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and SVOCs are all considered COCs at this IHSS. However, characterization analytical results indicate all COC concentrations in soil are less than the WRW ALs.

Action/No Further Accelerated Action Recommendation

Based on the actions taken and the results of the SSRS, NFAA is required. Ecological effects will be further evaluated in the AAESE and the ecological portion of the Sitewide CRA. No long-term stewardship activities are recommended for the IHSS beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS. No specific engineering controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from EPA (the lead regulatory agency) of the NFAA status for IHSS Group SW-1 on December 18, 2003 (EPA 2003b).

References

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

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DOE, 2003a, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-09, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2003b, Final Closeout Report for IHSS Group SW-1, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

EPA, 2003a, ER RSOP Notification #03-09 Approval Letter, September 4.

EPA, 2003b, Correspondence to J. Legare, DOE RFO, from M. Aguilar, EPA, RE: Closeout Report for IHSS Group SW-1, December 18.

## PAC REFERENCE NUMBER: SW-133.6

IHSS Number: SW-133.6

Operable Unit: 5

IHSS Group: SW-1

Unit Name: Concrete Wash Pad

Approximate Location: N747,500; E2,079,000

Date(s) of Operation or Occurrence

1953 - March 1979

Description of Operation or Occurrence

Excess concrete from construction activities at RFETS was routinely washed from concrete trucks southwest of the Plant. In March 1979, Plant Services was requested to clean up debris from past cement truck washouts, and all future cement truck washouts were to be conducted at the Present Landfill (IHSS 114). Reference was made to ash being disposed southwest of the Incinerator, which may have been close to this area (DOE 1992). Ground disturbance in the area is apparent in aerial photographs taken beginning in 1953, and in later Plant photographs (DOE 1992).

Physical/Chemical Description of Constituents Released

The Concrete Wash Pad was a waste concrete disposal site. However, concrete is not a hazardous waste. Potentially contaminated ash generated from the Incinerator may have been deposited southwest of the Incinerator in the area of the Concrete Wash Pad.

Responses to Operation or Occurrence

The existence of the adjacent buried former Plant Incinerator (IHSS SW-133.5) was confirmed in April 2003 during removal of concrete overburden at this location. Notification of the planned accelerated action for the Incinerator and the Concrete Wash Pad (IHSS SW-133.6) was provided in ER RSOP Notification #03-09 (DOE 2003a), which was approved by EPA, Region 8 on September 4, 2003 (EPA 2003a). Accelerated action activities took place from April 2003 to November 2003 and included removal of clean concrete from the Concrete Wash Pad as a best management practice (BMP). This removal action was not considered an accelerated action because the concrete was not contaminated. The concrete, up to 5 ft thick in some places, was broken up using a hydraulic hammer and recycled in accordance with the RSOP for Recycling Concrete (DOE 2003b). The concrete pieces were turned over and surveyed to determine

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whether radionuclide contamination was present. Approximately 3,000 cy of concrete debris were taken from the adjacent area and sent to the Building 850 recycle pile (DOE 2003c).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and SVOCs are all considered COCs in soil surrounding this IHSS. However, characterization analytical results indicate all COC concentrations in soil are less than WRW ALs.

Action/No Further Accelerated Action Recommendation

Based on the actions taken and the results of the SSRS, NFAA is required. Ecological effects will be further evaluated in the AAESE and the ecological portion of the Sitewide CRA. No long-term stewardship activities are recommended for the IHSS beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS. No specific engineering controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from EPA (the lead regulatory agency) of the NFAA status for IHSS Group SW-1 on December 18, 2003 (EPA 2003b).

References

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 2003a, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-09, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2003b, RFCA Standard Operating Protocol for Recycling Concrete, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2003c, Final Closeout Report for IHSS Group SW-1, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

EPA, 2003a, ER RSOP Notification #03-09 Approval Letter, September 4.

EPA, 2003b, Correspondence to J. Legare, DOE RFO, from M. Aguilar, EPA, RE: Closeout Report for IHSS Group SW-1, December 18.

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## PAC REFERENCE NUMBER: 000-121

IHSS Number: 121

Operable Unit: Industrial Area

IHSS Groups: 400-3 (Tanks 4, 5, and 6)

400-8 (Tanks 2, 3, and OPWL)

700-4 (Tanks 8, 12, 13, 14, 15, 16, 17, 36, and 37)

800-1 (OPWL in IHSS Group 800-1)

Unit Name: OPWL

Location: IA

Date(s) of Operation or Occurrence

1952 - 1983 (approximate)

Description of Operation or Occurrence

The OPWL are a network of tanks and underground pipelines constructed to transport and temporarily store aqueous chemical and radioactive process wastes from point of origin to on-site treatment and discharge points. The system handled process wastes from Buildings 123, 444, 707, 771, 776, 779, 865, 881, 883, and 889. Minor amounts of waste from Buildings 122 and 441 were also handled. Depending on the level of radioactivity and chemical composition, process wastes were routed to Building 774 for treatment, Pond B-2 (PAC NE-142.6), or the SEP (PAC 000-101) (DOE 1996a).

The OPWL was placed into service when the Plant began production activities in 1952. Repairs and additions were made to the system through 1975. Numerous accidental releases of process waste occurred during the operating history of the OPWL. The HRR (DOE 1992) provides detailed reference tables and specific narratives for descriptions of operations and occurrences. The OPWL was replaced, beginning in 1975, by a double-contained, fully inspectable process waste system completed in the summer of 1984. Most OPWL pipelines that were not converted to the new process waste system are believed to have been abandoned in place (DOE 1996a).

As defined in the 1988 OPWL Closure Plan, the OPWL consists of approximately 35,000 ft of pipeline and 39 separate tank locations that house a total of 73 tanks. OPWL tanks and pipelines exist in RFETS Areas 100, 400, 500, 600, 700, 800, and 900; the SEP; and the northeast BZ between the 900 Area and Pond B-2 (DOE 1996a).

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The tanks and OPWL relevant to this revised PAC narrative are described as follows (DOE 2002a):

***Tank 2 - Concrete Waste Storage Tank, and Tank 3 - Steel Waste Storage Tank (B441)***

Tanks 2 and 3 are interconnected tanks located in the 400 Area, along the southern wall of Building 441 near its southwestern corner. Tank 3 refers to the 3,200-gallon carbon steel AST and an underlying 3,000-gallon concrete storage tank. Tank 2 is an underground concrete tank that partially underlies Building 441. The precise location of the underground tanks and the tank designations are not clear. The underground tanks could not be visually inspected because of the presence of water in the vaults and the as-built drawings do not adequately describe the tanks. Tank 3 is assumed to be steel, and Tank 2 is assumed to be an underground concrete tank that has three concrete access chambers overlying the tank. The field inspection could not determine whether the tank underlying these vaults extended under Tank 3, nor could the field inspection assess the condition of the underground tank(s).

Tanks 2 and 3 were installed in 1952. The underground concrete tanks and the AST were abandoned in June 1982 after reportedly being decontaminated, filled with gravel, and covered with concrete. However, the reference to being filled with gravel probably refers to the part of Tank 2 that underlies the addition to Building 441, whereas the other part of Tank 2 that is outside the building probably remains intact. The as-built drawing for this tank indicates that a separate chamber to this tank lies entirely outside the building foundation. Furthermore, no gravel underlying the three concrete access chambers was noted during the limited visual inspection of Tank 2. Information also indicates a pipe directed effluent to this part of the tank so that the other parts could be filled with gravel upon construction of the addition to Building 441.

These tanks reportedly received waste streams from Buildings 122, 123, and 441. Waste streams included acids, bases, solvents, radionuclides, metals, thiocyanate, ethylene glycol, trace PCBs, bleach, soap, blood, and hydrogen peroxide. Tank 3 reportedly last stored ammonia after storing several other wastes. This site has been identified as a known release location.

HPGe surveys were conducted during the OU 9 RFI/RI and results indicated thorium-232 activity was slightly greater than background levels. NaI surveys indicated six locations with concentrations greater than background levels. Surface soil samples were also collected and analyzed; americium-241 and plutonium-239/240 activities were greater than background levels.

Subsurface soil samples indicated plutonium-239/240 activities were greater than background levels at a depth of 0.0 to 0.6 inches and 2.0 to 4.6 ft bgs at a location adjacent to the northwestern corner of Tanks 2 and 3. Groundwater samples at this location indicated all TAL metal concentrations and radionuclide activities, except cesium, molybdenum, beryllium, and silver, were greater than background levels. Plutonium-239/240 activities and lead concentrations were greater than background levels at 0 to 6 inches depth adjacent to the southwestern corner of the tanks. Groundwater samples at the same location indicated americium-241, uranium-233/234, and uranium-238 activities, and aluminum, arsenic, barium, lead, manganese, potassium, sodium, and strontium concentrations were greater than background levels.

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Soil samples from the borehole located adjacent to the southern side of Building 441 indicated americium-241 and plutonium-239/240 activities and lead concentrations were greater than background levels at the depth of 0.0 to 6.0 inches. Plutonium-239/240 and uranium-238 activities and lead concentrations were greater than background levels at a depth of 0.0 to 6.0 inches at the borehole located adjacent to the eastern side of Building 441. Groundwater samples from the same location indicated all radionuclide activities, as well as all metal concentrations except antimony, beryllium, cadmium, calcium, cesium, molybdenum, silicon, silver, and tin were greater than background levels.

Soil samples from the borehole adjacent to the northeastern corner of Building 441 indicated plutonium-239/240 activities and lead concentrations were greater than background at a sample depth of 0.0 to 6.0 inches. Groundwater samples indicated all radionuclide activities and all metal concentrations except antimony, beryllium, cadmium, calcium, cesium, molybdenum, silicon, silver, and tin were greater than background levels. Soil data are available in the IA Data Summary Report (DOE 2000).

Analysis of the liquid samples from the Tank T-2 vault indicated every radionuclide analyzed for had positive activity, with gross alpha/beta, uranium-233/234, uranium-235, and uranium-238 having moderate to high activity.

***Tank 4 - Process Waste Pits (B447)***

Existing data for these tanks have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 5 - Process Waste Tanks (B444)***

Existing data for these tanks have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 6 - Process Waste Floor Sump and Foundation Drain Floor (B444)***

Existing data for these tanks have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 8 - East and West Process Tanks***

Tank 8 is located in the 700 Area within Building 728, and is referred to as the Building 771 Process Waste Pit. It is located approximately 30 ft north of Building 771. Tank 8 consists of two 25,000-gallon underground concrete tanks. For clarity, these two tanks were designated T-8 (west) and T-8 (east).

These two tanks were installed in 1952 and were reportedly taken out of service in May 1984, cleaned, painted, and converted to plenum deluge catch tanks for fire water from Building 771. The tanks originally received waste streams from Building 771, the Plutonium and Americium Recovery Building, including radionuclides, acids, bases, solvents, metals, fuel oil, lubricating oil, PCBs, and photography laboratory wastes.

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The T-8 tanks reportedly fill with groundwater periodically, and surface water reportedly ran into Building 728 during periods of high runoff.

HPGe surveys conducted during the OU 9 RFI/RI did not identify areas of elevated radionuclide activities. Radiological contamination survey results indicated fixed and removable alpha contamination was below 100 dpm/100 $cm^2$ in the area around the tanks. Two boreholes were drilled around Tank 8. No radionuclides, metals, VOCs, or SVOCs were detected at concentrations greater than background values in borehole soil samples near the northwestern corner of the tank. East of Tank 8, borehole soil samples indicated americium-241 activities were greater than background levels at 14 to 15 ft bgs. These data are available in the IA Data Summary Report (DOE 2000).

During visual inspection of the tanks, Tank 8 (east) contained 2.5 ft of clear liquid and Tank 8 (west) contained approximately 6 ft of clear liquid. No sludge was noted in either tank. These liquids were sampled and analyzed. Analytical results from the liquid in Tank 8 (east) indicated traces of aluminum, barium, calcium, copper, magnesium, mercury, molybdenum, potassium, silicon, sodium, strontium, americium-241, gross alpha and beta, plutonium-239/240, radium-226, tritium, uranium-233/234, uranium-235, and uranium-238. Analytical results from the liquid in Tank 8 (west) indicated traces of aluminum, barium, calcium, copper, manganese, magnesium, mercury, molybdenum, nickel, potassium, silicon, sodium, strontium, tin, zinc, americium-241, gross alpha and beta, plutonium-239/240, radium-226, tritium, uranium-233/234, uranium-235, and uranium-238. These data are available in the IA Data Summary Report (DOE 2000).

***Tank 12 - Two Abandoned 20,000-Gallon Underground Concrete Tanks***

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 13 - Abandoned Sump - 600 Gallons***

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 14 - 30,000-Gallon Concrete UST (68), and Tank 16 - OPWL - Two 14,000-Gallon Concrete USTs (66, 67)***

Tanks T-14 and T-16 are located in the 700 Area on the eastern side of Building 774 underlying a chemical storage shed. Tank T-14, which is designated by RFETS as Tank 68, is a 30,000-gallon concrete underground tank. Tank T-16 consists of two 14,000-gallon concrete underground tanks underlying the chemical storage shed north of Tank T-14. The northernmost T-16 tank, referred to as T-16 (north), is designated by RFETS as Tank 66, while the other T-16 tank, referred to as T-16 (south), is designated by RFETS as Tank 67.

These tanks were installed in 1952 and were reportedly abandoned in November 1989. The HRR (DOE 1992) indicates the tanks were to be closed in compliance with RCRA closure requirements, even though confirmation of this is unavailable. These tanks were reportedly removed from the list of RCRA-permitted or RCRA interim status tanks before closure was conducted and were then transferred to OU 9. The tanks received waste streams from Building

774, the Process Waste Treatment Facility, including acids, bases, radionuclides, metals, and other wastes from RFETS processes. Releases from the tanks were documented, specifically from tank overflow in 1980 and 1981.

HPGe surveys conducted during the OU 9 RFI/RI did not identify areas of elevated radionuclide activity. Radiological contamination survey results indicated there was no removable contamination near the T-14 and T-16 tanks, but there was fixed alpha and beta contamination. Fixed alpha activities ranged from 118 dpm/100 $cm^2$ to approximately 4,500 dpm/100 $cm^2$. Five boreholes were drilled around Tank 16. Soil samples from the borehole located at the southeastern corner of Tank 16 indicated americium-241 and plutonium-239/240 activities were greater than background levels from 0 to 0.5 ft. Barium and lead concentrations, as well as americium-241 and plutonium-239/240 activities, were greater than background levels from 0 to 2.5 ft, and silver was detected from 0 to 0.5 ft in the borehole located at the southeastern corner of Tank 14. Americium-241 and plutonium-239/240, activities were also greater than background levels from 6.5 to 8.9 ft. Silver, americium-241, and plutonium-239/240 were detected at levels exceeding background in the sample interval from 0 to 0.5 ft in the borehole located near the southeastern corner of Tank 14. These data are available in the IA Data Summary Report (DOE 2000).

Sludge and liquid from Tanks T-14 and T-16 were sampled and analyzed. Analytical results from the liquid in Tank T-14 indicated aluminum, beryllium, calcium, cesium, copper, lithium, nickel, silicon, and silver were detected at 1 ppm. Americium-241, plutonium-239/240, tritium, uranium-233/234, and uranium -238 were detected at activities greater than 1,000 pCi/L, and uranium-235 was detected at activities greater than 100 pCi/L. Plutonium-239/240 and the combination of plutonium-238 plus americium-241 were detected at activities exceeding 150,000 pCi/g in the sludge sample. Uranium-235 was detected at activities less than 1.82 pCi/g.

Analytical results from the liquid in Tank 16 indicated calcium, potassium, and silicon were detected at 1 ppm. Americium-241, plutonium-239/240, and tritium were detected at activities greater than 1,000 pCi/L. Uranium-233/234 was detected at activities greater than 1,000 pCi/L and uranium-235 and uranium-238 were detected at activities less than 100 pCi/L. Plutonium-239/240 was detected at activities exceeding 325,000 pCi/g in the sludge sample. The combination of plutonium-238 and americium-241 was detected at activities exceeding 225,000 pCi/g. Uranium-235 was detected at activities less than 0.3 pCi/g.

***Tank 15 - Two 7,500-Gallon Process Waste Tanks (34W and 34E)***

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 17 - Four Concrete Process Waste Tanks (30, 31, 32, and 33)***

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

***Tank 36 - Steel Carbon Tetrachloride Sump***

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

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### *Tank 37 - Steel-Lined Concrete Sump*

Existing data for this site have not been located; however, soil in the vicinity of the tank has been characterized (see Responses to Operation or Occurrence).

### *OPWL Within IHSS Groups 400-8 and 800-1*

Aside from data for specific tanks identified above, existing data for OPWL within these IHSSs have not been located.

Physical/Chemical Description of Constituents Released

Aqueous process wastes containing low-level radioactive materials, nitrates, caustics, and acids are known to have been transported in the OPWL. Small quantities of other liquids were also introduced to the system, including pickling liquor from foundry operations, medical wastes, miscellaneous laboratory wastes, and laundry effluent. Certain process waste streams also contained metals, VOCs, oils and greases, and cleaning compounds. Low-level aqueous wastes with high concentrations of nitrate were the primary OPWL waste stream. Radionuclides present in the wastes include uranium-234, uranium-235, uranium-238, plutonium-239, and americium-241, with lesser amounts of plutonium-240 and trace amounts of plutonium-238, plutonium-241, and plutonium-242. Major VOCs used in plant processes include 1,1,1-trichloroethane, trichloroethene, and carbon tetrachloride. Other constituents potentially introduced include hexavalent chromium, beryllium, iodine, phosphate, and tritium (DOE 1996a).

Responses to Operation or Occurrence

The HRR (DOE 1992) summarizes responses to OPWL releases in Table 000-2. Generally, upon the report of a release from OPWL piping or associated tanks, the area was excavated to make repairs and, in some cases, the contaminated soil was removed from the release site for disposal. Contamination was primarily determined using field radiation detection equipment rather than by sample collection and analysis. Surface releases were sometimes flushed with water until radiation readings were within acceptable ranges. Contaminated soil and pavement were removed for disposal in some instances. In 1971, wells were drilled around many OPWL tanks located adjacent to and exterior to buildings to monitor plutonium, pH, nitrate, and fluoride in groundwater.

The responses to operation or occurrence for the tanks and OPWL relevant to this revised PAC narrative are as follows:

### *Tanks 2 and 3 and OPWL in IHSS Group 400-8*

Tanks 2 and 3 and OPWL are associated with Building 441. UBC 441 is part of IHSS Group 400-8. In accordance with IASAP Addendum #IA-03-01 for IHSS Group 400-8 (DOE 2002b), characterization samples were collected and analyzed. Notification of planned accelerated action activities was provided in ER RSOP Notification #03-06 (DOE 2003a). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 400-8 (DOE 2004a).

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In accordance with ER RSOP Notification #03-06 (DOE 2003a), Tanks T-2 and T-3 were completely removed. OPWL under the Building 441 slab and exiting the southern addition to Building 441(from Tanks T-2 and T-3) were exposed, tapped and drained, and removed. Most of the lines were cast iron. Two OPWL manholes west of Fourth Street were also removed.

***Tanks 4, 5, and 6 in IHSS Group 400-3***

Tanks 4, 5, and 6 are associated with Buildings 444 and 447. UBC 444 and UBC 447 are part of IHSS Group 400-3. In accordance with IASAP Addendum #IA-03-06 (DOE 2003b), characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003c).

***Tanks 8, 12, 13, 14, 15, 16, 17, 36, and 37 in IHSS Group 700-4***

Tanks 8, 12, 13, 14, 15, 16, 17, 36, and 37 are part of IHSS Group 700-4. In accordance with IASAP Addendum #IA-03-01 (DOE 2002b), characterization samples were collected and analyzed. Notification of planned accelerated action activities, the analytical results from characterization activities, and a summary of the accelerated action activities and the confirmation sampling results are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004b).

Of the OPWL tanks present in IHSS Group 700-4, only Tanks 14 and 16 were removed. Tanks 14 and 16 were two of the seven OPWL tanks that were addressed in the Accelerated Action Plan for Interagency Agreement Underground Storage Tanks Containing RCRA-Regulated Materials (DOE 1995) and the Final Proposed Action Memorandum for the Contaminant Stabilization of Underground Storage Tanks (DOE 1996b). These documents specifically address the accelerated removal action and stabilization of potential contaminants in seven IAG underground tank systems. In accordance with the Accelerated Action Plan and PAM, the contents of these tanks were removed, the tanks were multirinsed, and an inert material (polyurethane foam) was used to stabilize any remaining contamination. Removal of Tanks 14 and 16 (now foamed) was initiated in October 2003 in accordance with the Building 771 DOP (DOE 2003d). Soil characterization samples were collected after the tanks were removed. Because a soil removal decision was made based on these data, an ER RSOP Notification was required. However, in order to expedite the soil removal action, the CDPHE agreed that the Notification could be included with the Closeout Report. The soil removal action was completed in November 2003 when confirmation sampling data indicated RFCA requirements were met. Approximately 2,112 $ft^3$ of soil and fill with radionuclide contamination were removed.

***OPWL in IHSS Group 800-1***

OPWL is associated with Building 865. UBC 865 is part of IHSS Group 800-1. Characterization activities were conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). Notification of the planned activities was provided in ER RSOP Notification #03-12 (DOE 2003e). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004c).

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In accordance with ER RSOP Notification #03-12 (DOE 2003e), all process waste lines under the Building 865 slab, including OPWL and drains leading to the OPWL, were tapped, drained, and removed. These lines had been previously filled with epoxy.

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for these tanks and the OPWL in IHSS Group 800-1. In addition, SVOCs are considered COCs for the IHSS Group 700-4 tanks, and SVOCs, nitrate, and PCBs are considered COCs for the IHSS Group 400-8 tanks and OPWL. The nature and extent of contamination at the tanks was characterized in accordance with the IASAP Addenda for the respective IHSS Groups. The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

As detailed below, based upon the analytical results for the soil samples collected, no current or potential contaminant source was identified at the tanks and OPWL in the IHSS Groups.

***Tanks 2 and 3 and OPWL in IHSS Group 400-8***

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for Tanks 2 and 3 and associated OPWL in IHSS Group 400-8 because of the following:

- Potential sources of contamination that existed in IHSS Group 400-8 (manholes, tanks, and drain lines) were removed.
- COC concentrations were less than WRW ALs, except for one elevated arsenic concentration at location BW38-004 (between 4.5 and 6.5 ft in depth) and one benzo(a)pyrene concentration at BV38-002 (between 10 and 11 ft in depth). These sampling locations are near the OPWL and Tank 2, respectively. However, the arsenic concentration was 23.0 mg/kg, and the WRW AL is 22.2 mg/kg. The detected arsenic concentration is within the range of background concentrations historically observed at the Site. The benzo(a)pyrene concentration was 3,700 µg/kg, and the WRW AL is 3,490 µg/kg.

***Tanks 4, 5, and 6 in IHSS Group 400-3***

Based on analytical results and the SSRS, action is not required, and an NFAA determination is justified for Tanks 4, 5, and 6 in IHSS Group 400-3 because of the following:

- With the exception of one sample, COC concentrations in soil were less than the WRW ALs. Although there was one soil sample with a lead concentration exceeding the WRW AL (not in the vicinity of Tanks 4, 5, and 6), in accordance with approved methodologies (resampling due to apparent cross-contamination and 95% UCL calculations), further investigation into the lead WRW AL exceedance resulted in an NFAA determination.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.

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- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

***Tanks 8, 12, 13, 14, 15, 16, 17, 36, and 37 in IHSS Group 700-4***

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for Tanks 8, 12, 13, 14, 15, 16, 17, 36, and 37 in IHSS Group 700-4 because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs;

- The section of OPWL that exits at Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of 3 times the AL. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23 and will be addressed as part of closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely because even though there is groundwater contamination in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

***OPWL in IHSS Group 800-1***

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for OPWL in IHSS Group 800-1 because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (process waste lines) were removed.

- Contaminant concentrations were less than WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg (sampling location not near OPWL).

No long-term stewardship activities are recommended for IHSS Groups 400-3, 400-8, 700-4, and 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on

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construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Groups. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Groups.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003), for IHSS Group 400-8 on March 19, 2004 (CDPHE 2004a), for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004b), and for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004c).

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## PAC REFERENCE NUMBER: 000-190

| | |
|---|---|
| IHSS Number: | 000-190 |
| Operable Unit: | Industrial Area |
| IHSS Group: | 000-3 |
| Unit Name: | Caustic Leak |
| Approximate Location: | N749,000; E2,082,000 - Steam plant (Building 443) catch basin to Pond B-1 via Central Avenue Ditch and South Walnut Creek |

Date(s) of Operation or Occurrence

December 3 and 4, 1978, and January 6, 1989

Description of Operation or Occurrence

On December 3 and 4, 1978 a bulk caustic storage tank leaked into its spill catch basin. Due to operator error, an NaOH solution was subsequently released from the catch basin to the Central Avenue Ditch. The NaOH solution flowed eastward down the Central Avenue Ditch and was diverted to South Walnut Creek and Pond B-1 for temporary containment (DOE 1992).

On January 6, 1989, caustic solution was released from the same Building 443 tank involved in the December 1978 incident into its secondary containment (spill catch basin). The outlet pipe and valve on the tank deteriorated to the extent that the pipe disconnected from the tank. Due to cold weather, the caustic froze thereby preventing further leakage (DOE 1992).

Physical/Chemical Description of Constituents Released

The December 1978 incident involved approximately 1,000 to 1,500 gallons of caustic solution that was composed of 12.5 Normal NaOH (also expressed as 50 percent NaOH). This is generically referred to as concentrated NaOH. The January 1989 incident involved approximately 1 to 3 gallons of concentrated caustic solution (DOE 1992).

Responses to Operation or Occurrence

In response to the December 1978 incident, immediate steps were taken to isolate the contamination, treat the contaminated runoff, and divert drainage from adjacent areas. These steps included the following (DOE 1992):

- Divert the 400 Area snowmelt water across Central Avenue Ditch to the 700 Area drainage;

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- Dam the upper Central Avenue Ditch above the B-Series ponds near the cattle fence;
- Divert Building 995 sewage effluent to Pond 207B-South and retain Pond B-3 as a reserve pond;
- Rope off the upper portion of the Central Avenue Ditch;
- Pump water from Pond B-2 to Pond A-2 and hold Pond B-2 as a last resort catch pond; and
- Neutralize Pond B-1 by adding 1,400 pounds of alum and then pump this liquid to Pond 207B-North.

Follow-up response activities to the December 1978 incident included (DOE 1992):

- Neutralize the Central Avenue Ditch water between Fifth and Tenth Streets by adding 5,000 pounds of alum;
- Complete final sampling of Pond 207B-North on approximately January 19, 1978;
- Monitor the pH of the ditch. On March 23, 1979, the ditch was considered to be no longer a problem and runoff from the ditch was allowed to be discharged offsite;
- On approximately May 4, 1979, Pond 207B-North liquid was drained into Pond B-2; and
- On approximately June 29, 1979, the remaining liquid in Pond B-1 was declared environmentally acceptable and sprayed on the adjacent hillside.

The tank leak was identified and all repairs were completed. Furthermore, the incident was reviewed with all Stationary Operating Engineers at the Central Steam Plant and they were directed to review all SOPs on chemical handling and storage. An incident report was prepared (DOE 1992).

In response to the January 1989 incident, the tank was temporarily repiped and emptied. The removed caustic was neutralized and transferred to Building 374 for treatment as a process waste (DOE 1992).

Fate of Constituents Released to Environment

IHSS 000-190 has not been specifically investigated. Although the IHSS has been sampled in many locations as part of investigations of neighboring IHSSs, these data (radionuclides, metals, and organics) are generally not relevant to the contaminant release (that is., a spill of sodium hydroxide). First, sodium (a metal) is considered a common essential nutrient and, accordingly, does not have a WRW AL (DOE et al. 2003). The potential hazard of a release of NaOH is elevation of the pH of water in the ditch, and in Pond B-1 where the water had discharged. The pH rises in the water because of the release of hydroxyl ions from the dissolution of NaOH as follows:

$$NaOH \rightarrow Na^{+} + OH^{-}$$

However, as reported, the water was neutralized soon after the release by the addition of alum ($Al_2(SO_4)_3$) in accordance with the following reaction:

$$Al_2(SO_4)_3 + 6\ OH^{-} \rightarrow 2\ Al(OH)_3 + 3\ SO_4^{2-}$$

The aluminum hydroxide ($Al(OH)_3$) produced is a solid that would have settled out of the water. However, even if residual aluminum hydroxide is present in the ditch today, the maximum aluminum concentration in surface soil within and directly adjacent to the IHSS is 23,000 mg/kg at sampling location BZ39-000. See Figure 2 for surface soil sampling locations. This concentration is an order of magnitude below the WRW AL for aluminum, which is 228,000 mg/kg.

Lastly, the release occurred over 15 years ago, a time frame over which a significant quantity of water has flowed through the ditch, thereby further neutralizing/diluting the original NaOH release.

Action/No Further Accelerated Action Recommendation

IHSS 000-190 is proposed for NFAA. The release that rendered the ditch an IHSS was a caustic spill that raised the pH of the water. The documentation shows the water was adequately neutralized with alum shortly after the spill event. The neutralization process produces aluminum hydroxide which would have settled out of the water. However, aluminum concentrations in surface soil within the IHSS are well below the WRW AL. Lastly, the release occurred over 15 years ago, a time frame over which a significant quantity of water has flowed through the ditch, further neutralizing/diluting the original release. Therefore, it is concluded that NFAA is required at IHSS 000-190.

No long-term stewardship activities are recommended for IHSS Group 000-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS 000-190 on July 9, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval: No Further Accelerated Action (NFAA), PAC 000-190, Caustic Leak, July 9.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, CDPHE, and EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment 5, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

## PAC REFERENCE NUMBER: 000-504

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 800-1 (NPWL in IHSS Group 800-1)

Unit Name: NPWL

Approximate Location: Industrial Area

Date(s) of Operation or Occurrence

1984 to Present

Description of Operation or Occurrence

The NPWL consist of a network of underground pipelines and tanks that transport liquid waste streams to Building 374, Waste Treatment Operations. The NPWL overlap the OPWL in many places and, for the most part, replace the OPWL infrastructure. Installation of the NPWL system was required primarily because of the deterioration of the OPWL, installed in 1952. Installation of the NPWL was completed in 1984. Some of the OPWL lines have been converted to NPWL, and all NPWL are double-contained (DOE 1999).

The NPWL relevant to this revised PAC narrative are described as follows:

***NPWL in IHSS Group 800-1***

NPWL are associated with Buildings 865/866. UBCs 865/866 are part of IHSS Group 800-1. The NPWL consist of two short segments of line: one segment extends from the Building 866 footprint to Valve Vault #6, and the other segment extends from the Building 866 footprint to Building 889 (DOE 2004).

Physical/Chemical Description of Constituents Released

The NPWL transport a variety of waste streams to Building 374. These current and past waste streams include laundry water, nonradioactive/chemical laboratory waste, uranium and beryllium waste, PCBs, solar pond water, incidental water, high-nitrate waste from Building 774, and waste from site laboratories and utilities. PCOCs include acids, bases, solvents, radionuclides, PCBs, metals, oils, and photographic laboratory chemicals. Releases from NPWL have been documented at several PACs and are summarized in the 1999 Annual Update to the HRR (DOE 1999).

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Responses to Operation or Occurrence

The 1999 Annual Update to the Historical Release Report (DOE 1999) summarizes responses to NPWL releases that occurred at several PACs. Generally, responses included repairing valve vaults and piping and removing contaminated soil.

The responses to operation or occurrence for the NPWL relevant to this revised PAC narrative are as follows:

- Characterization of IHSS Group 800-1, which includes NPWL, was conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-12 (DOE 2003). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004).

- In accordance with ER RSOP Notification #03-12 (DOE 2003), the two NPWL sections located west of Building 865 were tapped and drained, filled with epoxy, and removed. These sections were packaged and sent off site for disposal as LLMW. The northernmost line was removed up to Valve Vault #6, and all of the line to the Building 889 area was removed. (There was no remaining end to grout.)

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for the NPWL in IHSS Group 800-1. The nature and extent of contamination at the lines was characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for NPWL in IHSS Group 800-1 because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (slabs, pits, a sump, and process waste lines) were removed.

- Contaminant concentrations are less than the WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg. The sampling location was not near NPWL.

No long-term stewardship activities are recommended for IHSS Group 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

DOE, 1999, Annual Update for the Historical Release Report, RF/RMRS-99-428.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Notification #03-12, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: 300-186

IHSS Number: 300-186

Operable Unit: Industrial Area

IHSS Group: 500-1

Unit Name: Valve Vaults 11, 12, and 13

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

1985 - 1989 (DOE 1992)

Description of Operation or Occurrence

Valve Vaults 11, 12, and 13 are located inline along the process waste line south of Building 374 and west of Building 552. Several incidents have occurred in one or more of these valve vaults resulting in the release of process waste to the environment. These valve vaults are connected by the process waste lines and the containment lines which surround the pipes. In addition to the double-contained lines, the process waste lines are equipped with leak-detection sensors (DOE 1992).

June 12, 1985 was the first incident related to these valve vaults for which documentation was found. Contractors excavating a drainage ditch along the south side of the protected area in the northeast corner of the Building 371 Parking Lot broke the outer containment of four lines and the inner line of the low-level transfer line near Valve Vault 13. Soon after it was broken, pumping began from the process waste tanks in Building 460 to Building 374 allowing liquid to be released from the inner pipe (DOE 1992).

In June 1986, corrosion of a one-inch diameter hole in a black iron flange which was connected to a stainless steel piping system caused a release of process waste into Valve Vault 13. The liquid in the vault was recirculated by the sump pump. The sensor alarm sounded but was not responded to until the next day ((DOE 1992).

Leakage of the process waste line between Valve Vault 12 and Valve Vault 13 was reported on October 24, 1986. The process waste lines are designed to provide a constant slope between adjacent valve vaults to allow any liquid in the containment pipe to flow into a vault and trigger an alarm. No alarm sounded when the release occurred and it was determined at the time the leakage occurred that the lines had been previously repaired and reworked in 1981 or 1982, and that they were not replaced in a manner that allowed drainage. (No documentation could be found as to why the lines were repaired or replaced.) Instead a trap was created, allowing saturation of the bedding material and soil around the pipe (DOE 1992).

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On June 1, 1987, a radioactive leak was discovered near Valve Vault 13 when contamination was found in the culvert drain collection basin. The leak was found to be in the high-level transfer line between Building 374 and Valve Vault 13 (DOE 1992).

On September 13, 1988 Valve Vault 12 was flooded with 1,700 gallons of high nitrate solution during transfer between Building 774 and Building 374. A connection at a tygon tube became separated which allowed the leak to occur (DOE 1992).

In October 1989, a significant amount of liquid was found in Valve Vault 11, Valve Vault 12, and Valve Vault 13. The alarms had sounded in the Building 231 Pump House, Pump Station #1 and Valve Vault 19 but upon inspection no problems were found at these locations. The inspection continued and resulted in the discovery of liquids in Vaults 11, 12, and 13 (DOE 1992).

Physical/Chemical Description of Constituents Released

Details of the spill in 1985 indicated a pH of 5 and 6 on litmus paper with a laboratory analysis of 7.2. The process waste consisted of Oakite (an industrial cleaning agent containing phosphoric acid) and distilled water. It was estimated at the time that 1,700 gallons of liquid were pumped but only about 4.4 gallons were spilled onto the ground (DOE 1992).

The June 1986 incident involved an acidic liquid waste which corroded the iron flange. In October 1986, the soil surrounding the pipe was saturated with a yellow liquid. Monitoring of the area disclosed alpha, beta, and uranium-238 contamination of up to 1.7 x 10, 5 x $10^4$, and 9 x $10^2$ pCi/l, respectively. There were no abnormal amounts of other commonly found elements. Analytical results from water samples indicated the presence of uranium, americium, plutonium, total alpha activity and total beta activity (DOE 1992).

A radioactive acidic solution was released in the June 1987 incident. Analytical results from samples taken in the culvert drain collection basin showed 42,000 pCi/l gross alpha activity and 13,000 pCi/l gross beta activity. Direct counts on soil and the culvert were reported as "high"(DOE 1992).

The liquid that leaked in 1989 was approximately 10,000 gallons of solar pond water with a pH of 7.5 to 8.0. Analytical results of radioactivity levels indicated 3,122 to 7,134 pCi/l gross alpha activity (DOE 1992).

Responses to Operation or Occurrence

The pipe was repaired after the 1985 incident. Investigation at that time revealed no radioactive contamination. In June 1986, the black iron flange was replaced with a stainless steel flange with no release of contamination. These repairs were thought to have contributed to the leak found in 1987 because the repairs were not compatible with the original design (DOE 1992).

After the leak had been detected in October 1986, an area 30 by 100 ft was excavated to locate the leak in the process waste lines. The repairs were completed on November 13, 1986. A series of small cofferdams was built to contain surface and groundwater. The collected fluids were eventually removed by a tank truck and placed in Solar Pond 207A. Approximately 24 waste

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boxes of uranium-contaminated sand and gravel were shipped offsite for low-level radioactive disposal. Cleanup was completed on December 8, 1986 by reducing the radiation levels to slightly above background. The area was backfilled (DOE 1992).

A document written in May 1989, indicated the backfilling of an excavation at this valve vault would have to be delayed for over a year because of legalities in dealing with the contaminated waste. This excavation may be due to the flooding incident in 1988 (DOE 1992).

In response to the culvert contamination in 1987, dikes were installed in the drain path to prohibit further draining. Liquids were drained from the transfer pipe and pumped to a mobile tanker. The culvert was taken out and soil was removed until both alpha and beta counts were below 250 cpm. A Work Order was submitted to install a leak-detection device but it is not known if this was complete. The high and low level transfer lines were to have been replaced with fibercast piping and the containment piping was repaired to the original design specifications (DOE 1992).

The supervisor of Building 374 ordered pumping to be stopped from Building 778 and Building 774 in response to the 1989 incident. The RCRA/CERCLA office was notified. The appropriate lockout/tagouts were provided on the valves in Valve Vault 12 and in the Building 231 Pump House. The liquid was removed and repairs to the line were completed by October 22, 1989. The line was flow-tested successfully. A RCRA Contingency Plan Implementation Report (89-015) was prepared and submitted on this incident.

Accelerated action characterization activities were conducted at IHSS Group 500-1, which includes IHSS 300-186, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-04-03 (DOE 2003).

Fate of Constituents Released to Environment

Based on IHSS 300-186 site history and historical soil sampling results, radionuclides, metals, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (2.5-6.5 ft bgs) soil samples were analyzed for COCs during characterization activities. No COCs were detected at concentrations or activities greater than WRW ALs. The accelerated action characterization activities conducted at IHSS 300-186 and the rationale for NFAA are discussed in detail in the Draft Data Summary Report for IHSS Group 500-1 (DOE 2004). The rationale for NFAA at IHSS 300-186 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 300-186 is based on the following:

- All residual contaminant concentrations in surface and subsurface soil are less than WRW ALs.
- No further accelerated action is required based on the SSRS.

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After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-1, including IHSS 500-117.1, on September 29, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-1, IHSS 300-186, IHSS 500-117.1 and IHSS 500-197, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-03, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2004, Draft Data Summary Report for IHHS Group 500-1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 300-708

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformers North of Building 371

Approximate Location: N750,500; E2,082,500

Date(s) of Operation or Occurrence

Prior to August 1991

Description of Operation or Occurrence

The following six transformers were located north of Building 371: 371-1, 371-2, 371-3, 371-4, 371-5, and 371-6. Transformers 371-7 and 371-8, located in Room 3581 of Building 371, were also included in this PAC, not to imply that they leaked, but to provide additional information only. It was noted in one reference that the area outside Room 3581 had the potential to be contaminated with PCBs due to a transformer spill or fire (DOE 1992).

Transformer 371-1 had staining on the pad beneath the drain valve indicating leakage. The transformers were all located within a rock-filled berm (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

The following table presents 1985 and 1992 PCB analytical results for the oil in the transformers (DOE 1996):

| Transformer No. | 1985 Results | 1992 Results |
|---|---|---|
| 371-1 | 2,244 ppm | 20 ppm |
| 371-2 | 20 ppm | 19 ppm |
| 371-3 | 58 ppm | 4 ppm |
| 371-4 | 1,799 ppm | 18 ppm |
| 371-5 | 952 ppm | 12 ppm |
| 371-6 | 1,026 ppm | 13 ppm |

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Responses to Operation or Occurrence

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, surface soil samples were collected and analyzed in accordance with approved EPA protocols (DOE 1995). These analytical results indicated 3 out of 20 samples contained PCB levels greater than 50 ppm (DOE 1996).

In 1995, under the approved Final PAM for Remediation of Polychlorinated Biphenyls (DOE 1995), approximately 300 soil screening samples were collected to determine the presence or absence of PCB contamination in the soil and determine the lateral and vertical extent of PCB migration. Soil samples were analyzed using EPA Method 4020 and concrete samples were analyzed using EPA Method 8080 (DOE 1996).

In accordance with the PAM (DOE 1995), approximately 2 cy of PCB-contaminated soil were excavated on the northern side of Transformer 371-2, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California, for disposal (DOE 1997).

Fate of Constituents Released to Environment

Recently there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the 1995 analytical results, PCB concentrations in the soil were detected at less than 10 ppm using EPA Method 4020, and were below detection levels using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the EPA Method 4020 (Immunoassay Field Technique) analytical results. PCB results for the concrete samples were less than 1.3 ppm. Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE

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received concurrence from CDPHE (the lead regulatory agency) DOE received concurrence from CDPHE on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

## PAC REFERENCE NUMBER: 300-709

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer Leak - 334-1

Approximate Location: N749,500; E2,082,500

Date(s) of Operation or Occurrence

1975 to 1986

Description of Operation or Occurrence

Transformer 334-1 was located on a concrete pad and surrounded by a concrete berm adjacent to the northwest side of Building 334. Plant utility records indicate the transformer had been in several previous locations. This 500 KVA transformer was manufactured in 1975 (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Transformer 334-1, which contained 285 gallons of dielectric fluid, had been reported as leaking. The transformer contained mineral oil with 772 ppm PCBs prior to being retrofilled in 1986 (DOE 1992).

Responses to Operation or Occurrence

The dielectric fluid in transformer 334-1 was flushed in 1986 (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected at this location in accordance with approved EPA sampling protocols, and analyzed for PCBs using EPA Method 8080 (DOE 1995). All 1991 analytical results for PCBs were below 0.2 ppm (DOE 1996).

Fate of Constituents Released to Environment

Recently there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain



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dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 400-116.1

IHSS Number: 116.1

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: West Loading Dock - Building 447

Approximate Location: N748,500; E2,082,000

Date(s) of Operation or Occurrence

1956 (date Building 447 first occupied) - present

Description of Operation or Occurrence

The west loading dock is located on the northern side of Building 447 and west of Building 444. Manufacturing operations conducted in both buildings dealt mainly with beryllium and depleted and enriched uranium. Drums containing nonradioactive solvents may have also been stored on the dock. Building 453, located in the alcove formed by Buildings 447 and 444, was known to have stored oil (PAC 400-182). Spills and leaks may have impacted soil and groundwater beneath the dock (DOE 1992).

Physical/Chemical Description of Constituents Released

No documentation was found detailing releases on the west loading dock itself; however, there is record of oil surfacing around Building 453, located just north of the dock. There is a possibility that solvents were stored at this site as well as the south loading dock. Because of the nature of operations in Buildings 447 and 444, there may be infiltration of radioactive materials into the surrounding soil. Hydrocarbons may also be present in the soil due to leaks and spills (DOE 1992).

Responses to Operation or Occurrence

A sitewide radiometric survey was performed from 1977 through 1984. The purpose of the survey was to identify surface areas contaminated with plutonium. The area around Building 444 and Building 447 was surveyed in April and May 1984. Areas south of Building 447, west of Building 447, and north of Building 453 were identified as areas that could not be surveyed due to high-level background radioactivity (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSS 116.1, characterization samples were collected and analyzed. Analytical results

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from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides and metals are considered COCs for IHSS 116.1. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSS 116.1, because of the following:

- All COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: 400-116.2

IHSS Number: 116.2

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: South Loading Dock, Building 444

Approximate Location: N748,500; E2,082,500

Date(s) of Operation or Occurrence

1953 (date Building 444 first occupied) - present

Description of Operation or Occurrence

The south loading dock is located on the southern side of Building 444 and east of Building 447. Many incidents have contributed to possible contamination in this area. In 1953, high winds blew the lids off drums stored there releasing uranium to the dock, sidewalks, and driveways (DOE 1992).

On August 30, 1954, while vacuuming in a centrifuge, the motor of a portable vacuum short-circuited. When the chips in the vacuum receptacle ignited, the receptacle was taken to the dock (known then as Dock No. 2). To extinguish the fire, the bag's contents were transferred to a steel drum and Metal-X powder was added. The explosive nature of the burning material released "gross" amounts of airborne contamination to the outside atmosphere and covered the dock and adjacent areaway with oxide. The areaway is the pit entrance to the basement that is used to store cyanide and graphite drums (DOE 1992).

In October 1955, a 55-gallon drum of perclene still bottoms and nitric acid stored on the dock leaked and sprayed its contents onto two workers who were in the areaway adjacent to the dock (DOE 1992).

Until 1970, chlorinated hydrocarbon solvents used to rinse beryllium parts were dumped on the ground outside Room 106, which opens to the dock (DOE 1992).

Physical/Chemical Description of Constituents Released

Constituents that may have contaminated soil around the south dock include enriched and depleted uranium, beryllium, and chlorinated hydrocarbon solvents (DOE 1992).

High winds in 1953 resulted in direct uranium activity readings as high as 7,500 dpm/100 $cm^2$ and smear readings with a maximum of 350 dpm. In 1954, air count results during extinguishing

operations were as high as 33,000 percent of the MPL average on the dock. Direct counts in the dock area were as high as 1,372 dpm (DOE 1992).

Analytical results of soil samples collected 2 to 4 inches bgs indicated 350 to 1,000 µg of beryllium per gram of soil due to dumping of chlorinated hydrocarbon solvents used to clean beryllium parts. Normal concentrations of beryllium are 0.01 to 2 µg per gram of soil (DOE 1992).

Responses to Operation or Occurrence

In 1953, the dock and sidewalks were cleaned and the driveway was seal-coated. After the vacuum incident, the dock was cleaned; however, the pit had not been decontaminated. There is no discussion of cleanup in the reference pertaining to the perclene drum leak in 1955; however, the leaks were plugged and the drum was moved. The contents of the drum were transferred to a stainless steel drum and treated with caustic. Environmental Control was looking into possible removal of soil in this area in 1975; however, it is not known whether this was accomplished (DOE 1992).

Environmental Control personnel conducted air sampling in the area of solvent dumping from June 20 through September 20, 1977. The average concentration was $9.0 \times 10^{-4}$ micrograms/$m^3$ which was 9% of the EPA standard. It was concluded that soil removal was not necessary (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSS 116.2, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS 116.2. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSS 116.2, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater

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contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: 400-122

IHSS Reference Number: 122

Operable Unit: Industrial Area

IHSS Group: 400-8

Unit Name: Underground Concrete Tanks

Approximate Location: N749,000; E2,082,000

Date(s) of Operation or Occurrence

1952 - June 1982

Description of Operation or Occurrence

PAC 400-122 is part of the OPWL network of tanks and pipelines (PAC 000-121). The tanks were used to handle the waste from Buildings 122, 123, and 441. Interviewees for the CEARP Phase 1 document mentioned that leaks may have occurred. At times the tanks were known to have filled with groundwater, which was pumped out and sent to waste treatment. Documentation was found for only one surface release from these tanks. On June 1, 1953, the tanks overflowed by approximately 1,200 gallons. The spill consisted of process waste from Building 123 (DOE 1992).

Tanks 2 and 3 are interconnected tanks located along the southern wall of Building 441 near its southwestern corner. Tank 3 refers to the 3,200-gallon carbon steel AST and an underlying 3,000-gallon concrete storage tank. Tank 2 is an underground concrete tank that partially underlies Building 441. The precise location of the underground tanks and the tank designations are not clear. The underground tanks could not be visually inspected because of the presence of water in the vaults and the as-built drawings do not adequately describe the tanks. Tank 3 is assumed to be steel, and Tank 2 is assumed to be an underground concrete tank that has three concrete access chambers overlying the tank. The field inspection could not determine whether the tank underlying these vaults extended under Tank 3, nor could the field inspection assess the condition of the underground tank(s) (DOE 2002a).

Tanks 2 and 3 were installed in 1952. The underground concrete tanks and the AST were abandoned in June 1982 after reportedly being decontaminated, filled with gravel, and covered with concrete. However, the reference to being filled with gravel probably refers to the part of Tank 2 that underlies the addition to Building 441, whereas the other part of Tank 2 that is outside the building probably remains intact. The as-built drawing for this tank indicates a separate chamber to this tank lies entirely outside the building foundation. Furthermore, no gravel underlying the three concrete access chambers was noted during the limited visual inspection of Tank 2. Information also indicates a pipe directed effluent to this part of the tank

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so that the other parts could be filled with gravel upon construction of the addition to Building 441 (DOE 2002a).

These tanks reportedly received waste streams that included acids, bases, solvents, radionuclides, metals, thiocyanate, ethylene glycol, trace PCBs, bleach, soap, blood, and hydrogen peroxide. Tank 3 reportedly last stored ammonia after storing several other wastes. This site has been identified as a known release location (DOE 2002a).

HPGe surveys were conducted during the OU 9 RFI/RI and results indicated thorium-232 activity was slightly greater than background levels. NaI surveys indicated six locations had activities greater than background levels. Surface soil samples were also collected and analyzed, and americium-241 and plutonium-239/240 activities were greater than background levels (DOE 2002a).

Subsurface soil samples indicated plutonium-239/240 activities were greater than background levels at a depth of 0.0 to 0.6 inches and 2.0 to 4.6 ft adjacent to the northwestern corner of Tanks 2 and 3. Groundwater samples at this location indicated all TAL metal concentrations and radionuclide activities, except cesium, molybdenum, beryllium, and silver, were greater than background levels. Plutonium-239/240 activities and lead concentrations were greater than background levels at 0 to 6 inches bgs adjacent to the southwestern corner of the tanks. Groundwater samples at the same location indicated americium-241, uranium-233/234, and uranium-238 activities, as well as aluminum, arsenic, barium, lead, manganese, potassium, sodium, and strontium concentrations were greater than background levels (DOE 2002a).

Soil samples from the borehole located adjacent to the southern side of Building 441 indicated americium-241 and plutonium-239/240 activities and lead concentrations were greater than background levels at the depth of 0.0 to 6.0 inches. Plutonium-239/240 and uranium-238 activities and lead concentrations were greater than background levels at a depth of 0.0 to 6.0 inches at the borehole located adjacent to the eastern side of Building 441. Groundwater samples from the same location indicated all radionuclide activities and all metal concentrations except antimony, beryllium, cadmium, calcium, cesium, molybdenum, silicon, silver, and tin were greater than background levels (DOE 2002a).

Soil samples from the borehole adjacent to the northeastern corner of Building 441 indicated plutonium-239/240 activities and lead concentrations were greater than background at a sample depth of 0.0 to 6.0 inches. Groundwater samples indicated all radionuclide activities and all metal concentrations except antimony, beryllium, cadmium, calcium, cesium, molybdenum, silicon, silver, and tin were greater than background levels. Soil data are available in the IA Data Summary Report (DOE 2000).

Liquid samples collected in the Tank T-2 vault indicated every radionuclide analyzed for had positive activity, with gross alpha/beta, uranium-233/234, uranium-235, and uranium-238 having moderate to high activity (DOE 2002a).

Physical/Chemical Description of Constituents Released

The tanks were known to have stored process waste from Buildings 441 and 123. Nitrates and radionuclides would have been present. One reference describes the waste as having TDSsolids

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ranging from 532 to 965 ppm and a pH that ranged from 7.15 to 5.85. Limestone was used to help control the acidic nature of the waste (DOE 1992).

Responses to Operation or Occurrence

In 1953, the system was modified to allow liquid wastes to be released directly to the sanitary system therefore reducing the amount of waste passing through these tanks. A telephone interview was conducted on November 14, 1991, with RFP Liquid Waste Operation personnel. It was stated that at the present time the limestone tank may contain groundwater seepage but that it is no longer pumped or checked (DOE 1992).

Tanks 2 and 3 and the OPWL are associated with Building 441. UBC 441 is part of IHSS Group 400-8. In accordance with IASAP Addendum #IA-03-01 for IHSS Group 400-8 (DOE 2002b), characterization samples were collected and analyzed. Notification of planned accelerated action activities was provided in ER RSOP Notification #03-06 (DOE 2003). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 400-8 (DOE 2004). As noted in the Closeout Report, Tanks T-2 and T-3 were completely removed.

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, SVOCs, nitrate, and PCBs are considered COCs for IHSS Group 400-8, which includes PAC 400-122. The nature and extent of contamination at PAC 400-122 was characterized in accordance with IASAP Addendum #IA-03-01 for IHSS Group 400-8 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 400-8, which includes PAC 400-122, because of the following:

- Potential sources of contamination that existed in IHSS Group 400-8 (tanks and drain lines) were removed.

- Contaminant concentrations were less than WRW ALs, except for one elevated arsenic concentration at location BW38-004 (between 4.5 and 6.5 ft bgs) and one benzo(a)pyrene concentration at BV38-002 (between 10 and 11 ft bgs.) (Only BV38-002 is near the tanks.) The arsenic concentration was 23.0 mg/kg, and the WRW AL is 22.2 mg/kg. The detected arsenic concentration is within the range of background concentrations historically observed at the Site. The benzo(a)pyrene concentration was 3,700 µg/kg, and the WRW AL is 3,490 µg/kg.

No long-term stewardship activities are recommended for IHSS Group 400-8 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on

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construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-8 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 400-8 (B441) - Approval, March 19.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report for IHSS Group 400-8, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: 400-136.1 AND 400-136.2

| | |
|---|---|
| IHSS Number: | 136.1 and 136.2 |
| Operable Unit: | Industrial Area |
| IHSS Group: | 400-3 |
| Unit Name: | 400-136.1 - Cooling Tower Pond West of Building 444 |
| | 400-136.2 - Cooling Tower Pond East of Building 444 |
| Approximate Location: | N480,000; E2,082,000 |

Date(s) of Operation or Occurrence

1956 - 1969

Description of Operation or Occurrence

The CEARP Phase 1 and RCRA 3004(u) both state that there were three cooling water ponds located in the vicinity of Building 444; however, documentation was found during the HRR research that supports the location and existence of only two ponds (DOE 1992).

One pond west of Building 444 (IHSS 136.1) can be clearly seen in an aerial photograph taken in 1964. Another pond was excavated east of the Building 444 (IHSS 136.2) exclusion area fence and railroad spur. It was utilized May 25, 26, and 27, 1956, by an outside contractor (Dowell) to collect the various solutions used during cleaning of the cooling tower. In September 1956, when the liquid had evaporated and percolated away, the pond was backfilled (DOE 1992).

On December 2, 1958 cooling water from Building 447 was pumped to a surface ditch and allowed to flow across plant site. The reference for this release indicates the pond east of Building 444 should have been utilized in this instance because it had been used in the past for drainages and flushing of the cooling tower. It is possible that this reference was to the pond used by Dowell in 1956 (DOE 1992).

Physical/Chemical Description of Constituents Released

The main purpose of these ponds was to hold cooling tower blowdown from Buildings 444 and 447. This liquid probably contained chromates because chromium was found during the cooling tower's dismantlement in 1975. Hexavalent chromium was commonly used in cooling towers as a corrosion inhibitor until the early 1970s. One pond was used to catch solutions during a cleaning operation of the cooling tower. Lithium may also have been destroyed (oxidized) by

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placement of the material in one of these ponds. In addition, small amounts of depleted uranium may have been buried at this site (DOE 1992).

Responses to Operation or Occurrence

In 1956, liquids in the pond east of Building 444 (IHSS 136.2) were allowed to evaporate and percolate into the soil; the pond was later backfilled. No documentation of the response to other ponds was found (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSSs 136.1 and 136.2, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSSs 136.1 and 136.2. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSSs 136.1 and 136.2, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: 400-157.2

IHSS Number: 400-157.2

Operable Unit: Industrial Area

IHSS Group: 400-6

Unit Name: Radioactive Site South Area

Approximate Location: N748,700; E2,082,300

Date(s) of Operation or Occurrence

1953 - Present

Description of Operation or Occurrence

The Radioactive Site South Area (IHSS 157.2) includes the soil and paved area surrounding Buildings 444, 447, 440, and 439. IHSS 137 site boundaries were expanded to include the area adjacent to and surrounding the buildings to include other activities that took place in the general area that characterize this site (DOE 1992).

Building 444 was functioned mainly as a depleted uranium foundry, a carbon machining shop, and for beryllium fabrication. Prior to 1973, the soils surrounding Buildings 444, 447, 440, and 439 were known to contain low levels of uranium and chemical contamination. Buildings 439 and 440 also had possible infiltration of hydraulic oil and carbon tetrachloride originating from the uranium machine tool storage area (DOE 1992).

Several operations associated with Building 444 contributed to contamination in the area. Probably the most significant contamination occurred near the south dock where solvents, used to rinse beryllium parts, were dumped onto the ground. Details of activities on this dock are described in the narrative for PAC 400-116.2. In March 1954, soil sampling revealed contamination at levels twice background in a ditch south of Building 444 caused by washing the dock and apron. Another reference states that sampling conducted in 1954 indicated soil activity levels 3 times that of background in a ditch south of Building 444 (DOE 1992).

Material storage in an open ingot storage area east of Building 444, a metal storage area to the south of the building, and a uranium machine tool storage area to the west undoubtedly resulted in low-level radionuclide contamination of the soil. There have also been cooling tower ponds in the area that are described in PAC 400-136 (DOE 1992).

Numerous incidents are mentioned in documents found during the 1992 HRR (DOE 1992) search that indicate contamination releases to the area; however, most of them provide few details. The documented incidents include the following:



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- In May 1960, a vacuum collector fire in Building 447 resulted in the release of approximately 44 µCi of depleted uranium. The depleted uranium was deposited on the roof of the building.
- One reference mentions the need to cleanup the area around Building 444 but there is no indication of what was cleaned.
- In December 1962, a uranium and beryllium release from Building 444 occurred through an unfiltered hood.
- In June 1966, a process waste line broke to the north of Building 444.
- On November 11, 1974, 170 $ft^2$ of road south of Building 444 (probably Cedar Avenue) was contaminated when a barrel containing uranium chips was dropped during transfer.
- RFP photographs taken in 1978 show poor housekeeping in the area of Building 440. The area is littered with miscellaneous materials such as pallets, open paint cans, and machinery, and cargo containers are located north of the building.
- On February 23, 1978, a fire in the air plenum south of Building 444 that services the beryllium machining operations in Room 107 resulted in the release of an estimated 14.5 g of beryllium. Details of this fire can be found in PAC 400-810.
- An incident occurred on November 4, 1985 involving pressurization of a process line in Building 447. The pressure forced liquid through a floor drain and up the vent pipe onto the roof where it ran into the gutter and onto the ground below. Contamination levels were as high as 10,000 cpm beta activity.
- While transferring three drums across plant site on November 30, 1990 one barrel containing beryllium ingots somehow picked up some radioactivity. All areas were smeared along the path the barrels had been taken and other high smears (greater than 25 cpm/$ft^2$) were found just outside the beryllium machine shop (Building 444) at the exit/entrance door.

Physical/Chemical Description of Constituents Released

The principal materials that have contributed to contamination in the area around Building 444 are depleted and enriched uranium, beryllium, chlorinated solvents, and hydraulic oil. There may also be lithium and chromium in the sediments due to the presence of cooling tower ponds (PAC 400-136).

Responses to Operation or Occurrence

No documentation was found that indicated cleanup of any of the minor incidents with the exception of a cleanup in 1960, which had no associated incident.

There was a large cleanup attempt after the 1978 Building 444 plenum fire. Firemen responding to the alarm began spraying the exterior of the plenum with water where the paint had started to blister in addition to the area around the plenum to settle the contaminated dust. Temporary dams were established in the ditches south and east of the building and samples were taken of the



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impounded firewater. Laboratory analysis revealed 1.6 mg/L beryllium in the east ditch and 4.3 mg/L in the south ditch, respectively. This water was picked up and sent to Building 774 for processing. Personnel who were in the building at the time of the fire were sent to Building 881 for showers. This water was retained until analytical results indicated there was no beryllium present.

After the 1985 Building 447 event, the process waste overflow was decontaminated to less than 250 cpm or painted to contain the radioactivity. The drain that was involved was to have been relocated and a ball check valve installed on the vent pipe.

Following the 1990 drum event, the contaminated drum at the machine shop was wiped down to under to 25 cpm/ft$^2$ and the barrels were removed from the beryllium machine shop.

Accelerated action activities were conducted at IHSS Group 400-6, which consists of IHSS 400-157.2, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-14 (DOE 2003).

Fate of Constituents Released to Environment

Based on IHSS Group 400-6 Site histories and historical soil sampling results, radionuclides, metals, pesticides, PCBs, SVOCs, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-10.5 ft bgs) soil samples were analyzed for COCs during characterization activities. Three COCs; arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene, were detected in subsurface soil at concentrations greater than WRW ALs: The accelerated action characterization activities conducted at IHSS Group 400-6 and the rationale for NFAA at IHSS 400-157.2 are discussed in detail in the Draft Data Summary Report for IHSS Group 400-6 (DOE 2004). The rationale for NFAA at IHSS 400-157.2 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 400-157.2 based on the following:

- Concentrations of COCs were not detected above RFCA WRW ALs except for arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene. The concentrations of arsenic and dibenz(a,h)anthracene were only slightly higher than the WRW ALs. Benzo(a)pyrene was detected at approximately 4 times the WRW AL, but this was an isolated detection in the subsurface.

- Migration of soil contaminants to surface water is unlikely because IHSS Group 400-6 is not located in an area of high erosion, based on RFCA Attachment 5, Figure 1.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-6 (IHSS 400-157.1) on September 29, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 400-6, IHSS 157.2 Radioactive Site South Area, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, CO, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-14, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2004, Draft Data Summary Report for IHHS Group 400-6, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 400-182

IHSS Number: 182

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Buildings 444/453 Drum Storage Area

Approximate Location: N748,700; E2,082,150

Date(s) of Operation or Occurrence

Prior to 1957 - unknown

Description of Operation or Occurrence

In May 1957, it was noted that numerous barrels of depleted uranium oxide were being stored in the "backyard" of Building 444. The storage was not on a concrete slab and there was concern that the barrels would be subject to corrosion (DOE 1992).

For many years Building 453 was used as an oil storage area. In July 1983, high groundwater forced some of the residual oil that had been spilled over the years out of the ground. Several pools of oil formed adjacent to the building. At that time, 25 barrels of used oil awaiting disposal were being stored outside the building. Low-level oblique photographs taken in 1982 reveal heavy, dark staining around Building 453 and along the western side of Building 444 (DOE 1992).

Physical/Chemical Description of Constituents Released

The waste stored in the "backyard of Building 444" in 1957 was depleted uranium oxide waste.

No documentation was found that detailed what the oil that surfaced in July 1983 had been used for or whether it was contaminated. The building superintendent was advised to cleanup the area in 1983. As of July 22, 1983, the oil had not been cleaned up and the building superintendent had been contacted a second time (DOE 1992).

Responses to Operation or Occurrence

A sitewide radiometric survey was performed from 1977 through 1984. The purpose of the survey was to identify surface areas extremely contaminated with plutonium. The area around Building 453 was surveyed in May 1984. The area north of Building 453 was identified as being unable to be surveyed due to high-level background radioactivity. As of August 2, 1984,

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activities associated with a contaminated area discovered by the Radiometric Survey Team, near Door 2 of Building 453, had not yet been reduced to background (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSS 182, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS 182. The nature and extent of contamination was characterized in accordance IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSS 182, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

## PAC REFERENCE NUMBER: 400-207

IHSS Reference Number: 207

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Inactive 444 Acid Dumpster

Approximate Location: N748,600; E2,082,650

Date(s) of Operation or Occurrence

1980 - 1987

Description of Operation or Occurrence

Two 500-gallon stainless steel acid dumpsters were located east of Building 444 to store building waste. As the waste was generated, it was drained into a small free-standing metal sump tank and then pumped to the dumpster. Although the total capacity would have been 1,000 gallons, only one dumpster was filled at a time. The dumpster receiving waste was placed within a berm with a capacity of 640 gallons. When the dumpster became full, it was removed with a fork lift and transported to either Building 374 or Building 774. An empty dumpster was then put within the berm to receive waste (DOE 1992).

The containment berm had interior dimensions of 9 ft by 9.5 ft by 1 ft and was built of asphalt. It was still intact as of October 1988. In January, 1981, Radiation Monitoring encountered uranium contamination in the catch basin. The quick disconnect assembly had been replaced without a gasket allowing liquid to leak into the catch basin (DOE 1992).

Physical/Chemical Description of Constituents Released

The types of wastes stored in these containers consisted of acid waste from beryllium machining, electropolishing solution, and wastes from chemical milling. The raw milling acid was a mixture of 75 percent phosphoric acid, 3 percent sulfuric acid, and chromium trioxide. Analytical results indicated the acid waste contained significant amounts of cyanide, cadmium, chromium, lead, silver, and arsenic, and also contained detectable amounts of uranium, americium, and tritium. The spill in 1981 consisted of uranium-contaminated process waste (DOE 1992).

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Responses to Operation or Occurrence

The dumpsters and piping were decontaminated and moved to another processing area in 1987. The process waste spill was cleaned up and a new gasket was installed. The dumpsters are no longer in place (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSS 207, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

No documentation was found that detailed a release to the environment in 1981. The spill was contained within the catch basin (DOE 1992).

Radionuclides and metals are considered COCs for IHSS 207. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSS 207, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

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References

CDPHE, 2003. Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

95

## PAC REFERENCE NUMBER: 400-208

IHSS Reference Number: 208

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Inactive 444/447 Waste Storage Area

Approximate Location: N748,650; E2,082,100

Date(s) of Operation or Occurrence

1986 - 1987

Description of Operation or Occurrence

This area was used for a short time for hazardous waste storage in a 20- by 8-ft cargo container with secondary containment. The maximum volume of waste stored was 990 gallons. No documentation was found that indicates spills or leaks to the soil in this area. The cargo container has been moved. This unit was identified as Unit No. 3 in the 1986 RCRA Part B Permit application (DOE 1992).

Physical/Chemical Description of Constituents Released

The typical wastes stored in the cargo container included a composite of nitric acid with silver, sodium fluoride solution, plating acids (hydrochloric acid, nitric acid, and hydrofluoric acid) with concentrated chromium plating solution, concentrated cadmium cyanide solution, nickel sulfate, and developer/fixer (DOE 1992).

Responses to Operation or Occurrence

No documentation was found that indicated releases to the environment in this area. The cargo container was moved to the Building 444/453 Drum Storage Area (PAC 400-182).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes IHSS 208, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

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Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS 208. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes IHSS 208, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: 400-801

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Transformer, Roof of Building 447

Approximate Location: N748,500; E2,082,500

Date(s) of Operation or Occurrence

Unknown - 1987

Description of Operation or Occurrence

A transformer was located on the roof of Building 447. The pad may have had a berm around it at one time. It is believed to have leaked prior to its removal in 1987. Downspouts are located north of the transformer's former position that would have allowed PCB-contaminated runoff to infiltrate soils adjacent to Building 447. A storm drain is situated roughly 20 ft from the building and may have also been contaminated (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sample location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Smear samples collected in 1987 from the drain valve and adjacent transformer wall revealed 120 and 194 µg of PCBs, respectively (DOE 1992).

Responses to Operation or Occurrence

In 1976, roofing material was removed from under the transformer because of possible leaks. The transformer was removed in 1987. It was recommended in 1987 that the area be cleaned again unless it had already been cleaned three times, in which case no further action was required (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes PAC 400-801, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

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Fate of Constituents Released to Environment

Radionuclides, metals, and PCBs are considered COCs for PAC 400-801. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes PAC 400-801, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

99

# PAC REFERENCE NUMBER: 400-803

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-4

Unit Name: Miscellaneous Dumping, Building 446 Storm Drain

Approximate Location: N749,000; E2,083,000

Date(s) of Operation or Occurrence

July 1972

Description of Operation or Occurrence

PAC 400-803 consists of a reported release to the storm drain west of Building 446. A roofing contractor at Building 444 had reportedly dumped miscellaneous materials into the storm drain, which consisted of silver paint, aluminum paint, and possibly other materials including oil. The material flowed along a historic open ditch south of Cottonwood Avenue to a point south of the former fuel oil storage tanks, passed beneath the street, and ran northeast to the extent of Seventh Avenue (DOE 1992).

Physical/Chemical Description of Constituents Released

The dumping consisted of silver paint and possibly other materials including oil and aluminum paint (DOE 1992).

Responses to Operation or Occurrence

The contractor was to have cleaned up the ditch and taken the residue to the landfill (DOE 1992).

In accordance with IASAP Addendum #IA-04-14 for IHSS Group 400-4 (DOE 2004a), which includes PAC 400-803, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-4 (DOE 2004b).

Fate of Constituents Released to Environment

Radionuclides, metals, and SVOCs are considered COCs for PAC 400-803. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-04-14

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(DOE 2004a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-4, which includes PAC 400-803, because of the following:

- COC concentrations in soil were less than the WRW ALs except for benzo(a)pyrene and dibenz(a,h)anthracene.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants to groundwater with subsequent impact to surface water is not likely because of the low levels of soil contamination found at UBC 770. The existing contaminated groundwater in the area is considered part of the IA Plume, which will be further evaluated in the groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 400-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-4 on August 23, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, Re: Approval, Data Summary Report for IHSS Group 400-4, PAC 400-803 – Miscellaneous Dumping, Building 446 Storm Drain, and PAC 400-804 – Road North of Building 460, August 23.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004a, Industrial Area Sampling and Analysis Plan Fiscal Year 2004 Addendum #IA-04-14, IHSS Group 400-4, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2004b, Data Summary Report for IHSS Group 400-4, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

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## PAC REFERENCE NUMBER: 400-804

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-4

Unit Name: Road North of Building 460

Approximate Location: N749,000; E2,082,000

Date(s) of Operation or Occurrence

June 11, 1957

Description of Operation or Occurrence

On June 11, 1957, a pallet box with four ingots of unknown composition fell from a truck. The road, which was north of Building 446, was damaged. After removal of the ingots, the area was dry-vacuumed and monitored; however, monitoring was discontinued because of rain. Photographs have been located that document this event (DOE 1992).

Physical/Chemical Description of Constituents Released

The contamination consisted of four ingots of unknown composition (DOE 1992).

Responses to Operation or Occurrence

The ingots were removed and the area was dry vacuumed. The day after the incident direct counts up to 500 cpm and smears up to 104 dpm were obtained from the damaged area. These hot spots were covered with asphalt patching material (DOE 1992).

In accordance with IASAP Addendum #IA-04-14 for IHSS Group 400-4 (DOE 2004a), which includes PAC 400-804, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-4 (DOE 2004b).

Fate of Constituents Released to Environment

Radionuclides, metals, and SVOCs are considered COCs for PAC 400-804. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-04-14 (DOE 2004a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-4, which includes PAC 400-804, because of the following:

- COC concentrations in soil were less than the WRW ALs except for benzo(a)pyrene and dibenz(a,h)anthracene.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants to groundwater with subsequent impact to surface water is not likely because of the low levels of soil contamination found at UBC 770. The existing contaminated groundwater in the area is considered part of the IA Plume, which will be further evaluated in the groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 400-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-4 on August 23, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, Re: Approval, Data Summary Report for IHSS Group 400-4, PAC 400-803 – Miscellaneous Dumping, Building 446 Storm Drain, and PAC 400-804 – Road North of Building 460, August 23.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004a, Industrial Area Sampling and Analysis Plan Fiscal Year 2004 Addendum #IA-04-14, IHSS Group 400-4, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2004b, Data Summary Report for IHSS Group 400-4, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

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## PAC REFERENCE NUMBER: 400-810

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Beryllium Fire - Building 444

Approximate Location: N748,500; E2,082,000

Date(s) of Operation or Occurrence

February 23, 1978

Description of Operation or Occurrence

While welding on a small inlet duct of the beryllium air plenum that serves Building 444, a Swinerton and Walberg (S&W) employee noticed a fire on the face of the prefilters. He immediately informed another S&W employee who activated a manual fire alarm. The Fire Department was already responding to the automatic filter alarm. In approximately 15 minutes, the fire was extinguished (DOE 1992).

The exhaust fan automatically shut down when the filter fire detection equipment was activated resulting in a negative pressure inside the building which caused smoke to back up into Room 107. A worker in the area noticed the smoke and activated a third alarm (DOE 1992).

Physical/Chemical Description of Constituents Released

Analytical results indicated 14.5 grams of beryllium were released. This exceeded the EPA limit of 10 grams. Beryllium levels in the fire water collected from the east and south impoundment were 1.6 and 4.3 mg/L, respectively. Analytical results from pond samples and the shower water impounded at Building 990 indicated concentrations of beryllium less than 0.5 mg/L (DOE 1992).

Air sampling stations indicated beryllium concentrations ranging from 0.009 to 0.021 $\mu gm/m^3$. At the time of this incident, OSHA's standard 8-hour time-weighted average was 2.0 $\mu gm/m^3$. Samples collected along Highway 93 contained concentrations of 0.006 to 0.015 $\mu gm/m^3$ which can be compared to the EPA standard of 0.01 $\mu gm/m^3$ continuous exposure to the general public. RFP Environmental Sciences estimated that exposure time would have been only one half hour (DOE 1992).

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Stack emissions were monitored for uranium during the fire. Total long-lived alpha was found to be 0.08 pCi/L and total uranium was 0.092 pCi/L. Total Plant stack emissions for February 1977 were 2.3 µCi (DOE 1992).

Responses to Operation or Occurrence

Firemen responded to the fire by initially spraying the outside of the plenum where the paint had blistered. One team was able to extinguish the fire from inside the plenum. A fog nozzle was used which was thought to have "washed" any airborne particulate from the air. Other areas around Building 444 were also sprayed down to control contamination. The roadway south of Building 444, where the fire water had flowed, was vacuumed and monitored for beryllium. All smears were determined to have background levels (DOE 1992).

Fire water samples were collected from the impounded ditches south and east of Building 444. Water samples were also collected at Ponds A-3, B-3, and C-1, and from the Building 881 shower water where some employees were bussed to take showers. Air samplers were set up to establish the amount of airborne contamination. Employees that were evacuating the building were monitored in an established control area (DOE 1992).

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes PAC 400-810, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Water from the ditches adjacent to Building 444 was transferred to Building 774 for processing. Shower water from Building 881 was impounded at the building's south holding basin (DOE 1992).

Radionuclides and metals are considered COCs for PAC 400-810. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes PAC 400-810, because of the following:

- COC concentrations in soil were less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater

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contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003. Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: 500-117.1

IHSS Number: 500-117.1,

Operable Unit: Industrial Area

IHSS Group: 500-1

Unit Name: North Site Chemical Storage

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

Prior to September 1959 - Early 1970s (DOE 1992).

Description of Operation or Occurrence

IHSS 500-117.1 is an area northeast of Building 551 that was used as a general warehouse storage yard. Numerous incidents are reported in the 1992 HRR (DOE 1992) as follows:

- In September 1959, an occasional build-up of radioactive material was detected during routine monitoring of the aluminum scrap pile near Building 551;
- In May 1963, uranium chips and turnings were discovered in an aluminum scrap pile located at the site; and,
- In May 1964, 40 drums of aluminum scrap contaminated with uranium chips and turnings were discovered in the storage yard.

Physical/Chemical Description of Constituents Released

In September 1959, an area of the aluminum scrap (approximately 1 ft square) located near Building 551 measured a maximum of 20 mr/hr (DOE 1992).

Responses to Operation or Occurrence

The 40 drums of aluminum scrap contaminated with uranium chips and turnings was dumped into the acid waste in Solar Evaporation Pond 207A (PAC 000-101) (DOE 1992). In the early 1970s, the material in the general warehouse storage yard was transferred to the Property Utilization and Disposal storage yard southwest of the present landfill (PAC NW-170).

Surface soil samples collected during the OU 13 Phase I RFI/RI indicated plutonium-241, copper, mercury, lead, selenium, silver, and zinc were present above background levels.

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Numerous VOCs were detected in soil gas samples (DOE 2001). These data are available in the IA Data Summary Report (DOE 2000).

Accelerated action activities were conducted at IHSS Group 500-1, which includes IHSS 500-117.1, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with IASAP Addendum #IA-04-03 (DOE 2003).

Fate of Constituents Released to Environment

Based on IHSS 500-117.1 site history and historical soil sampling results, radionuclides, metals, PCBs, dioxins/furans, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-14.5 ft bgs) soil samples were analyzed for COCs during characterization activities. No COCs were detected at concentrations or activities greater than WRW ALs. The accelerated action characterization activities conducted at IHSS 500-117.1 and the rationale for NFAA are discussed in detail in the Draft Data Summary Report for IHSS Group 500-1 (DOE 2004). The rationale for NFAA at IHSS 500-117.1 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 500-117.1 based on the following:

- Residual contaminant concentrations or activities in surface and subsurface soil are less than WRW ALs.
- No further accelerated action is required based on the SSRS.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-1, including IHSS 500-117.1, on September 29, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-1, IHSS 300-186, IHSS 500-117.1 and IHSS 500-197, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-03, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

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DOE, 2004, Draft Data Summary Report for IHHS Group 500-1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

## PAC REFERENCE NUMBER: 500-117.2

IHSS Reference Number: 117.2

Operable Unit: Industrial Area

IHSS Group: 500-4

Unit Name: Middle Site Chemical Storage

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

Prior to approximately 1971 - prior to September 1988

Description of Operation or Occurrence

There have been minor leaks and spills in the chemical storage area east of Building 551. An inspection in approximately 1971 revealed several drums that were leaking an oily substance. On October 20, 1986, a 55-gallon drum of aluminum nitrate was punctured by a forklift east of Building 551. Most of the 55 gallons flowed out and across the roadway to the east (Seventh Street) (DOE 1992).

Physical/Chemical Description of Constituents Released

Constituents released included acids, oils, soaps, solvents, and beryllium scrap metal. The October 20, 1986 incident released aluminum nitrate (DOE 1992).

Responses to Operation or Occurrence

In the early 1970s, there was a recommendation made for the repacking of leaking drums in the storage area. The chemical storage area east of Building 551 was covered with asphalt sometime during the 1970s. The October 20, 1986, incident was controlled with no environmental damage. No documentation was found that detailed further responses to occurrences at the chemical storage area east of Building 551 (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents (DOE 1992).

Characterization samples were collected and analyzed at IHSS 117.2 in accordance with IASAP Addendum #IA-03-05 for IHSS Group 500-4 (DOE 2003). Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 500-4 (DOE 2004).

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Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS 117.2. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-05 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS 117.2 because of the following:

- Contaminant concentrations were below WRW ALs with the exception of arsenic in subsurface soil at one location.
- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination encountered in IHSS 117.2. Contaminated groundwater in the vicinity of the IHSS is considered part of the IA Plume, which will be further evaluated in the groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS 117.2 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-4 on June 18, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-4, IHSS 500-117.2, Middle Site Chemical Storage, June 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Final Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, 2004, Data Summary Report for IHSS Group 500-4, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

## PAC REFERENCE NUMBER: 500-158

IHSS Reference Number: 158

Operable Unit: Industrial Area

IHSS Group: 500-2

Unit Name: Radioactive Site - Building 551

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

September 1959 - 1970

Description of Operation or Occurrence

There may have been residual contamination from leakage of waste boxes loaded onto railroad container cars in the area north of Building 551. In September 1959, three containers with radiation measuring 6,000 to 40,000 cpm were held back from off-site shipment. On June 7, 1961, isolated spots of contamination up to 8,000 cpm were found on the dock and in the helium storage area of Building 553 (DOE 1992).

Empty drums contaminated with uranium from off site were received at Building 551. In October 1962, spot checks of one load of approximately 220 drums indicated they were generally contaminated with up to 1,200 cpm on exteriors and up to 7,000 cpm on the interior surfaces. In July 1963 and again in 1970, RFETS received equipment and drums from off site that contained uranium above the acceptable level (DOE 1992).

Physical/Chemical Description of Constituents Released

Uranium is a constituent documented to have been released to the environment.

Responses to Operation or Occurrence

Spots of contamination (found in June 1961) on the dock and in the helium storage area of Building 553 were cleaned. In 1970, an entire shipment of 55-gallon drums was returned to the vendor. No documentation was found that further detailed responses to the occurrences at this site.

In accordance with IASAP Addendum #IA-03-07 (DOE 2003), characterization samples were collected and analyzed at IHSS 158. Characterization results indicated one surface soil sampling location, CA41-025, where chromium (2,600 mg/kg) exceeded the RFCA WRW AL of 268

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mg/kg. The remaining contaminant concentrations were below RFCA WRW ALs. Because a WRW AL was exceeded at this one location in surface soil, accelerated action activities were planned as provided in ER RSOP Notification #04-14 (DOE 2004a). Chromium-contaminated soil at location CA41-025 was removed from an area approximately 4.5 ft by 5 ft by 6 inches deep. Analytical results from the site characterization and confirmation sampling are presented in the Closeout Report for IHSS Group 500-2 (DOE 2004b).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS 158. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-07 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further accelerated action is not required and an NFAA determination is justified for IHSS 158 because of the following:

- Chromium-contaminated soil surrounding location CA41-025 was removed. Confirmation sampling indicated chromium levels were well below the WRW AL.
- Accelerated action characterization and confirmation sampling results indicate no other contaminant concentrations exist in surface or subsurface soil greater than the RFCA WRW ALs.

No long-term stewardship activities are recommended for IHSS 158 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-2 (IHSS 158) on June 18, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Closeout Report for IHSS Group 500-2, IHSS 500-158 Radioactive Site – Building 551, June 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-07, IHSS Group 500-2, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2004a, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #04-14, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004b, Closeout Report for IHSS Group 500-2, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

## PAC REFERENCE NUMBER: 500-169

IHSS Reference Number: 169

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Waste Drum Peroxide Burial

Approximate Location: N749,500; E2,083,000

Date(s) of Operation or Occurrence

April 1981

Description of Operation or Occurrence

According to the HRR (DOE 1992), during the week ending April 24, 1981, warehouse personnel were transporting three 55-gallon drums of hydrogen peroxide when two of the drums fell off a pallet. According to one reference, one of the drums burst open, and the peroxide drained into a culvert at the corner of Fifth and Central Avenues. A second reference states that in April 1981, a 55-gallon drum of 35-percent hydrogen peroxide solution spilled at the warehouse (no associated building number was given). The contents of the drum leaked out and were flushed into a hole with water (see Comments).

According to the RCRA 3004(u) Report, a 55-gallon drum of hydrogen peroxide was buried in the chemical storage area east of Building 551 (DOE 1992). As discussed in the HRR, the documentation indicating that a 55-gallon drum of hydrogen peroxide was buried in the chemical storage yard was considered suspect, and additional documentation was not found that corroborated this report. Research during the preparation of the Phase I RFI/RI Work Plan for OU 13 (EG&G 1992) did not reveal any additional information to substantiate the buried drum described as IHSS 169.

Physical/Chemical Description of Constituents Released

A drum of hydrogen peroxide was reportedly buried, and the contents may have been released to the environment.

Responses to Operation or Occurrence

Consistent with the findings presented in the HRR (DOE 1992), Phase I RFI/RI Work Plan for OU 13 (EG&G 1992), Technical Memorandum 1 for OU 13 (DOE 1994), and Data Summary No. 2 for OU 13 (DOE 1995), IHSS 169 was proposed for NFA in the 1998 Annual Update to

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the HRR. However, based on comments received from the regulatory agencies on July 9, 1999, (EPA and CDPHE 1999), GPR techniques were utilized on June 29, 2000, to determine whether a buried drum existed in the area. An area approximately 60 by 40 ft was surveyed using GPR at a 2-ft grid spacing.

Fate of Constituents Released to Environment

Four anomalies appeared on the GPR strip charts as dense shallow objects. All of the locations identified, with the exception of one, were believed to be remnant concrete pieces associated with the fence (now removed) at this location, or rocks. Based upon the density readings, the other location was considered to be a large, dense metallic object (K-H 2000). It is not currently believed that this anomaly represents a drum. Furthermore, if there was a release of hydrogen peroxide, it would decompose into water and oxygen in the presence of metals, which are abundant in the soil. The Phase I RFI/RI Work Plan for OU 13 (EG&G 1992) concluded that a release or potential release of hydrogen peroxide does not constitute a threat to human health or the environment.

Action/No Further Accelerated Action Recommendation

IHSS 169 is proposed for NFAA for several reasons. First, the evidence that a drum of hydrogen peroxide was disposed in the chemical storage area is suspect. Second, the results of the GPR survey in this area do not appear to indicate the presence of a buried drum. Third, hydrogen peroxide readily breaks down into water and oxygen in the environment, a process that would have certainly run its course in the more than 20 years since the peroxide may have been released. Accordingly, the hydrogen peroxide release would not constitute a threat to human health or the environment. Lastly, the chemical storage yard lies within IHSS 117.2, and is being investigated pursuant to IASAP Addendum #IA-03-05 for IHSS Group 500-4 (DOE 2003).

After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS 169 on February 20, 2004 (CDPHE 2004).

Comments

The description of IHSS 191 (PAC 400-191) in the 1997 update to the HRR (DOE 1997) is identical to the description presented in this first paragraph, and is based on the same two references. The NFA for PAC 400-191 was approved by the regulatory agencies in 1999 (EPA and CDPHE 1999). Accordingly, the focus of PAC 500-169 is the hydrogen peroxide release based on the RCRA 3004(u) Report.

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval: No Further Accelerated Action (NFAA), PAC 500-169 Waste Drum Peroxide Burial, February 20.

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DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1994, Technical Memorandum 1, Addendum to the Field Sampling Plan, OU 13, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 1995, Draft Operable Unit 13 Data Summary No. 2, 100 Area, RFP/ERM-95-009, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 1997, Annual Update for the Historical Release Report, Revision 0, RF/RMRS-97-073.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

EG&G, 1992, Phase I RFI/RI Work Plan for OU 13, 100 Area, 21100-WP-OU13.01, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

EPA and CDPHE, 1999, Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII and S. Gunderson, CDPHE, RE: 1997 Annual HRR Review, July 9.

K-H, 2000, Building 551 Ground Penetrating Radar Report, conducted June 29, 2000, Rocky Flats Environmental Technology Site, Golden, Colorado.

## PAC REFERENCE NUMBER: 500-197

IHSS Number: 500-197

Operable Unit: Industrial Area

IHSS Group: 500-1

Unit Name: Scrap Metal Storage Site

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

Approximately 1958 - Early 1960s (DOE 1992).

Description of Operation or Occurrence

In approximately 1958, scrap metal components, mostly from the original plant construction program, were buried in trenches west of Building 559. Some of the buried materials were recovered from process areas. Another source states that the burial probably occurred in the early 1960s. The site was probably used by the Austin Company for disposal of construction debris during early building activities (DOE 1992).

Physical/Chemical Description of Constituents Released

Some of the scrap metal material recovered from the process areas and buried in the trenches could possibly have been radioactively contaminated. There is a slight possibility that transformers containing PCBs were disposed of at this site (DOE 1992).

Responses to Operation or Occurrence

In 1981, excavation for the construction of the Perimeter Security Zone unearthed the scrap metal burial sites, including IHSS 500-197. Plant personnel remediated the site by complete excavation of the trenches and removal of the buried material to the sanitary landfill (PAC NW-114) (DOE 1992).

Accelerated action activities were conducted at IHSS Group 500-1, which includes IHSS 500-197, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-04-03 (DOE 2003).

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Fate of Constituents Released to Environment

No radioactive contamination was detected in the material excavated from the scrap metal trenches (DOE 1992).

Based on IHSS 500-197 site history and historical soil sampling results, radionuclides, metals, PCBs, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-6.5 ft bgs) soil samples were analyzed for COCs during characterization activities. No COCs, except for arsenic, were detected at concentrations or activities greater than WRW ALs. Arsenic was detected in one subsurface sample at a concentration of 25.9 mg/kg. The WRW AL is 22.2 mg/kg. The accelerated action characterization activities conducted at IHSS 500-197 and the rationale for NFAA are discussed in detail in the Draft Data Summary Report for IHSS Group 500-1 (DOE 2004). The rationale for NFAA at IHSS 500-197 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 500-197 based on the following:

- Accelerated action sampling results were less than WRW ALs, with the exception of one subsurface arsenic concentration of 25.9 mg/kg. The WRW AL is 22.2 mg/kg.
- No further accelerated action is required based on the SSRS.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-1, including IHSS 500-117.1, on September 29, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-1, IHSS 300-186, IHSS 500-117.1 and IHSS 500-197, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-03, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2004, Draft Data Summary Report for IHHS Group 500-1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 500-900

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer Leak - 515/516

Approximate Location: N750,500; E2,083,000

Date(s) of Operation or Occurrence

Prior to January 1986

Description of Operation or Occurrence

Transformers 515 and 516 were located within the PA west of Building 566 (the new laundry). Transformer 515 rested on the northern side of a switchgear building, and Transformer 516 was located on the southern side of the same building. An EPA inspection in January 1986 identified one of the transformers at the 515/516 substation in violation of TSCA due to leaking. It is believed that the referenced leak occurred on the eastern side of Transformer 516. In September 1986, Transformers 515 and 516 were reported as leaking. A photograph dated September 1986 shows that staining is visible on the concrete pad beneath the Transformer 516 drain valve (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

In 1985, analytical results indicated the oil in Transformers 515 and 516 contained less than 50 ppm PCBs. In October and November 1985 and in June 1986, it was reported that the coolant oil in Transformers 515 and 516 contained 63 and 65 ppm PCBs, respectively. Following a January 1986, inspection, approximately 9 $ft^2$ of soil beneath a valve at the 515/516 substation was found to be contaminated with PCB-contaminated oil. In November 1986, smear samples collected from the Transformer 515 drain valve and concrete pad indicated 3.3 and 2.5 ppm PCBs, respectively. Additional records indicate that transformer oil samples collected in 1992 from Transformers 515 and 516 contained PCB levels of 3 and less than 1 ppm, respectively (DOE 1992).

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Oil containing between 50 and 500 ppm PCBs is believed to have been released to the environment at this site; however, differentiation of contaminant releases between the two transformers is vague in historical records (DOE 1992).

Responses to Operation or Occurrence

In January 1987, it was recommended that the concrete pad beneath Transformer 516 be coated with sealant. In 1986, the fluid in Transformers 515 and 516 was drained and replaced with non-PCB dielectric oil. Transformers 515 and 516 were scheduled for cleanup on August 13, 1989. No further documentation could be found detailing the response to this occurrence.

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocols and analyzed for PCBs using EPA Method 8080. The results indicated PCB levels adjacent to Transformers 515 and 516 were less than 120 ppb and less than 26 ppm, respectively (DOE 1995).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), additional sample screening was completed in 1995 to verify the lateral and vertical extent of PCB migration. Soil screening samples were analyzed using EPA Method 4020, and concrete samples were analyzed using EPA Method 8080. Approximately 6 cy of PCB-contaminated soil were excavated from the eastern side of Transformer 516 in July 1995, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California for disposal (DOE 1996, 1997).

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

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Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 500-901

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer - 555

Approximate Location: N749,500; E2,083,000

Date(s) of Operation or Occurrence

Prior to June 1986

Description of Operation or Occurrence

In June 1986 during routine maintenance, Transformer 555 was reported to have been leaking dielectric coolant oil. The transformer was again reported as leaking in September 1986 (DOE 1992). Transformer 555 was one of two large transformers making up the 555/558 electrical substation that was located near the intersection of Seventh Street and Central Avenue. Transformer 558 was located on the northern side of a switchgear building connecting the two transformers. Soil contaminated with PCBs was identified in a confined area east of the Transformer 558 concrete pad during a sitewide sampling program in August 1991 (DOE 1996).

Physical/Chemical Description of Constituents Released

Historical records indicate Transformer 555 contained dielectric oil with 55 ppm PCBs. Smear samples (up to 6.2 ppm PCBs) collected prior to 1986 from the transformer valve and adjacent areas on the unit confirmed that small quantities of PCBs were released to the environment (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected and analyzed. The results indicated PCB concentrations in soil adjacent to Transformer 555 were less than 4.0 ppm (DOE 1995).

Responses to Operation or Occurrence

In 1986, Transformer 555 was retrofilled with a non-PCB dielectric oil and re-energized (DOE 1992).

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Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 500-902

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer Leak - 559

Approximate Location: N750,000; E2,084,500

Date(s) of Operation or Occurrence

Prior to 1987

Description of Operation or Occurrence

Transformer 559-1 was located on the eastern side of Building 559. This transformer leaked oil containing PCBs from a faulty valve prior to relocation and retrofilling in 1987 (DOE 1992).

Physical/Chemical Description of Constituents Released

Transformer 559-1 contained 235 gallons of dielectric cooling fluid. In October and November 1985, it was reported that Transformer 559-1 contained PCB fluid exclusively (PCBs greater than 500 ppm). In March 1989, it was reported that Transformer 559-1 contained fluid with 500,000 ppm PCBs (DOE 1992).

Responses to Operation or Occurrence

Transformer 559-1 was scheduled for cleaning at the drain valve and the case near the drain valve. In 1987, the transformer was retrofilled and relocated on a new concrete pad several ft to the south of its previous location. Concrete material was removed from the previous transformer location. In March 1989, it was reported that Transformer 559-1 was replaced under the Environmental Hazards Elimination Project. No historical documentation was found that details further response to this occurrence (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocols, and analyzed for PCBs using EPA Method 8080. Based on 1991 analytical results, the highest PCB concentration found adjacent to the old concrete transformer pad was 190 ppm (DOE 1995).

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Under the approved *Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls* (DOE 1995), additional sample screening was completed in 1995 to verify the lateral and vertical extent of PCB migration. Soil samples were analyzed using EPA Method 4020 and concrete samples were analyzed using EPA Method 8080 (DOE 1996).

In accordance with the PAM (DOE 1995), approximately 25 cy of PCB-contaminated soil was excavated in October 1995, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California for disposal (DOE 1997). Based on the cleanup confirmation analytical results, PCB levels in the soil were less than 10 ppm using EPA Method 4020 and less than 2.4 ppm using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the EPA Method 4020 (Immunoassay Field Technique) analytical results. PCB levels on the concrete transformer pad were less than 0.041 ppm using EPA Method 8080.

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

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DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 500-904

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 500-5

Unit Name: Transformer Leak - 223-1/223-2

Approximate Location: N750,000; E2,083,000

Date(s) of Operation or Occurrence

Prior to 1986 - 2003

Description of Operation or Occurrence

Transformers 223-1 and 223-2 are located north of Building 549. In February 1986, the valve, tap changer, and bushings of Transformer 223-1 were reported leaking, and in January 1987, residual staining was noted on the concrete pad underlying Transformer 223-2. Reportedly, the transformers were retrofilled with non-PCB cooling oil in 1987, and Transformer 223-1 was reportedly replaced in March 1989. Sometime during the 1990s, non-PCB oil from the western transformer was released to the environment, probably due to overfilling the oil reservoir, resulting in an oil stain in the soil north of the pad (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Analytical data from approximately 1985 indicated the oil in Transformer 223-1 contained more than 500 ppm PCBs, and the oil in Transformer 223-2 contained less than 50 ppm PCBs. In October and November 1985, it was reported that the dielectric fluid in Transformers 223-1 and 223-2 contained 19,800 and 296 ppm PCBs, respectively. In November 1986, a smear sample collected from the concrete underlying the drain valve of Transformer 223-1 indicated less than 50 $\mu g/cm^2$ PCBs (DOE 1992).

Responses to Operation or Occurrence

Reportedly, the transformers were retrofilled with non-PCB cooling oil in 1987, and Transformer 223-1 was reportedly replaced in March 1989 (DOE 1992). Both transformers were removed from their concrete pads in 2003, and the concrete pads were removed in 2004.

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As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, surface soil samples were collected and analyzed in accordance with approved EPA protocols (DOE 1995). The samples were analyzed for PCBs using EPA Method 8080 and plutonium-239/240 using alpha spectrometry. The soil data indicated at two locations the concentrations of Aroclor-1254 exceeded the RFCA WRW AL (highest concentration was 55,000 µg/kg) (DOE 2004).

In accordance with IASAP Addendum #IA-04-03 for IHSS Group 500-5 (DOE 2003) (PAC 500-904 is the only PAC in the IHSS Group), characterization samples were collected and analyzed. At the request of CDPHE, two samples were also analyzed for dioxins and furans (historical sampling locations with the highest PCB concentrations). Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 500-5 (DOE 2004).

Fate of Constituents Released to Environment

PCBs are considered COCs for IHSS Group 500-5 (PAC 500-904). The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-04-03 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical data gathered pursuant to the IASAP Addendum and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 500-5 (PAC 500-904) because of the following:

- All PCB concentrations in surface soil are less than the WRW ALs.
- Migration of contaminants to surface water through erosion is unlikely because the IHSS Group is not in an area prone to erosion and landslides.
- In general, PCBs in soil are not mobile and do not migrate to surface water or groundwater.
- The summed TEQs for both sampling locations where samples were analyzed for dioxins and furans do not exceed the EPA residential cleanup guidance of 1,000 pg/g, and the TEQs are also well within the cited Front Range background range of 0.1 to 57.5 pg/g.[4]

No long-term stewardship activities are recommended for IHSS Group 500-5 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered

[4] Because there are no existing RFCA ALs for dioxins and furans, results for dioxins and furans were converted to TEQs using TEFs in accordance with SW8290 (EPA 1994) and a World Health Organization study (1998). The TEQ values were summed for each sampling location and compared to the EPA residential cleanup guidance level (EPA 1998) and Front Range background concentration ranges (EPA 2001).

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controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 500-5 on May 17, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Data Summary Report for IHSS Group 500-5, PAC 500-904 (April 2004), May 17.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-03, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2004, Data Summary Report for IHSS Group 500-5, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

EPA, 1994, Test Methods for Evaluating Solid Wastes.

EPA, 1998, Approach for Addressing Dioxins in Soil at CERCLA and RCRA Sites, OSWER Directive 9200.4-26, Memo from Timothy Fields Jr., April 13.

EPA, 2001, Denver Front Range Study Dioxins in Surface Soil, July.

World Health Organization, 1998, Assessment of the Health Risk of Dioxins: Re-Evaluation of the Tolerable Daily Intake (TDI), WHO European Center for Environment and Health, Geneva, Switzerland, May.

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## PAC REFERENCE NUMBER: 500-905

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer – 558-1

Approximate Location: N749,500; E2,083,000

Date(s) of Operation or Occurrence

Prior to June 1986

Description of Operation or Occurrence

Transformer 558-1 is one of two large transformers making up the 555/558 electrical substation located near the intersection of Seventh Street and Central Avenue. Transformer 558 is located on the northern side of a switchgear building connecting the two transformers (DOE 1996). There was evidence of leakage on a valve on the northeastern side of Transformer 558-1. The transformer had been situated on a concrete pad surrounded by rock fill. There was no berm around the transformer (DOE 1992).

Physical/Chemical Description of Constituents Released

No documentation was identified for sampling of the dielectric oil or the surrounding soil at the Transformer 558-1 site prior to August 1991 (DOE 1996). As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected and analyzed. The results indicated PCB contamination existed primarily in one area of the substation immediately west of the Transformer 558-1 pad. PCB levels of 480 ppm were identified at this discrete location (DOE 1992).

Responses to Operation or Occurrence

No documentation was found that indicated Transformer 558 was retrofilled; however, one reference indicates a schedule was initiated for cleanup to take place at the substation on August 21, 1989 (DOE 1992). No cleanup was performed at that time (DOE 1996).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), follow-up sample screening was completed in July 1995 using MRI methods (EPA 1986) to verify the lateral and vertical extent of PCB migration. Approximately 5 cy of PCB-contaminated soil were excavated immediately west of the 558 transformer pad. The

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soil was containerized and shipped to an EPA-licensed TSCA landfill in Kettleman, California for disposal (DOE 1997).

PCB levels remaining in the soil following excavation were less than 10 ppm using EPA Method 4020 (Immunoassay Field Technique) and less than 1.3 ppm using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the Method 4020 Immunoassay Field Technique.

On July 10, 1996, under an electrical upgrade construction project, the 558/555 substation was demolished and replaced with a more modern facility. The transformers were shipped by rail to a licensed off site facility for incineration (DOE 1996).

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, and the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

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DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

EPA, 1986, Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup, Office of Toxic Substances, EPA-560/5-86-017, Washington, D.C., May.

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## PAC REFERENCE NUMBER: 600-120.1

IHSS Number: 120.1

Operable Unit: Industrial Area

IHSS Group: 600-3

Unit Name: Fiberglass Area North of Building 664

Approximate Location: N748,550; E2,082,750

Date(s) of Operation or Occurrence

1972 - 1979

Description of Operation or Occurrence

IHSS Group 600-3 (IHSS 600-120.1 is the only IHSS in the group) consists of the area beneath and around Building 668 where waste packing boxes were coated with fiberglass. Building 668, located north of Building 664, was a wooden framed structure with deteriorating walls constructed of transite panels over a single concrete slab. The structure and slab were removed by K-H in January 2004 (DOE 2004). Fiberglass activities occurred in the area from 1972 to 1979. The fiberglass process may have resulted in spills of polyester resin, peroxide catalyst materials, and cleaning solvents, even though there is no documentation of spills in this area (DOE 1992).

The Aerial Radiological Measurements System survey, conducted in 1977, detected elevated gamma radiation and americium activities in the vicinity of this site. No documentation was found that provided an explanation for the origin of the elevated readings (DOE 1992).

Physical/Chemical Description of Constituents Released

Persons interviewed for the CEARP Phase 1 report indicated the area may contain residue from spills of polyester resin, peroxide catalyst materials, and cleaning solvents. Plutonium- and uranium-contaminated liquid and solid wastes staged in Building 664 are the likely source for the elevated radiation readings in 1977 (DOE 1992).

Responses to Operation or Occurrence

In accordance with the IASAP Addendum #IA-04-05 for IHSS Group 600-3 (DOE 2003), which consists of IHSS 120.1, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 600-3 (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and SVOCs are considered COCs for IHSS Group 600-3. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-04-05 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

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

- There are no WRW AL exceedances at IHSS Group 600-3.
- Migration of contamination to surface water through erosion is unlikely because this IHSS Group is not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 600-3. The VOC contamination present in groundwater, although notably not present in IHSS Group 600-3 soil, is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 600-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 600-3 on May 12, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Data Summary Report for IHSS Group 600-3 (B668) - Approval, May 12.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-05, IHSS Group 600-3, IHSS 600-120.1, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, Data Summary Report for IHSS Group 600-3, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

## PAC REFERENCE NUMBER: 600-1000

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit | Industrial Area |
| IHSS Group | Not Applicable |
| Unit Name: | Transformer Storage Outside Building 662 |
| Approximate Location: | N748,900; E2,083,500 |

Date(s) of Operation or Occurrence

Prior to August 1982 through August 1986

Description of Operation or Occurrence

The first indication of transformer storage outside Building 662 is a photograph dated August 1982. There were approximately 10 pole-mounted transformers located on the eastern side of the building (DOE 1992).

From June to October 1983, a large PCB-containing transformer was stored in a catch basin outside Building 662. On October 13, 1983, the transformer was shipped off site for disposal. Neither the condition of the transformer nor the PCB content of the transformer oil were known. It is also unknown whether storage in the catch basin was normal procedure a unique occurrence (DOE 1992).

During an inspection on January 30, 1986, EPA audited the electrical yard outside of Building 662 and found 28 pole-mounted transformers being stored for reuse. One of the transformers was found to be leaking at that time. The PCB content of the leaking oil was then unknown, but was later determined to contain greater than 500 ppm PCBs. Documentation of the inspection indicates that 10 of the 28 transformers were awaiting disposal rather than reuse, because of their age or condition (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Dielectric cooling oil that contained greater than 500 ppm PCBs leaked from the transformer found during the 1986 inspection (DOE 1992). Other past activities occurring in the electrical

yard from storage and repair practices are suspected to have contributed to contamination of soil adjacent to the eastern side of Building 662 (DOE 1996).

Responses to Operation or Occurrence

Subsequent to the discovery of the leaking transformer in 1986, it was stated that if the analysis of the oil indicated transformer contained PCBs, it would be disposed of as PCB waste, and the soil and pad would be cleaned up. No documentation was found detailing actual cleanup activities (DOE 1992).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), additional sample screening was completed in 1996 to verify the lateral and vertical extent of PCB migration. Approximately 270 soil samples were collected analyzed using EPA Method 4020. Destructive concrete samples were collected and analyzed using EPA Method 8080 (DOE 1996).

In accordance with the PAM (DOE 1995), approximately 86 cy of PCB-contaminated soil were excavated, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California, for disposal in July 1996 (DOE 1997). Based on the cleanup verification analytical results, PCB levels remaining in the soil were less than 10 ppm using EPA Method 4020. Split samples were analyzed using EPA Method 8080 to provide confirmation of the EPA Method 4020 (Immunoassay Field Technique) analytical results. PCB concentrations on the concrete pads east of Building 662 were less than 1.2 ppm using EPA Method 8080.

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

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Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 600-1002

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer Storage - West of Building 666

Approximate Location: N748,500; E2,083,000

Dates of Operation or Occurrence

Unknown

Description of Operation or Occurrence

Unused and unusable transformers were stored and dismantled for spare parts on a concrete pad west of Building 666. It is suspected that the transformers were also stored inside of Building 666 within secondary containment basins. Leaks and spills of transformer oil may have occurred at this site according to Plant employees (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

PCBs are the PCOCs at this location; however, radionuclides (plutonium-239) were also present in soil samples collected in July 1991. Plutonium of unknown origin was detected at levels up to 9.1 pCi/g (DOE 1996).

Responses to Operation or Occurrence

No historical documentation was found that detailed a response to spills or releases prior to 1991. Transformer storage no longer occurs at this site; however, the building is still used as a primary TSCA waste storage facility. As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocol and analyzed for PCBs using EPA Method 8080 (DOE 1996). The results indicate the highest PCB contamination level in the soil adjacent to the concrete transformer pad was 1.6 ppm (DOE 1996). The plutonium-239 concentration of 9.1 pCi/g is well below the WRW AL of 50 pCi/g.

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Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels;
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado,April 15.

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## PAC REFERENCE NUMBER: 600-1003

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformers North and South of 661/675 Substation

Approximate Location: N749,000; E2,083,000

Dates of Operation or Occurrence

Unknown

Description of Operation or Occurrence

Evidence of a leaking valve was discovered on the northern side of Transformer 661-1, which is located on the northern side of the 661/675 Substation. The transformer was situated on a concrete pad. There was no berm around the transformer pad (DOE 1992).

Another transformer was located south of the 661/675 Substation, identified as Transformer 675-1. There was no evidence that the transformer was leaking or had leaked in the past (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Based on analytical results from 1985, PCB levels in the 661-1 and 675-1 transformer dielectric oil were 12 and 5 ppm, respectively. PCB results from 1992 for the 661-1 and 675-1 transformer dielectric oil were 11 and 5 ppm, respectively (DOE 1996).

Responses to Operation or Occurrence

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocol and analyzed for PCBs using EPA Method 8080. Analytical results for PCBs in soil adjacent to the 661 and 675 transformers were 61 and 4.1 ppm, respectively (DOE 1995).

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Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), additional sample screening was completed in 1995 to verify the lateral and vertical extent of PCB migration. Soil samples were collected and screened using EPA Method 4020, and concrete samples were analyzed using EPA Method 8080.

In accordance with the PAM, approximately 47 cy of PCB-contaminated soil were excavated in December 1995, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California for disposal (DOE 1997). Cleanup confirmation analytical results indicate PCB contamination levels remaining in the soil were less than 10 ppm using EPA Method 4020 and less than 0.67 ppm using EPA Method 8080. PCB levels on the concrete transformer pads are less than 0.086 ppm using EPA Method 8080.

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

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DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 600-1004

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 600-5

Unit Name: Central Avenue Ditch Soil Spreading

Approximate Location: N36,500; E19,500

Date(s) of Operation or Occurrence

September 27, 1993

Description of Operation or Occurrence

During a walkdown tour of several IHSSs, EG&G ERM and CDH representatives observed EG&G Plant Services spreading excavated soil from the Central Avenue Ditch (IHSSs 157.1 and 172) into areas adjacent to the two large fuel oil tanks located on the southwest corner of Central Avenue and Seventh Street (IHSS 152) (DOE 1994).

A review of the operation revealed that Plant Services spread the ditch spoils into IHSS 152 without authorization from ERM. These instructions were in conflict with the April 7, 1993, Environmental Assessment for Construction Activities (Soil Disturbance Permit #TG048663), which provided specific instructions that all dirt, soil, gravel, and rock removed from any of the ditches to be cleaned were to remain on the bank of the ditch in the immediate area from where they were originally removed. All material removed was to be spread and incorporated into the banks of the ditch. Although no soil and/or water samples were required for this work, radiological screening was required when working in any of the IHSSs involved in this activity (DOE 1994).

Physical/Chemical Description of Constituents Released

Potentially contaminated dirt from IHSSs 157.1 and IHSS 172 was spread into the IHSS 152 area. The Central Avenue Ditch (IHSS 157.1) underwent an HPGe radiological survey both before the disturbance and again afterward, and no radiological contamination was observed above background levels in either case (DOE 1994).

Responses to Operation or Occurrence

The operation was immediately shut down due to the potential of cross-contamination from one or more IHSSs to IHSS 152. Additional sampling was proposed and several actions were taken

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to prevent a similar occurrence in the future. In general, these included briefings/training of the construction and maintenance personnel by ERM to increase awareness of proper procedures by non-ER employees working in the IHSS areas (DOE 1994).

Fate of Constituents Released to Environment

Potentially contaminated dirt from the Central Avenue Ditch was spread into IHSS 152 adjacent to the ditch, and adjacent to two large fuel tanks (DOE 1994).

In accordance with IASAP Addendum #IA-04-09 (DOE 2004a), which consists of PAC 600-1004, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 600-5 (DOE 2004b).

Radionuclides, metals, VOCs, and SVOCs are considered COCs for IHSS Group 600-5. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-04-09 (DOE 2004a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

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 contamination to surface water through erosion is unlikely because this IHSS Group is not in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 600-5. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 600-5 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 600-5 on June 18, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 600-5, PAC 600-1004 (June 2004), June 18.

DOE, 1994. Historical Release Report, Sixth Quarterly Update, October 1, 1993 to January 1, 1994.

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

DOE, 2004b, Data Summary Report for IHSS Group 600-5, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

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## PAC REFERENCE NUMBER: 700-124.1 – 124.3

IHSS Reference Number: 124.1 - 124.3

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Names: 124.1 - 30,000-Gallon Tank (Tank #68)

124.2 - 14,000-Gallon Tank (Tank #66)

124.3 - 14,000-Gallon Tank (Tank #67)

Approximate Location: N751,000; E2,084,000

Date(s) of Operation or Occurrence

1953 - 1989

Description of Operation or Occurrence

The two 14,000-gallon tanks and a single 30,000-gallon tank are designated Tanks #66, #67, and #68, respectively. Tank #68 is also designated as OPWL Tank T-14, and Tanks #66 and #67 are designated as OPWL Tank T-16 (Tank T-16 north and T-16 south). The three tanks are shown on RFP Drawing #1-5392-74 as being east of Building 774 and immediately east of Tanks #30, 31, 32, 33, 34E, and 34W, which are discussed under PAC 700-146. Tanks #66 (also designated as PAC 700-125) and #67 are identical with the same size, construction, and age, and they share an internal wall. Tank #67 is immediately south of Tank #66, and Tank #68 is located 2 ft south of Tank #67. The walls of all three tanks are approximately 10-inch-thick reinforced concrete, even though the exact dimensions of Tanks #66 and #67 are different from Tank #68. A shed was constructed over Tanks #66 and #67 with bay doors at the eastern and western sides. The roof of the tanks serves as the floor to the shed (DOE 1992).

The main function of Tanks #66 and #67 was to receive treated liquid decanted from the second-stage batch precipitation process in Building 774. According to personnel interviewed for the development of the RCRA Closure Plan, the tank floors were cleaned, sandblasted, and coated with eight coats of Americoat No. 55 in 1956. Details regarding the processes that created the waste destined for the tanks are provided in the 1989 RCRA Closure Plan. These tanks were taken out of service in September 1989 because they did not meet the requirements for permitting (DOE 1992).

In July 1981, Tank #66 overflowed, spilling an estimated 500 gallons of liquid waste. A second source states that during the week ending July 17, 1981, about 3,300 gallons of process

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wastewater overflowed a tank in Building 774 and approximately 50 gallons ran onto the asphalt driveway. Another source states that this spill involved between 50 to 100 gallons of liquid that contaminated the ground to the east of Building 774 (DOE 1992).

Physical/Chemical Description of Constituents Released

The released process wastewater was high in nitrate and contaminated with approximately 40,000 dpm/L plutonium. Another source states that the liquid released in the overflow incident was high in nitrate, contained plutonium and uranium, and was measured at approximately 30,000 dpm/L. An analytical report of the process wastewater released from the July 1981 Tank #66 spill indicated total alpha activity at $7.8 \times 10^4$ pCi/l, total beta activity at $4.6 \times 10^4$ pCi/L, nitrate at $5.6 \times 10^3$ mg/L, and a pH of 12 (DOE 1992).

Responses to Operation or Occurrence

The area east of Building 774 was paved following the overflow of Tank #66 in 1981. The contamination may not have been removed prior to paving. A sitewide radiometric survey was performed from 1977 to 1984. The purpose of the survey was to identify surface areas extremely contaminated with radioactivity (500,000 to 1,000,000 pCi/g) (DOE 1992).

In September 1989, Tanks #66, #67, and #68 were taken out of service in compliance with RCRA closure regulations.

Tanks #66, #67, and #68 (OPWL Tanks T-16 north, T-16 south, and T-14, respectively) were addressed in the Accelerated Action Plan for Interagency Agreement Underground Storage Tanks Containing RCRA-Regulated Materials (DOE 1995) and the Final Proposed Action Memorandum for the Contaminant Stabilization of Underground Storage Tanks (DOE 1996), both of which are documents that specifically address the accelerated removal action and stabilization of potential contaminants in seven IAG underground tank systems. In accordance with the Accelerated Action Plan and PAM, the contents of these tanks were removed, the tanks were multi-rinsed, and an inert material (polyurethane foam) was used to stabilize any remaining contamination.

Removal of Tanks #66, #67, and #68 (now foamed) was initiated in October 2003 in accordance with the Building 771 DOP (DOE 2003).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSSs 124.1 – 124.3, characterization samples were collected and analyzed. Soil characterization samples were collected after the tanks were removed. Because a soil removal decision was made based on these data (hot spot beneath Tank T-16), an ER RSOP Notification was required. However, to expedite the soil removal action, CDPHE agreed that the Notification could be included with the Closeout Report. The soil removal action was completed in November 2003 when confirmation sampling data indicated RFCA requirements were met. Approximately 2,112 $ft^3$ of soil and fill with radionuclide contamination were removed.

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Fate of Constituents Released to Environment

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSSs 124.1 – 124.3, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank T-16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs;

- The section of OPWL that exits Building 771 and runs due west is in the area of the sampling locations that have SVOC concentrations in excess of 3 times the AL. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Accelerated Action Plan for Interagency Agreement Underground Storage Tanks Containing RCRA-Regulated Materials, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 1996, Final Proposed Action Memorandum (PAM) for the Contaminant Stabilization of Underground Storage Tanks, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2003, 771 Closure Project Decommissioning Operation Plan, Modification 5, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, February.

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## PAC REFERENCE NUMBER: 700-125

IHSS Reference Number: 125

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Holding Tank (Tank #66)

Approximate Location: N751,000; E2,084,000

Date(s) of Operation or Occurrence

1952 - 1989 and July 1981

Description of Operation or Occurrence

Tanks #66, #67, and #68 are two 14,000-gallon tanks and a single 30,000-gallon tank, respectively. Tank #68 is also designated as OPWL Tank T-14, and Tanks #66 and #67 are designated as OPWL Tank T-16 (Tank T-16 north and T-16 south). The three tanks are shown on RFP Drawing #1-5392-74 as being east of Building 774 and immediately east of Tanks #30, 31, 32, 33, 34E, and 34W, which are discussed under PAC 700-146. Tanks #66 (also designated as PAC 700-124.2) and #67 are identical with the same size, construction, and age, and they share an internal wall. The walls of the tanks are approximately 10-inch-thick reinforced concrete. A shed was constructed over Tanks #66 and #67 with bay doors at the eastern and western sides. The roof of the tanks serves as the floor to the shed (DOE 1992).

The main function of Tanks #66 and #67 was to receive treated liquid decanted from the second-stage batch precipitation process in Building 774. According to personnel interviewed for the development of the RCRA Closure Plan, the tank floors were cleaned, sandblasted, and coated with eight coats of Amercoat No. 55 in 1956. Details regarding the processes that created the waste destined for the tanks are provided in the 1989 RCRA Closure Plan. These tanks were taken out of service in September 1989 because they did not meet the requirements for permitting (DOE 1992).

In July 1981, Tank #66 overflowed, spilling an estimated 500 gallons of liquid waste. A second source states that during the week ending July 17, 1981, approximately 3,300 gallons of process wastewater overflowed a tank in Building 774 and approximately 50 gallons ran onto the asphalt driveway. Another source states that this spill involved between 50 to 100 gallons of liquid which contaminated the ground east of Building 774 (DOE 1992).

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Physical/Chemical Description of Constituents Released

The released process waste water was high in nitrate and contaminated to approximately 40,000 dpm/L plutonium. Another source states that the liquid released in the overflow incident was high in nitrate, contained plutonium and uranium, and was measured at approximately 30,000 dpm/L. An analytical report of the process waste water released from the July 1981 Tank #66 spill indicated total alpha activity at $7.8 \times 10^4$ pCi/L, total beta activity at $4.6 \times 10^4$ pCi/L, nitrate at $5.6 \times 10^3$ mg/L, and a pH of 12 (DOE 1992).

Responses to Operation or Occurrence

The area east of Building 774 was paved following the overflow of Tank #66 in 1981. The contamination may not have been removed prior to paving. A sitewide radiometric survey was performed from 1977 to 1984. The purpose of the survey was to identify surface areas extremely contaminated with radioactivity (500,000 to 1,000,000 pCi/g) (DOE 1992).

In September 1989, Tanks #66, #67, and #68 were taken out of service in compliance with RCRA closure regulations.

Tanks #66, #67, and #68 (OPWL Tanks T-16 north, T-16 south, and T-14, respectively) were addressed in the Accelerated Action Plan for Interagency Agreement Underground Storage Tanks Containing RCRA-Regulated Materials (DOE 1995), and the Final Proposed Action Memorandum for the Contaminant Stabilization of Underground Storage Tanks (DOE 1996), both of which are documents that specifically address the accelerated removal action and stabilization of potential contaminants in seven IAG underground tank systems. In accordance with the Accelerated Action Plan and PAM, the contents of these tanks were removed, the tanks were multi-rinsed, and an inert material (polyurethane foam) was used to stabilize any remaining contamination.

Removal of Tanks #66, #67, and #68 (now foamed) was initiated in October 2003 in accordance with the Building 771 DOP (DOE 2003).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 125, characterization samples were collected and analyzed. Soil characterization samples were collected after the tanks were removed. Because a soil removal decision was made based on these data (a hot spot beneath Tank T-16), an ER RSOP Notification was required. However, in order to expedite the soil removal action, CDPHE agreed that the Notification could be included with the Closeout Report. The soil removal action was completed in November 2003 when confirmation sampling data indicated RFCA requirements were met. Approximately 2,112 cubic ft ($ft^3$) of soil and fill with radionuclide contamination were removed.

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 125, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

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Fate of Constituents Released to Environment

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 125, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23 and will be addressed in the closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Accelerated Action Plan for Interagency Agreement Underground Storage Tanks Containing RCRA-Regulated Materials, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 1996, Final Proposed Action Memorandum for the Contaminant Stabilization of Underground Storage Tanks, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2003, 771 Closure Project Decommissioning Operation Plan, Modification 5, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-126.1 – 126.2

IHSS Reference Number: 126.1 – 126.2

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: 126.1 - Westernmost Out-of-Service Process Waste Tank

126.2 - Easternmost Out-of-Service Process Waste Tank

Approximate Location: N751,180; E2,083,700

Date(s) of Operation or Occurrence

Approximately 1953 - 1984 (period of operation of the process waste tanks)

Description of Operation or Occurrence

The out-of-service process waste tanks are two tanks housed in Building 728 below grade. The tanks were built in 1952. The tanks each have an operating capacity of approximately 20,000 gallons and a maximum design capacity of 25,000 gallons. The tanks had stored laundry water from the Building 771 laundry facility, which ceased operations in the late 1950s. The tanks were sometimes referred to as laundry tanks. After being taken out of service in 1984, the tanks were converted to contain fire suppression deluge overflow for Building 771 plenums. The tanks leaked allowing groundwater to periodically flow into the tanks; the groundwater was then pumped into the process waste system (DOE 1992).

The tanks overflowed several times prior to 1956. Information gathered during CEARP interviews suggests the tanks may have leaked during use (DOE 1992).

Each of the two out-of-service process waste tanks is constructed of reinforced concrete. The combined exterior tank dimensions are 33 ft 6 inches (east-west) by 23 ft 5 inches (north-south) and are 11 ft 8 inches high. The ceiling and wall thickness is 10 inches and the floor thickness is 1 ft. The tanks share the inner wall. The bottom elevation of the tanks' interior is at 5,931 ft. The tanks were designed with a minimum cover of 3 ft of fill except for the area overlain by the building. The original design indicates two pipes enter each tank from the south. The invert elevations of the pipes where they entered the tanks are 5,939 and 5,938 ft. The volume of material that could remain in the tanks below the level of the outlet pipes is unclear from the design drawings (DOE 1992).

The pumphouse (Building 728) is a concrete structure situated directly above the tanks with dimensions of 14 ft 10 inches (east-west) by 7 ft 10 inches (north-south) and is 7 ft 6 inches high.

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The southern wall of the pumphouse is above the southern wall of the tanks. It contains the manholes for access into the tanks and one sump pump for each tank, as well as one sampling point into each tank. The pumphouse is partially underground, and this does not appear as large as its dimensions indicate (DOE 1992).

Physical/Chemical Description of Constituents Released

Liquid process wastes that likely contained nitrate, plutonium, uranium, and various other organic and inorganic constituents were released to the environment.

Responses to Operation or Occurrence

No documentation was found that detailed any response to releases from these tanks.

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSSs 126.1 and 126.2, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents.

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSSs 126.1 and 126.2, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBC 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of 3 times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23 and will be addressed in the closure of that IHSS Group.

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- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-137

IHSS Number: 137

Operable Unit: Industrial Area

IHSS Group: 700-6

Unit Name: Building 712/713 Cooling Tower Blowdown

Approximate Location: N750,750; E2,084,150

Date(s) of Operation or Occurrence

Late 1950s – Present (DOE 1992)

Description of Operation or Occurrence

IHSS 137 is associated with two cooling towers, Building 712 and Building 713. The two cooling towers serviced Buildings 776 and 777, and were situated next to each other in an area located between Buildings 774 and 777. IHSS 137 was initially defined as a 50-by 150-ft area (DOE 1992). Because of information obtained during the development of the OU 8 Phase I RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan (DOE 1994), IHSS 137 site boundaries were expanded to include the area adjacent to and surrounding the cooling towers, an area located approximately 10 ft (ft) beyond the foundation of Buildings 712 and 713 (DOE 1994).

Building 712 was constructed in 1962 to service Buildings 776 and 777, and Building 713 was constructed in 1966 to provide additional capacity. Underground laundry and process waste lines were present in the area where Building 713 was constructed; however, it is not known whether the waste lines were removed, rerouted, or abandoned in-place. Buildings 702 and 703 were pump houses for Building 712 and Building 713, respectively. The cooling tower sump is located between Building 712 and Building 702. Building 713 was operated during the winter, and Building 712 was operated during the summer because it had greater cooling capacity (DOE 2001).

In the past utility workers cleaned out the sump and scraped slime off the cooling tower slats at each tower. Material removed during these activities was disposed of on the ground immediately adjacent to the cooling towers (DOE 1992).

Wind and rain damaged the cooling towers and Building 712 was resided at least once. In 1991, Building 712 had open panel siding and Building 713 had open slat siding. The slat siding allowed some water to spray out of the tower onto the surrounding ground surface. On August 20, 1992, the ground east of Building 713 was puddled from overspray. Building 712 was not operational from that day forward (DOE 1994).

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Filtered, untreated raw water from the onsite raw water reservoir was generally used in the towers. Chemicals were added to the water to prevent the biological growth and chemical processes (corrosion and scaling) that degrade system performance by fouling heat-transfer surfaces. Prior to 1976, chromates and sodium silicate were added to cooling tower water to act as corrosion inhibitors (DOE 1994).

Water was removed from the cooling tower system by blowdown and drift. Drift water was released to the atmosphere and sprayed to the ground surrounding the tower. Tower water was periodically blown down to maintain a specified range of total dissolved solids. Prior to 1970, it was routine for the cooling towers to blow down effluent onto the soil outside the buildings where it evaporated, infiltrated into the soil, or flowed into the storm water culverts and pipes and was directed to North Walnut Creek (DOE 1994).

The Plutonium Area Underground Piping Plan, Section & Detail (RF-14264-9; As-Built, 6/30/67) shows the blowdown pipes for Building 713 exiting the tower on the western side. As shown, these pipes connect to a 4-inch storm sewer that encircles the tower and discharges at an outfall northeast of the cooling tower, near the southeast corner of Building 774. The effluent from this storm sewer drained into North Walnut Creek. It is inconclusive as to whether the outfall was ever sampled (DOE 1994).

The HRR (DOE 1992) states that the cooling tower blowdown pipes exited the towers on the south sides, and that these pipes were the most probable source of blowdown water contamination around the cooling towers. Although detailed records were not found, it was believed that blowdown water drained from the cooling towers through underground pipes outside the south ends of the buildings, and that from 1974 forward, the blowdown water from Buildings 712 and 713 was piped to the sanitary sewers and treated in the wastewater treatment plant (DOE 1994).

Interviewees for CEARP mentioned a release of cooling tower water south of Building 774 that flowed north into Walnut Creek. It is speculated that they were recalling a release from the Building 779 cooling tower in December 1976 (DOE 1992).

A leak in a cooling tower within the PAC was reported to have occurred between August 20 and September 6, 1990. A memorandum was sent to utilities personnel expressing the need to fix the leaks caused by corroded metal sides. Contact with the author of the document has verified that the leak came from either Building 712 or Building 713. Resource Conservation and Recovery Act (RCRA) personnel checked the leaking cooling tower behind Building 777. The cooling tower was reportedly releasing approximately 20 to 40 gallons per minute (gpm) of water. It is not known how long the cooling tower had been leaking prior to the RCRA response. Releases were attributed to leaks in the corroded sides of the cooling towers (DOE 1994).

Physical/Chemical Description of Constituents Released

According to the HRR (DOE 1992) the released water contained 50 mg/l total chromium. However, the sampling results were likely from a December 1976 spill attributed to the Building 776 Cooling Tower (IHSS 138) (DOE 1994).

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Responses to Operation or Occurrence

The release that occurred during the summer of 1990 was stopped after the memorandum was sent to utilities. No environmental cleanup was conducted in response to this occurrence (DOE 2001). Neither the HRR (DOE 1992) or the Phase I RFI/RI Work Plan for Operable Unit 8, 700 Area (DOE 1994) contain records of cleanup or sample collection related to this occurrence.

Accelerated action activities were conducted at IHSS Group 700-6, which includes IHSS 137, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-18 (DOE 2003a).

Fate of Constituents Released to Environment

Based on IHSS Group 700-6 site histories and historical soil sampling results, radionuclides, metals, SVOCs, and VOCs were identified as COCs, and were sampled and analyzed for during characterization activities. During characterization activities, two small areas of surface soil containing arsenic concentrations more than three times greater than WRW ALs were identified as potential sources of contamination that required removal. Soil removal activities were proposed and conducted in accordance with the ER RSOP Notification #04-17 (DOE 2004). Accelerated action activities (characterization and soil removal) and the rationale for NFAA at IHSS 137 are discussed in detail in the Draft Closeout Report for IHSS Group 700-6 (DOE 2004). The rationale for NFAA at IHSS 137 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 137 based on the following:

- The two small areas of surface soil that contained arsenic concentrations more than three times greater than the WRW AL were removed.
- Residual contaminant concentrations greater than RLs or background means plus two standard deviations remain in surface and subsurface soil located in IHSS 137. Residual contaminant concentrations greater than WRW ALs are limited to two analytes (arsenic and chromium) and soil at four sampling locations, and based on application of the hotspot methodology and SSRS, soil at these four locations does not require remedial action.

Based on the SSRS and stewardship evaluation, no additional accelerated actions are required, but minimal near- and long-term management actions are recommended for IHSS 137 as follows: restrict access to the site, control soil excavation, and prohibit groundwater pumping. These management actions will be achieved through imposition of the physical and institutional controls generally applied to sites located in the IA Site. Additional environmental engineering or monitoring activities are not recommended for IHSS 137.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-6, which includes IHSS 137, on September 29, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Closeout Report for IHSS Group 700-6, Buildings 712/713 Cooling Tower Blowdown, IHSS 700-139.1(S) Caustic/Acid Spills Hydroxide Tank Area, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1994, Phase I RCRA Facility Investigation/Remedial Investigation Work Plan for Operable Unit 8, 700 Area, Rocky Flats Plant, Golden, Colorado, October.

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

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-18, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2004a, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #04-17, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004b, Draft Closeout Report for IHHS Group 700-6, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 700-138

IHSS Number: 700-138

Operable Unit: Industrial Area

IHSS Group: 700-7

Unit Name: Building 779 Cooling Tower Blowdown

Approximate Location: N751,000; E2,084,500

Date(s) of Operation or Occurrence

Operation: Started in 1964

Occurrences: December 8, 1976, and December 8, 1990

Description of Operation or Occurrence

IHSS 700-138 is associated with the cooling towers near Building 779. The original Building 779 cooling towers were built in 1964 east of Building 779, and were replaced in 1986 by new cooling towers (Buildings 784, 785, 786, and 787). Building 783 was the pump house associated with the replacement towers and contained much of the ancillary piping (DOE 2004).

On December 8, 1976, a leak occurred in an underground pipeline connected to the original cooling towers. This encompasses a 50- by 50-ft area. The leak discharged approximately 400 gallons of cooling tower effluent, which was released into a storm sewer east of Building 779 and northwest of Building 727. At the time, it was stated that the spilled effluent drained toward Trench No. 6. Trench No. 6 was part of the original surface water and shallow groundwater collection system north of the SEP.

On December 8, 1990, an estimated 1,000 gallons of cooling tower water overflowed from the Building 785 Cooling Tower Number 2 onto the ground.

Physical/Chemical Description of Constituents Released

Cooling tower water released in the 1976 incident contained 50 milligrams per liter total chromium, and approximately 3,000 disintegrations per minute per liter alpha activity. The cooling tower water released in the 1990 incident was known to contain "Nalco 2826", an inorganic phosphate rust inhibitor (DOE 1992).

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Responses to Operation or Occurrence

The cooling tower water was sampled following the 1976 incident and found to contain 50 milligrams per liter total chromium and approximately 3,000 disintegrations per minute per liter alpha activity. A radiological survey was conducted along the course of the spill. No readings above background were observed. Soil samples were collected in the area, however, analytical results are not known. Samples were also reportedly collected daily from Trench No. 6; however, analytical results are not known (DOE 2004). The line involved in the December 1976 leak was excavated and repaired, and later removed when the original cooling towers were replaced.

Water from the December 1990 incident was sampled, however, analytical results are not known. There is no documentation to describe cleanup efforts for this spill (DOE 2004).

Soil sampling and groundwater monitoring have been conducted in the area since the incidents. Soil sampling was conducted as part of the Operable Unit (OU) 8 Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI). Historical soil and groundwater sampling results are summarized in IASAP Addendum #IA-03-15 (DOE 2003a).

Accelerated action characterization activities were conducted at IHSS Group 700-7, which includes IHSS 700-138, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-15 (DOE 2003a). Accelerated action soil removal activities were conducted at IHSS Group 700-7 sites, in accordance with ER RSOP Notification #03-10 (DOE 2003b), but not at IHSS 700-138.

Fate of Constituents Released to Environment

Based on IHSS 700-138 site histories and historical soil sampling results, radionuclides, metals, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-6.5 ft bgs) soil samples were analyzed for COCs during characterization activities. No COCs were detected at concentrations or activities greater than WRW ALs. The accelerated action characterization activities conducted at IHSS 700-138 and the rationale for NFAA at IHSS 700-138 are discussed in detail in the Draft Closeout Report for IHSS Group 700-7 (DOE 2004). The rationale for NFAA at IHSS 700-138 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 700-138 based on the following:

- Residual contaminant concentrations or activities in surface and subsurface soil are less than WRW ALs.

Based on the SSRS and stewardship evaluation, no additional accelerated actions are required, and no additional near- and long-term management actions are recommended beyond those generally applicable to the Site as follows: restrict access to the site, control soil excavation, and prohibit groundwater pumping. These management actions will be achieved through imposition of the physical and institutional controls generally applied to sites located in the IA Site.

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Additional environmental engineering or monitoring activities are not recommended for IHSS 700-138 (DOE 2004).

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-7, including IHSS 700-138, on October 1, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 700-7 (B779) - Approval, October 1, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-15, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-10, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Draft Closeout Report for IHHS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 700-139.1(N)(b)

IHSS Reference Number: 139.1(N)(b)

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Caustic/Acid Spills; Hydroxide Tank Area

Approximate Location: N751,100; E2,084,150 (Sodium Hydroxide Tank)

Date(s) of Operation or Occurrence

Approximately 1953 - Present

Description of Operation or Occurrence

The NaOH tank was a 6,500 gallon aboveground tank located north of Building 774. The tank was surrounded by a berm that had been constructed prior to 1973. Interviews for the CEARP indicated small leaks and spills at the caustic receiving area north and south of Building 774 (DOE 1992). Numerous releases of NaOH are documented for the 6,500-gallon aboveground NaOH tank.

In April 1985, a pinhole leak was discovered in the piping from the tank. Although the leak was inside Building 774, the caustic was found to have seeped along the pipe outside the building. In late April or early May of the same year, a small leak was discovered on a fitting for a thermocouple for this tank. The released caustic had solidified on the tank, never reaching the secondary containment. Caustic observed in the pit in this time frame was suggested to be the result of a poor sampling technique allowing the valve to drip. In October 1986, it was estimated that 80 to 100 gallons of sodium hydroxide were released over the history of the tank due to this problem (DOE 1992).

On June 22, 1987, during a routine delivery transfer from a tanker truck to the Building 774 NaOH supply tank, approximately 100 gallons of the liquid caustic soda overflowed. The caustic spilled inside the bermed area of the tank and drained to the caustic catch tank (western condensate receiving tank PAC 139.1[a]). Approximately one to 2 gallons of caustic leaked out of the bermed area onto the roadway in front of Building 774 (DOE 1992).

Some time around 1988, the NaOH tank north of Building 774 was overfilled again. No documentation was found that further detailed this event (DOE 1992).

Approximately 100 ft due north of the NaOH tank, were two steel 8,000-gallon aboveground condensate receiving tanks (PAC 139.1[N][a]). The two receiving tanks, now removed, were located on a concrete slab, and the 1992 HHR states that the tanks were highly corroded (DOE

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1992). The receiving tanks held "clean" condensate from an evaporative waste concentration system formerly used in Building 774. The condensate was tested for the absence of radioactive contamination and then released to the north or to the west of the tanks depending on the valve positions. The swampy area west of the tanks where the condensate could be released was known as Bowman's Pond. See the narrative on PAC 700-1108 for more details regarding Bowman's Pond. The tanks have been out of service for condensate receiving since approximately 1980 (DOE 1992).

The 1992 HRR states that the western condensate tank received overflow and precipitation runoff from the bermed area surrounding the sodium hydroxide tank. The berm area directs flow through a pipe and into the western condensate receiving tank (DOE 1992).

Physical/Chemical Description of Constituents Released

Numerous releases of NaOH are documented for the 6,500-gallon aboveground NaOH tank.

Responses to Operation or Occurrence

Interviewees for the CEARP indicated the small leaks and spills from the hydroxide tank were flushed with water to dilute the caustic and carry it away from the buildings and into the storm sewers.

In response to the June 22, 1987 incident, the 1 or 2 gallons of NaOH were diluted and rinsed off the roadway immediately following the occurrence. A work order was initiated to repair and seal the cracks in the berm on the same day of the occurrence (DOE 1992).

There was no documentation found on the responses to the incident in1988, nor was there documentation found on the response to the leak in 1985 from Building 774 (DOE 1992).

Accelerated action activities were conducted at IHSS Group 700-4, which includes IHSS 139.1(N)(b), to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-01 (DOE 2003).

Fate of Constituents Released to Environment

Based on IHSS Group 700-4 site histories and historical soil sampling results, radionuclides, metals, SVOCs, and VOCs were identified as COCs, and sampled and analyzed for during characterization activities. Accelerated action activities and the rationale for NFAA at IHSS 139.1(N)(b) are discussed in detail in the Draft Closeout Report for IHSS Group 700-4 (DOE 2004). The rationale for NFAA at IHSS 139.1(N)(b) is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 139.1 (N)(b) based on the following:

- The residual contaminant concentrations greater than RLs or background means plus two standard deviations that remain in surface and subsurface soil located in IHSS 139.1(N)(b) do not exceed WRW ALs.

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- Migration of contaminants from groundwater to surface water is unlikely because even though there is groundwater contamination in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA. After Buildings 771 and 774 have undergone the D&D process and building drains are no longer functioning, groundwater will join the rest of the water table where the potential exists for elevated concentrations. This may result in future Stewardship actions.

No long-term stewardship activities are recommended for IHSS 139.1(N)(b) beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS 139.1(N)(b). No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS 139.1(N)(b).

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4, which includes IHSS 139.1(N)(b) [PAC 139.1(N)(b)] on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, February.

## PAC REFERENCE NUMBER: 700-139.1(S)

IHSS Number: 139.1(S)

Operable Unit: Industrial Area

IHSS Group: 700-6

Unit Name: Caustic/Acid Spills; Hydroxide Tank Area

Approximate Location: N750,800; E2,083,950 (Potassium Hydroxide Tank)

Date(s) of Operation or Occurrence

Late 1950s - Present

Description of Operation or Occurrence

The KOH tank was a 5,400-gallon aboveground tank located southeast of Building 771. The tank was surrounded by a berm that had been constructed prior to 1973. The HRR (DOE 1992) describes the tank site as an "L" shaped area 25 ft wide and 140 ft long, that surrounds the KOH tank and includes the hydroxide transfer line into Building 771. Because of information obtained during the development of the OU 8 Phase I RFI/RI Work Plan (DOE 1994), site boundaries were changed to include only the 35- by 25-ft area adjacent to and surrounding the KOH tank (DOE 1994).

Several releases of KOH during routine filling operations are documented for the KOH tank.

The 1992 HRR states that the KOH tank overflowed before 1973, quantity unknown, and as a result, it was likely that the caustic seeped through the soil and infiltrated beneath the building (DOE 1992).

During the week ending May 5, 1978, a spill occurred at a caustic tank near Building 771. The spill occurred during a routine filling operation but was contained by the berm that surrounded the tank. This spill was believed to have involved the KOH tank (DOE 1992).

On November 13, 1989, the potassium tank was overfilled. Approximately 5 gallons of 12-molar KOH spilled into the earthen berm that surrounds the tank (DOE 1992).

Physical/Chemical Description of Constituents Released

Several releases of KOH during routine filling operations are documented for the KOH tank.

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Responses to Operation or Occurrence

Interviewees for the CEARP indicated small leaks and spills from the PAC 139(1) hydroxide tanks were flushed with water to dilute the caustic and carry it away from the buildings and into the storm sewers (DOE 1992).

In response to the November 1989 release, approximately 100 pounds of "oil dry" was used to absorb the KOH. The contaminated soil and oil dry were removed and placed into drums. The Fire Department hazardous materials team verified that the contaminated area was cleaned up by taking soil samples and performing pH tests. The area was backfilled with new gravel. Additionally, a RCRA CPIR (89-020) was made on this incident (DOE 1992).

Accelerated action activities were conducted at IHSS Group 700-6, which includes IHSS 139.1(S), to characterize the nature and extent of contamination in soil. Characterized activities were conducted in accordance with IASAP Addendum #IA-03-18 (DOE 2003a).

Fate of Constituents Released to Environment

Based on IHSS Group 700-6 site histories and historical soil sampling results, radionuclides, metals, SVOCs, and VOCs were identified as COCs, and sampled and analyzed for during characterization activities. Accelerated action characterization activities and results, and the rationale for NFAA at IHSS 139.1(S) are discussed in detail in the Closeout Report for IHSS Group 700-6 (DOE 2004). The rationale for NFAA at IHSS 139.1(S) is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 139.1(S) based on the following:

- Residual contaminant concentrations greater than RLs or background means plus two standard deviations remain in surface and subsurface soil located in IHSS 139.1(S). Residual contaminant concentrations greater than WRW ALs are limited to one analyte (benzo(a)pyrene) and three sampling locations. Based on application of the hotspot methodology and SSRS, soil at these three locations does not require remedial action.

Based on the SSRS and stewardship evaluation, no additional accelerated actions are required, but minimal near- and long-term management actions are recommended for IHSS 139.1(S) as follows: restrict access to the site, control soil excavation, and prohibit groundwater pumping. These management actions will be achieved through imposition of the physical and institutional controls generally applied to sites located in the IA Site. Additional environmental engineering or monitoring activities are not recommended for soil at IHSS 139.1(S).

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-6, which includes IHSS 139.1(S) [PAC 139.1(S)] on September 29, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Closeout Report for IHSS Group 700-6, Buildings 712/713 Cooling Tower Blowdown, IHSS 700-139.1(S) Caustic/Acid Spills Hydroxide Tank Area, dated September 2004, September 29, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-18, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2004, Draft Closeout Report for IHHS Group 700-6, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 700-139.2

IHSS Reference Number: 139.2

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Caustic/Acid Spills: Hydrofluoric Acid Tank Area

Approximate Location: N750,800; E2,083,940

Date(s) of Operation or Occurrence

Prior to May 1971 - Present

Description of Operation or Occurrence

Two 1,200-gallon HF acid supply tanks were located to the southwest of Building 771 in a small shed known as Building 714. HF acid had reportedly infiltrated the soil in the vicinity of the storage area. Numerous small spills and leaks were reported to have occurred during routine filling and transfer operations. Later, the HF acid was delivered in portable tanks that were replaced when empty and required no open transfer. These "portable tanks" were actually sealed cylinders with a weight of approximately 1,300 pounds fully loaded (DOE 1992).

In May 1971, a leak in a hydrogen fluoride connection outside Building 771 was reported. A small amount of vapor was released but no personnel exposures occurred. No further details of this incident were provided (DOE 1992).

Physical/Chemical Description of Constituents Released

HF acid is the COC.

In accordance with the IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 139.2, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

Although HF acid was spilled at IHSS 139.2, for the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination was characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002).

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The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 139.2, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill;
- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBC 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs;
- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of 3 times the AL. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.
- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete; and
- Migration of contaminants from groundwater to surface water is unlikely because even though there is groundwater contamination in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, February.

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## PAC REFERENCE NUMBER: 700-143

IHSS Number: 143

Operable Unit IA

IHSS Group 000-3

Unit Name: 771 Outfall

Approximate Location: N751,150; E2,083,525

Date(s) of Operation or Occurrence

1953 - 1965

Description of Operation or Occurrence

IHSS 143 is located northwest of Building 771 (Figure 2.5). When Building 771 went into operation in 1953, some waste liquids passed through a storm drain located north and west of the building and into North Walnut Creek. The main source was an outfall from the Building 771 Laundry holding tanks (Figure 2.6). Other sources included the analytical laboratory and radiography sinks, the personnel decontamination room, and runoff from the roof of Building 771 and the ground areas (DOE 1992a).

Liquid wastes in the laundry holding tanks were discharged to this drain if the plutonium concentration was below 3,300 dpm/L. Between mid-1953 and mid-1957, 4.5 million gallons of liquid was released containing a total of 2.23 mCi. In 1957, a waste line was completed that allowed the option of releasing these liquids to the Building 774 release below Building 995 (Pond B-1 [PAC NE-142.5]). Due to equipment problems, periodic releases from the laundry holding tanks to the 771 Outfall continued until 1965. From 1957 until 1965, 430,000 gallons were released containing an alpha activity of 0.25 mCi (DOE 1992a).

The other release sources for the 771 Outfall went directly to the storm sewer; no documentation exists regarding the liquid quantity or quality. For example, on April 9, 1958, it was noted that a decontamination sink was tied into a process waste drain that emptied into Walnut Creek north of Building 773. Water continuing to drain through the pipe and outfall almost certainly contributed to the spread of contamination into Walnut Creek (DOE 1992a).

In May 1971, a sewer line break resulted in storage tanks overflowing through the 771 Outfall (DOE 1992a).

During the week ending August 4, 1978, a hot spot approximately 875 $ft^2$ was found near a culvert northwest of the Building 771 parking lot (DOE 1992a).

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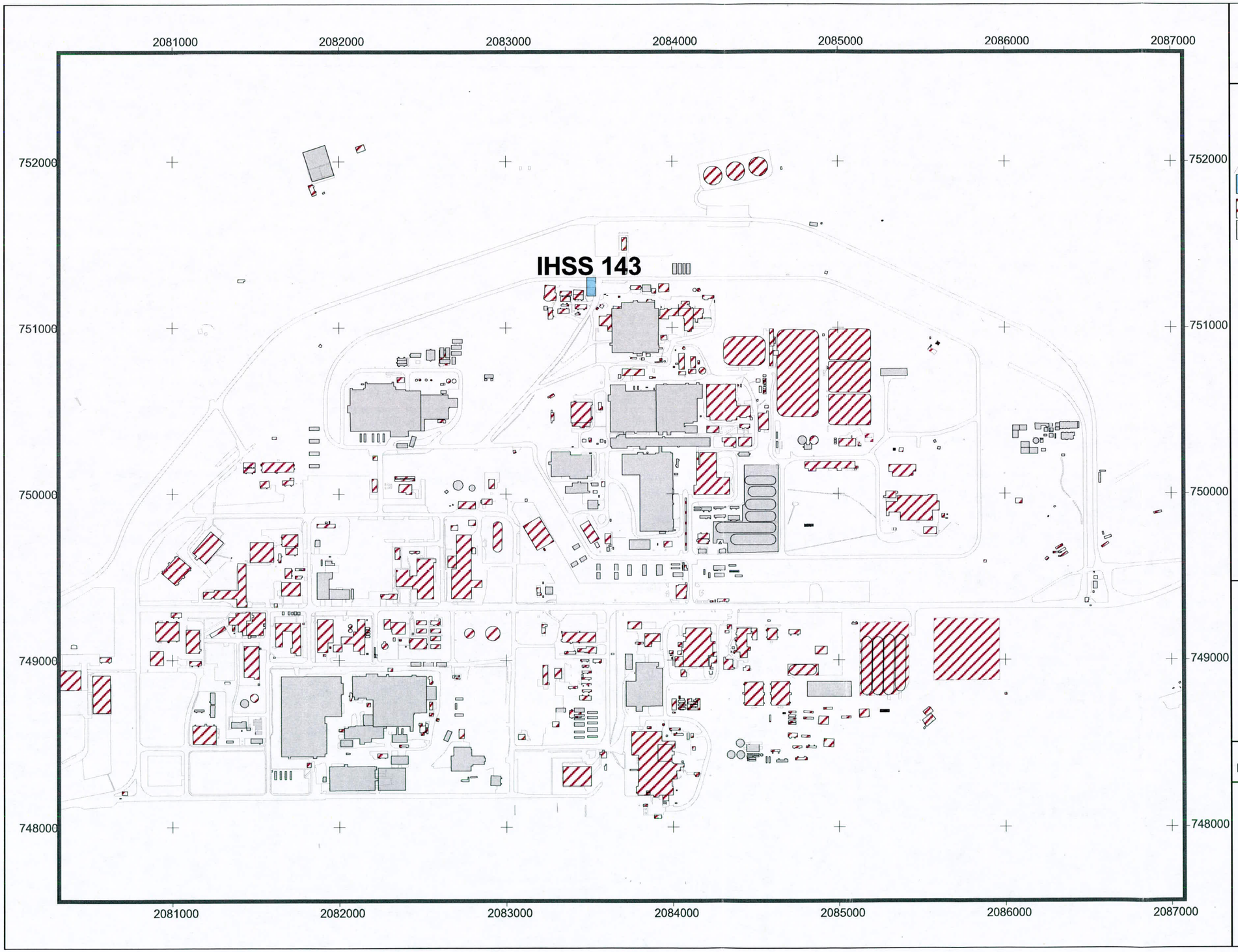


**Figure 2.5**
**IHSS 143 Location**

KEY

- Paved road
- IHSS
- Demolished building
- Standing building

N
W E
S

500 0 500 Feet

Scale = 1: 6800

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: RADMS

Date: 04.27.04

Prepared for: KAISER•HILL COMPANY

File: W:\Projects\Fy2004\central_ave_ditch\IHSS143\IHSS_143.apr

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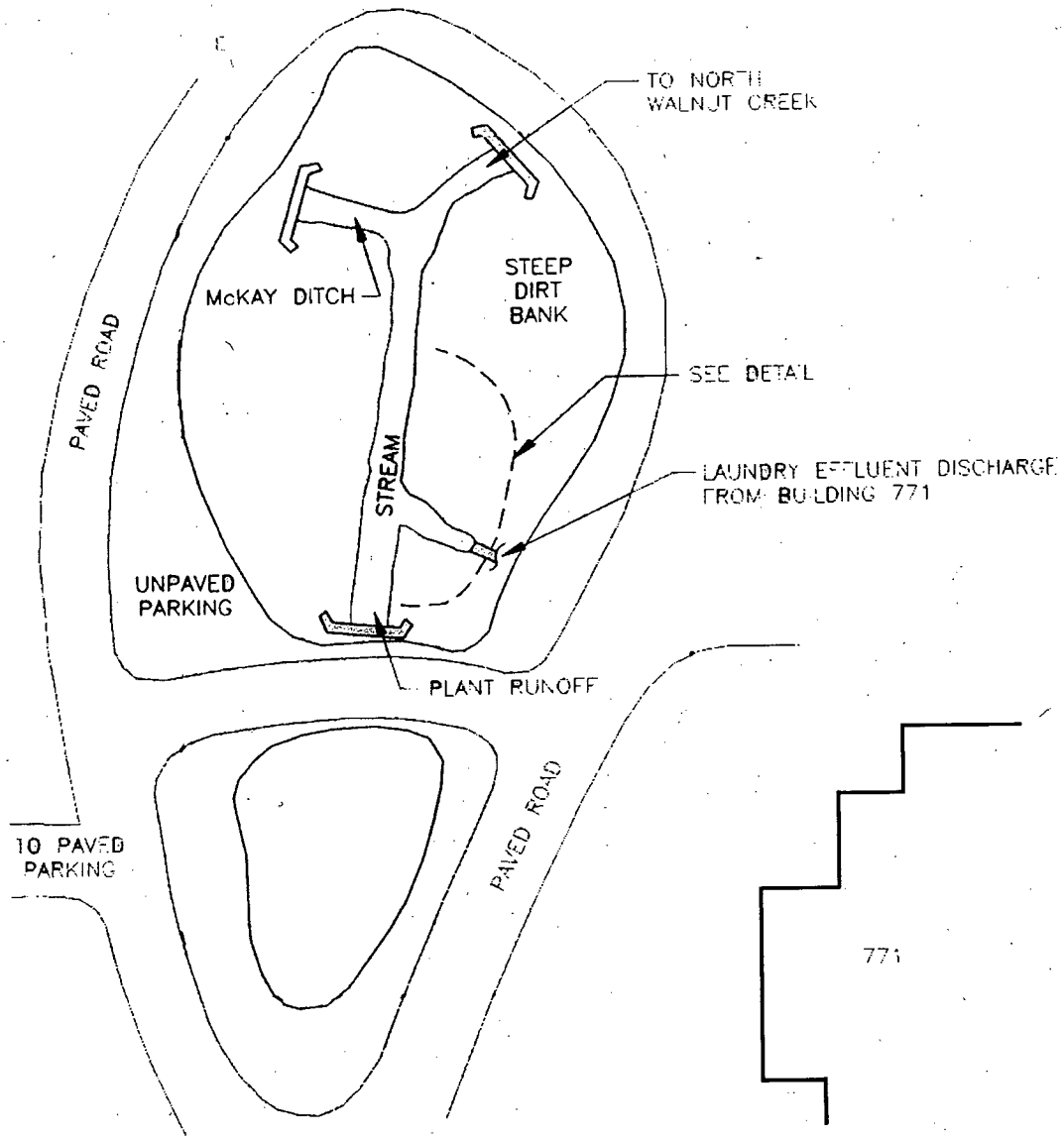
**Figure 2.6 Building 771 Outfall in 1971**




SOURCE: DOW 1971a



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Physical/Chemical Description of Constituents Released

The plutonium-contaminated wastewater also contained soaps and detergent that originated from the Building 771 Laundry, analytical laboratory, and radiography areas and associated decontamination sink (DOE 1992a).

Site Survey Monthly Reports from 1955 were obtained. They characterized the releases by reporting the monthly alpha activities in the water released to the environment. The alpha activity reported for the "71 Building to Walnut Creek" releases ranged from 1.03E-04 to 2.2E-04 curies for 1955 (DOE 1992a).

As early as 1953, contamination at the outfall was measured at 17,400 disintegrations per minute per gram (dpm/g) in the soil. Soil contamination at the discharge was reported in May 1956, with the highest sample containing 130 dpm/g gross alpha activity. In April 1958, instrument readings of up to 8,000 counts per minute (cpm) were obtained on the rocks in the area. In May 1958, soil contamination was reported to be as high as 2,000 dpm/g gross alpha activity (DOE 1992a).

In addition to the water released from Building 771, a soil stabilizing solution was frequently applied during remedial activities (see below) in 1971. The stabilizer was a mixture of water, ethylene glycol, and Dowell J-197 soil stabilizer (DOE 1992a).

Responses to Operation or Occurrence

Discharges of laundry waste to the outfall ceased in 1965. Remediation activities that followed are detailed below (DOE 1992a).

- The "initial discovery" of the hot spot occurred in April 1970 with samples containing more than 190,000 dpm/g plutonium. The area was then subject to frequent soil sampling and some monitoring with direct counting instruments. Sampling continued throughout the remediation process. Results for soil samples collected ranged from 28,621 to 229,290 dpm/g plutonium. For samples collected on February 18, 1971, activities ranged from 47 to 4,437 dpm/g plutonium during soil removal.

- In April 1970, sampling encountered 12 dpm/g gross alpha activity in the water draining through the effluent pipe.

- In September 1970, approximately 75 cubic ft ($ft^3$) of contaminated soil was removed from the area. Another document states that two 55-gallon drums of contaminated soil were removed during this time.

- In January 1971, the Health Physics Operations Group Technical and Construction Report stated that recent instrument surveys conducted in the ditch area ("stream" per Figure 2.6) indicated the prior removal of two barrels of soil and vegetation was insufficient. The removal resumed in February 1971. As of February 18, 1971, there were no known open drain lines from the building to the outfall.

- A letter dated February 19, 1971, stated that although it had been requested that the drain pipe to the outfall be capped, the capping would be withheld. This was because the water running out of it was not contaminated at that time and it was being checked daily by Health Physics.

- As of February 26, 1971, approximately 350 $ft^3$ of contaminated soil had been removed and barreled from an area of approximately 750 $ft^2$. It was believed that no contamination had been spread by the wind because the outfall was in a depression about 20 ft deep at the bottom of a hill, the soil was constantly moist, and the area was covered with grasses and cattails.

- The Health Physics Monthly Status Report for the month of February 1971 reported that 20 soil samples obtained from McKay Ditch (see Figure 2.6 for ditch location) indicated the plutonium contamination was localized and did not travel downstream.[5]

- In early March 1971, water collected from the effluent pipe at the outfall was analyzed and found to contain gross activity of 9.60 picocuries per liter (pCi/L). A typical Rocky Flats water sample averaged approximately 40 pCi/L at the time.

- Operations during May 1971 consisted of transferring contaminated mud from 23 used drums to new drums with provisions to absorb any contained liquid. Digging was to be resumed as the weather improved and the mud dried.

- By August 31, 1971, the removal of soil was complete. It had started in February 1971 and resulted in 149 drums that were shipped as hot waste (presumably off site but this was not specified in the documentation found). Cement was added to each drum before and after filling to absorb any contained liquid. The contaminated area was approximately 800 $ft^2$ with contamination as deep as 3.5 ft in one small area. The maximum soil sample result was 39,000 dpm/g. A final survey of the area showed no direct alpha count greater than 250 cpm (Figure 2.7). Final soil sampling results averaged 34 dpm/g with a maximum of 150 dpm/g.

- Cleanup of the soil found in the culvert in August 1978 occurred during summer 1980. The removal was complete by July 18, 1980 and resulted in nine boxes of contaminated soil. The removal was conducted to allow for the construction of the Perimeter Security Zone (PSZ). The area that was formally the outfall culvert has been filled in with soil and is now a paved parking lot for Building 771. Filling and parking lot construction occurred sometime after the soil removal in 1980 (DOE 1992a).

Fate of Constituents Released to Environment

Environmental data were collected for IHSS 143 pursuant to the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) Work Plan for the Walnut Creek Priority Drainage (Operable Unite [OU] 6) (DOE 1992b), and reported in the Phase I RFI/RI Report (DOE 1996).

[5] In September 1974, the Walnut Creek Diversion Dam and McKay Bypass Canal were constructed to route the McKay Ditch flow north of the Present Landfill, which is the current configuration of the ditch.

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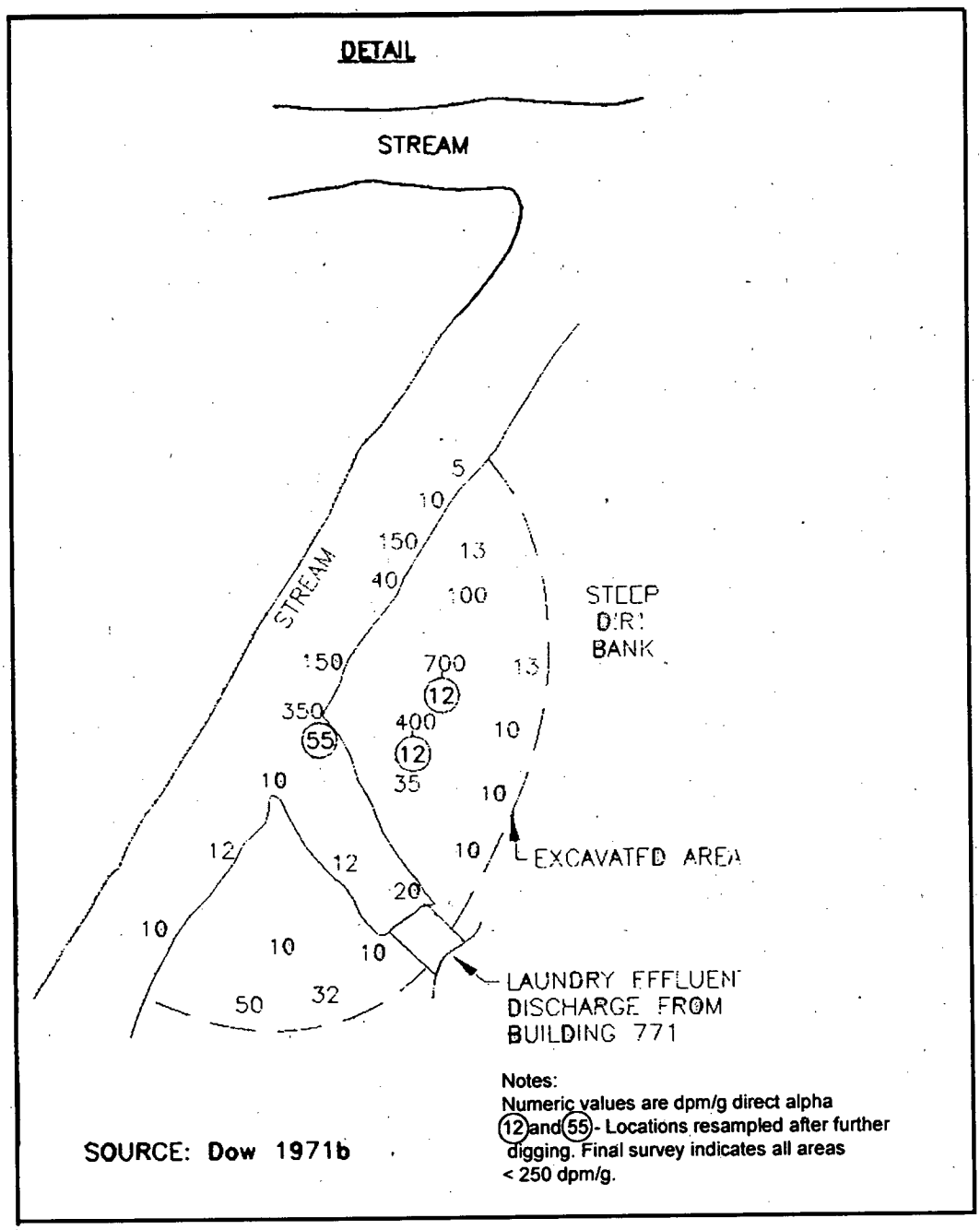
**Figure 2.7 Post Remediation Survey at Building 771 Outfall (August 1971)**



In 1993, soil borings were drilled in IHSS 143 as part of the Phase I RFI/RI for OU 6 (Figure 2.8). The IHSS was located from a review of historical aerial photographs and plans that depict the 771 Outfall, and the borings were located in the field by measuring distances and bearings from existing landmarks identified on the aerial photographs and plans in order to exactly target the outfall area (DOE 1996). Figure 2.9 depicts the location of the old storm water drainage basin northwest of Building 771 using the surrounding paved road as it appeared in an August 6, 1971 aerial photograph to demark it. The figure also superimposes the hand-drawn sketch of the Building 771 Outfall from DOW 1971a (see Figure 2.6).[6] The figure clearly shows that the borings are located in the 771 Outfall area, specifically, just north of the actual outfall where soil had been remediated. One of the boreholes (60592) was subsequently converted to an alluvial monitoring well (77492). An additional boring in the area (43792) had been drilled and sampled in the previous year (1992); these data have also been used in this evaluation. The borings penetrated the 6.5 ft of fill (DOE 1996) that was present in the area so that samples of pre-fill soil were collected at the lower depths. Four of the boreholes were selected for surface soil sampling (SS600092 through SS600392).

As shown in Table 2.5, surface soil, subsurface soil, and groundwater samples have been analyzed for metals, radionuclides, volatile organic compounds (VOCs) (except surface soils), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), and water quality parameters (WQPs). Groundwater was sampled frequently between 1993 and 1995.

The surface soil, subsurface soil, and groundwater data are summarized in Tables 2.6 through 2.8, respectively. These tables present analytes that were detected above background (see discussion below). In these tables, the following decision rules were applied to the calculation of summary statistics:

- Data rejected during validation were eliminated from the data set before computing statistics.
- The maximum value is the highest detected value observed.
- The average was computed using only data that are above background concentrations.

Figures 2.10 through 2.12 present all the data that were detected above background for surface soil, subsurface soil, and groundwater, and that have a Rocky Flats Cleanup Agreement (RFCA) action level (AL) (wildlife refuge worker [WRW] soil/sediment AL or groundwater AL). (The ALs are from RFCA Attachment 5, dated June 5, 2003 [DOE et al. 2003]). Background levels for inorganic constituents for subsurface soil and groundwater are from the Background Geochemical Characterization Report (DOE 1993). Background values for surface soils are from the Geochemical Characterization of Background Surface Soils: Background Soils Characterization Program (DOE 1995). All background values used for comparison are the

[6] Figure 5 also depicts the current configuration of surface water conveyances (storm drains, culverts and ditches). The hand-drawn sketch from DOW 1971a was oriented so that the stream entering the IHSS from the southwest (via a culvert) and the remnant of McKay Ditch aligned properly.

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mean background values plus two standard deviations. Any detection of an organic compound is considered an above-background level observation.

## Table 2.5 PAC 700-143 Analytical Program

| Location Code | Sample Type | Depth Interval | Analyte Group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Rads | Diss Rads | Tot Metals | Diss Metals | VOCs | SVOCs | Pesticides/ PCBs | WQPs |
| SS600092 | Surface Soil | < 6" | X | | X | | | X | X | X |
| SS600192 | Surface Soil | < 6" | X | | X | | | X | X | X |
| SS600292 | Surface Soil | < 6" | X | | X | | | X | X | X |
| SS600392 | Surface Soil | < 6" | X | | X | | | X | X | X |
| 43792 | Subsurface Soil | 3.65' – 3.9' | | | | | X | | | |
| 43792 | Subsurface Soil | 0.00' – 5.2' | X | | X | | | | | |
| 43792 | Subsurface Soil | 5.95' – 6.2' | | | | | X | | | |
| 43792 | Subsurface Soil | 10.2' – 10.5' | | | | | X | | | |
| 43792 | Subsurface Soil | 5.2' – 10.7' | X | | X | | | | | |
| 43792 | Subsurface Soil | 13.5' – 13.8' | | | | | X | | | |
| 43792 | Subsurface Soil | 15.2' – 15.5' | | | | | X | | | |
| 43792 | Subsurface Soil | 10.7' – 15.7' | X | | X | | | | | |
| 43792 | Subsurface Soil | 20.5' – 20.8' | | | | | X | | | |
| 60092 | Subsurface Soil | 1.2' – 1.5' | | | | | X | | | |
| 60092 | Subsurface Soil | 5.3' – 5.6' | | | | | X | | | |
| 60092 | Subsurface Soil | 0.0' – 6.6' | X | | X | | | X | X | |
| 60092 | Subsurface Soil | 8.9' – 9.2' | | | | | X | | | |
| 60092 | Subsurface Soil | 6.6' – 10.2' | X | | X | | | X | X | |
| 60192 | Subsurface Soil | 0.4' – 0.7' | | | | | X | | | |
| 60192 | Subsurface Soil | 5.2' – 5.5' | | | | | X | | | |
| 60192 | Subsurface Soil | 8.5' – 8.8' | | | | | X | | | |
| 60292 | Subsurface Soil | 2.9' – 3.2' | | | | | X | | | |
| 60292 | Subsurface Soil | 6.7' – 7.0' | | | | | X | | | |
| 60292 | Subsurface Soil | 6.5' – 10.7' | X | | X | | | X | X | |
| 60392 | Subsurface Soil | 1.3' – 1.6' | | | | | X | | | |
| 60392 | Subsurface Soil | 4.9' – 5.2' | | | | | X | | | |
| 60392 | Subsurface Soil | 7.4' – 7.7' | | | | | X | | | |
| 60392 | Subsurface Soil | 6.5' – 10.0' | X | | X | | | X | X | |
| 60492 | Subsurface Soil | 1.1' – 1.4' | | | | | X | | | |
| 60492 | Subsurface Soil | 5.7' – 6.0' | | | | | X | | | |
| 60492 | Subsurface Soil | 7.2' – 7.5' | | | | | X | | | |
| 60492 | Subsurface Soil | 10.7' – 11.0' | | | | | X | | | |
| 60492 | Subsurface Soil | 6.7' – 11.8' | X | | X | | | X | X | |
| 77492 | Subsurface Soil | 0.9' - 1.2' | | | | | X | | | |
| 77492 | Subsurface Soil | 4.7' – 5.0' | | | | | X | | | |
| 77492 | Subsurface Soil | 7.0' – 9.7' | X | | X | | | X | X | |
| 77492 | Subsurface Soil | 9.4' – 9.7' | | | | | X | | | |
| 77492 | Subsurface Soil | 16.8' – 17.1' | | | | | X | | | |
| 77492 | Subsurface Soil | 23.2' – 23.5- | | | | | X | | | |
| 77492 | Groundwater[1] | | X | | X | | X | X | X | X |

[1] No less than nine groundwater samples were collected and analyzed for the analytical suites shown. Sample collection dates are primarily from 1993 through 1995.

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## Table 2.6 Summary of Constituents Above Background in Surface Soil

| Analyte Group | Analyte | Total Number of Samples Analyzed | Detection Frequency | Average Conc. | Maximum Conc. | BG Mean Plus 2SD | WRW AL | Unit |
|---|---|---|---|---|---|---|---|---|
| Metals | Barium | 4 | 50% | 156 | 170 | 141.3 | 26400 | mg/kg |
| Metals | Chromium | 4 | 25% | 17.7 | 17.7 | 17.0 | 268 | mg/kg |
| Metals | Cobalt | 4 | 25% | 12.9 | 12.9 | 10.9 | 1550 | mg/kg |
| Metals | Iron | 4 | 25% | 21300 | 21300 | 18037.0 | 307000 | mg/kg |
| Metals | Manganese | 4 | 25% | 374 | 374 | 365.1 | 3480 | mg/kg |
| Metals | Nickel | 4 | 75% | 19 | 21.3 | 14.9 | 20400 | mg/kg |
| Metals | Strontium | 4 | 25% | 53.8 | 53.8 | 48.9 | 613000 | mg/kg |
| Metals | Zinc | 4 | 25% | 85.4 | 85.4 | 73.8 | 307000 | mg/kg |
| Radionuclide | Plutonium-239/240 | 4 | 50% | 0.39 | 0.52 | 0.066 | 50 | pCi/g |
| SVOCs | Anthracene | 4 | 25% | 660 | 660 | - | 204000000 | ug/kg |
| SVOCs | Benzo(a)anthracene | 4 | 50% | 1255 | 1800 | - | 34900 | ug/kg |
| SVOCs | Benzo(a)pyrene | 4 | 50% | 1635 | 2300 | - | 3490 | ug/kg |
| SVOCs | Benzo(b)fluoranthene | 4 | 50% | 2200 | 3200 | - | 34900 | ug/kg |
| SVOCs | Benzo(k)fluoranthene | 4 | 50% | 835 | 1200 | - | 349000 | ug/kg |
| SVOCs | Chrysene | 4 | 50% | 1155 | 1600 | - | 3490000 | ug/kg |
| SVOCs | Fluoranthene | 4 | 50% | 2050 | 2700 | - | 27200000 | ug/kg |
| SVOCs | Indeno(1,2,3-cd)pyrene | 4 | 25% | 890 | 890 | - | 34900 | ug/kg |
| SVOCs | Pyrene | 4 | 50% | 1950 | 2800 | - | 22100000 | ug/kg |
| WQPs | Nitrate | 4 | 25% | 1.41 | 1.41 | - | 1000000 | mg/kg |
| | Exceeds Wildlife Refuge Worker Action Level | | | | | | | |

BG – background
mg/kg – milligrams per kilogram
pCi/g – picocuries per gram
SD – standard deviation

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## Table 2.7a Summary of Constituents Above Background in Fill and Native Subsurface Soil

| Analyte Group | Analyte | Total Number of Samples Analyzed | Detection Frequency | Average Conc. | Maximum Conc. | BG Mean Plus 2SD | WRW AL | Unit |
|---|---|---|---|---|---|---|---|---|
| Metals | Barium | 10 | 10% | 1150 | 1150 | 289 | 26400 | mg/kg |
| Metals | Strontium | 10 | 10% | 279 | 279 | 211 | 613000 | mg/kg |
| PCBs | Aroclor-1254 | 7 | 14% | 940 | 940 | - | 12400 | ug/kg |
| Radionuclides | Americium-241 | 4 | 75% | 0.07 | 0.09 | 0.02 | 76 | pCi/g |
| Radionuclides | Plutonium-239/240 | 10 | 30% | 0.18 | 0.28 | 0.02 | 50 | pCi/g |
| Radionuclides | Uranium-238 | 10 | 10% | 1.5 | 1.6 | 1.49 | 351 | pCi/g |
| VOCs | Methylene chloride | 26 | 4% | 5 | 5 | - | 2530000 | ug/kg |
| VOCs | Toluene | 26 | 100% | 244 | 1200 | - | 31300000 | ug/kg |
| | Exceeds Wildlife Refuge Worker Action Level | | | | | | | |

BG – background
mg/kg – milligrams per kilogram
pCi/g – picocuries per gram
SD – standard deviation

## Table 2.7b Summary of Constituents Above Background in Native Subsurface Soil

| Analyte Group | Analyte | Total Number Samples Analyzed | Detection Frequency | Average Conc. | Maximum Conc. | BG Mean Plus 2SD | Wildlife Refuge Worker AL | Unit |
|---|---|---|---|---|---|---|---|---|
| Metal | Barium | 8 | 13% | 1150 | 1150 | 289 | 26400 | mg/kg |
| Metal | Strontium | 8 | 13% | 279 | 279 | 211 | 613000 | mg/kg |
| Radionuclide | Americium-241 | 2 | 100% | 0.055 | 0.074 | 0.02 | 76 | pCi/g |
| Radionuclide | Plutonium-239/240 | 8 | 25% | 0.227 | 0.2767 | 0.02 | 50 | pCi/g |
| Radionuclide | Uranium-238 | 8 | 13% | 1.52 | 1.518 | 1.49 | 351 | pCi/g |
| VOC | Methylene chloride | 12 | 8% | 5 | 5 | - | 2530000 | ug/kg |
| VOC | Toluene | 12 | 100% | 275 | 1200 | - | 31300000 | ug/kg |
| | Exceeds Wildlife Refuge Worker Action Level | | | | | | | |

Note – Based on subsurface soil samples at depth intervals greater than 6.5 ft
BG – background
mg/kg – milligrams per kilogram
pCi/g – picocuries per gram
SD – standard deviation

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## Table 2.8 Summary of Constituents Above Background in Groundwater

| Analyte Group | Analyte | Total Number Samples Analyzed | Number of Samples Exceeding BG But Less Than Tier II AL | Number of Samples Exceeding Tier II AL But Less Than Tier I AL | Number of Samples Exceeding Tier I AL | Average Conc | Maximum Conc | BG Mean Plus 2SD | Tier II Action Level | Tier I Action Level | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Metals | Aluminum | 8 | 3 | 5 | 0 | 53.15 | 105.00 | 11.24 | 36.5 | 3650 | mg/L |
| Metals | Arsenic | 9 | 9 | 0 | 0 | 0.01 | 0.02 | 0.01 | 0.05 | 5 | mg/L |
| Metals | Barium | 9 | 8 | 1 | 0 | 0.81 | 2.47 | 0.19 | 2 | 200 | mg/L |
| Metals | Beryllium | 9 | 1 | 4 | 0 | 0.01 | 0.03 | 0.003 | 0.004 | 0.4 | mg/L |
| Metals | Chromium | 9 | 6 | 1 | 0 | 0.08 | 0.22 | 0.02 | 0.1 | 10 | mg/L |
| Metals | Cobalt | 9 | 3 | 0 | 0 | 0.06 | 0.09 | 0.03 | 2.19 | 219 | mg/L |
| Metals | Copper | 9 | 4 | 0 | 0 | 0.09 | 0.19 | 0.04 | 1.3 | 130 | mg/L |
| Metals | Lead | 9 | 1 | 8 | 0 | 0.05 | 0.18 | 0.01 | 0.015 | 1.5 | mg/L |
| Metals | Lithium | 9 | 1 | 0 | 0 | 0.17 | 0.17 | 0.13 | 0.73 | 73 | mg/L |
| Metals | Manganese | 9 | 0 | 9 | 0 | 3.03 | 5.05 | 0.30 | 1.72 | 172 | mg/L |
| Metals | Mercury | 9 | 4 | 0 | 0 | 0.001 | 0.002 | 0.00 | 0.002 | 0.2 | mg/L |
| Metals | Nickel | 9 | 2 | 1 | 0 | 0.12 | 0.22 | 0.03 | 0.14 | 14 | mg/L |
| Metals | Strontium | 9 | 6 | 0 | 0 | 1.16 | 1.79 | 0.85 | 21.9 | 2190 | mg/L |
| Metals | Tin | 9 | 2 | 0 | 0 | 0.15 | 0.19 | 0.10 | 21.9 | 2190 | mg/L |
| Metals | Vanadium | 9 | 6 | 1 | 0 | 0.14 | 0.37 | 0.04 | 0.256 | 25.6 | mg/L |
| Metals | Zinc | 9 | 4 | 0 | 0 | 0.34 | 0.67 | 0.14 | 11 | 1100 | mg/L |
| Pesticides | 4,4'-DDD | 9 | 1 | 0 | 0 | 0.03 | 0.03 | - | 0.355 | 35.5 | ug/L |
| Pesticides | alpha-BHC | 9 | 1 | 1 | 0 | 0.02 | 0.02 | - | 0.0135 | 1.35 | ug/L |
| Radionuclide | Americium-241 | 9 | 4 | 0 | 0 | 0.07 | 0.11 | 0.03 | 0.145 | 14.5 | pCi/L |
| SVOCs | bis(2-Ethylhexyl)phthalate | 10 | 2 | 2 | 0 | 8.50 | 9.00 | - | 6 | 600 | ug/L |
| VOCs | 1,1-Dichloroethane | 12 | 2 | 0 | 0 | 0.35 | 0.60 | - | 3650 | 365000 | ug/L |
| VOCs | 1,1-Dichloroethene | 12 | 1 | 0 | 0 | 0.20 | 0.20 | - | 7 | 700 | ug/L |
| VOCs | 1,2-Dichloroethene (total) | 7 | 1 | 0 | 0 | 2.00 | 2.00 | - | 70 | 7000 | ug/L |

| Analyte Group | Analyte | Total Number Samples Analyzed | Number of Samples Exceeding BG But Less Than Tier II AL[1] | Number of Samples Exceeding Tier II AL But Less Than Tier I AL | Number of Samples Exceeding Tier I AL | Average Conc. | Maximum Conc. | BG Mean Plus 2SD | Tier II Action Level | Tier I Action Level | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs | Acetone | 7 | 1 | 0 | 0 | 4.00 | 4.00 | - | 3650 | 365000 | ug/L |
| VOCs | Carbon Tetrachloride | 12 | 6 | 2 | 0 | 4.17 | 8.00 | - | 5 | 500 | ug/L |
| VOCs | Chloroform | 12 | 3 | 0 | 0 | 1.40 | 3.00 | - | 100 | 10000 | ug/L |
| VOCs | Methylene chloride | 12 | 3 | 0 | 0 | 2.53 | 4.00 | - | 5 | 500 | ug/L |
| VOCs | Tetrachloroethene | 12 | 2 | 0 | 0 | 0.15 | 0.20 | - | 5 | 500 | ug/L |
| VOCs | Trichloroethene | 12 | 3 | 0 | 0 | 0.10 | 0.10 | - | 5 | 500 | ug/L |
| WQPs | Ammonia | 4 | 4 | 0 | 0 | 0.58 | 0.64 | - | 35.4 | 3540 | mg/L |
| WQPs | Nitrite | 6 | 2 | 0 | 0 | 0.07 | 0.20 | 0.04 | 1 | 100 | mg/L |
| WQPs | Sulfate | 6 | 6 | 0 | 0 | 66713.83 | 78000 | - | 500000 | 50000000 | ug/L |
| | Exceeds Tier II Action Level | | | | | | | | | | |

Note: Data are for Well 77492
BG - background
ug/L – micrograms per liter
mg/L – milligrams per liter
SD – standard deviation

[1] Organic detections, estimated or otherwise, are considered above-background concentrations.

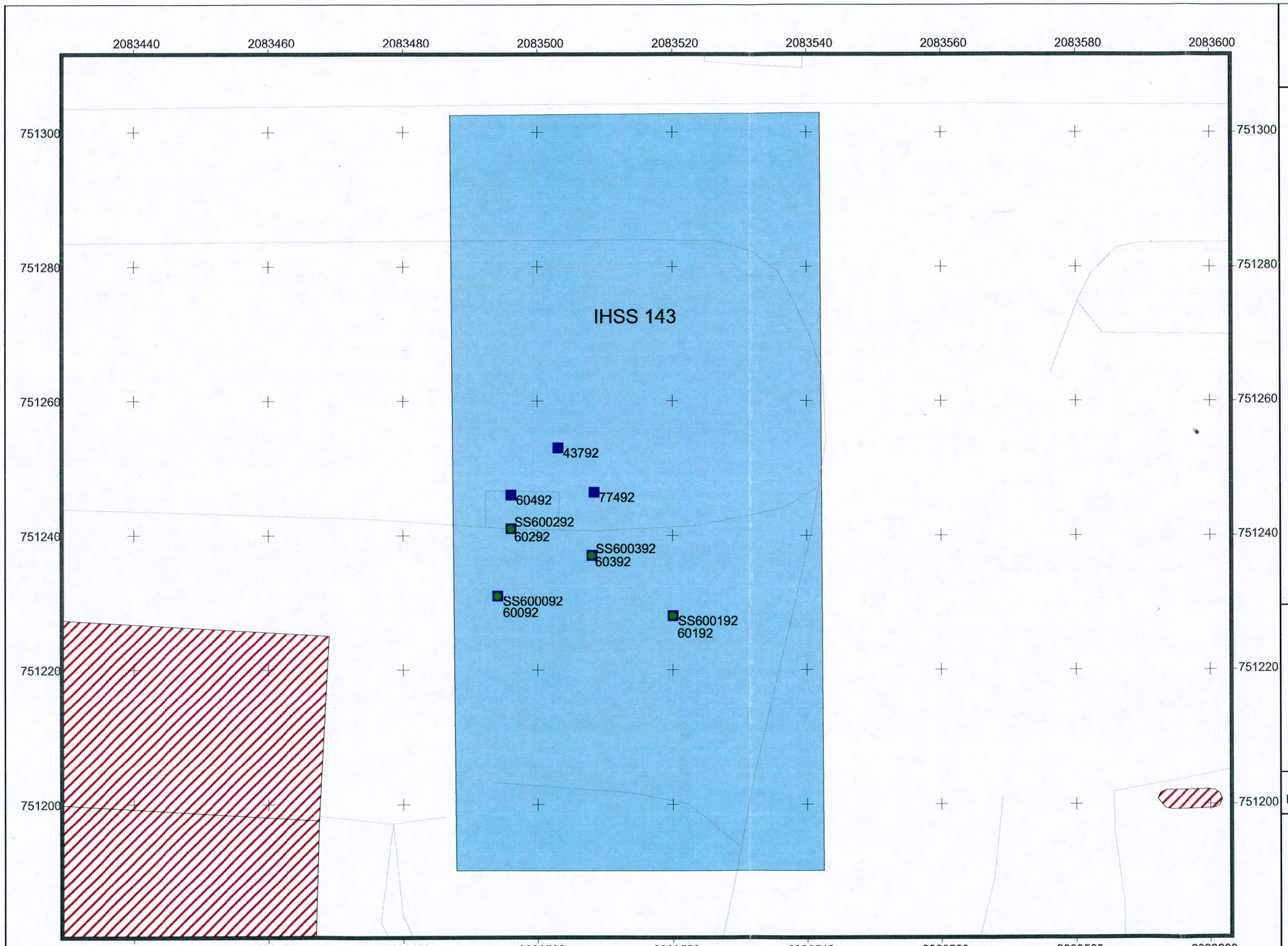


**Figure 2.8**
**Surface and Subsurface Sample Locations**

KEY

- Surface sample
- Subsurface sample
- Paved road
- IHSS
- Demolished building

N
W E
S

10 0 10 Feet

Scale = 1: 175

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Date: 04.27.04

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

File: W:\Projects\Fy2004\central_ave_ditch\IHSS143\IHSS_143.apr

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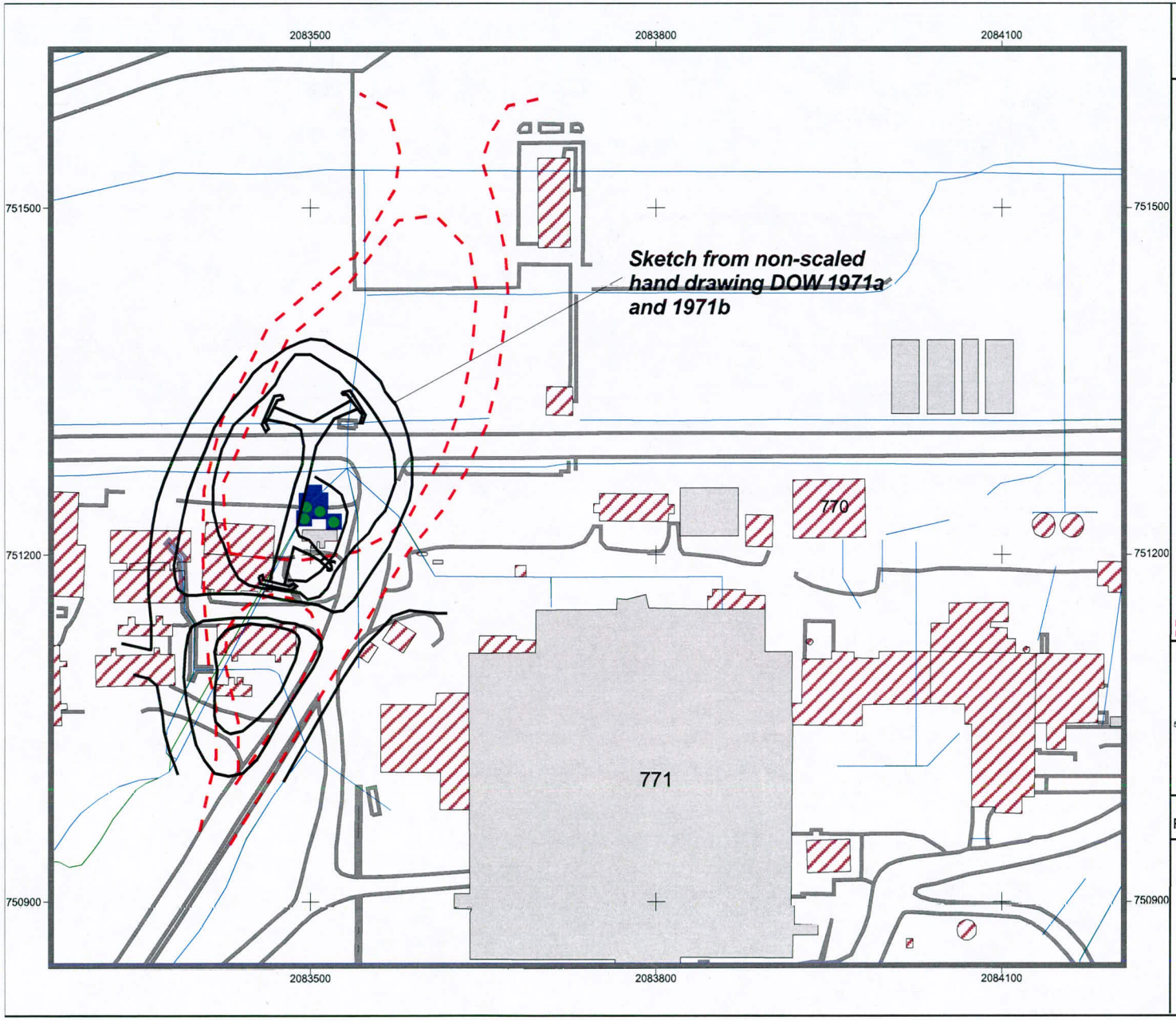



Figure 2.9
1971 Configuration of Storm Drainage Basin and Adjacent Paved Road at Building 771

KEY

Soil Sampling Locations
- Surface
- Subsurface

Approximate Location of Paved Road (1971)
Source - Aerial Photo, August 6, 1971

Paved Road

Streams

Surface water conveyances (storm drains, culverts, ditches)

IHSS

Structure
- Demolished
- Standing

Disclaimer:
Draft - data subject to change

N
W E
S

50 0 50 100 150 Feet

Scale 1:1,500
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

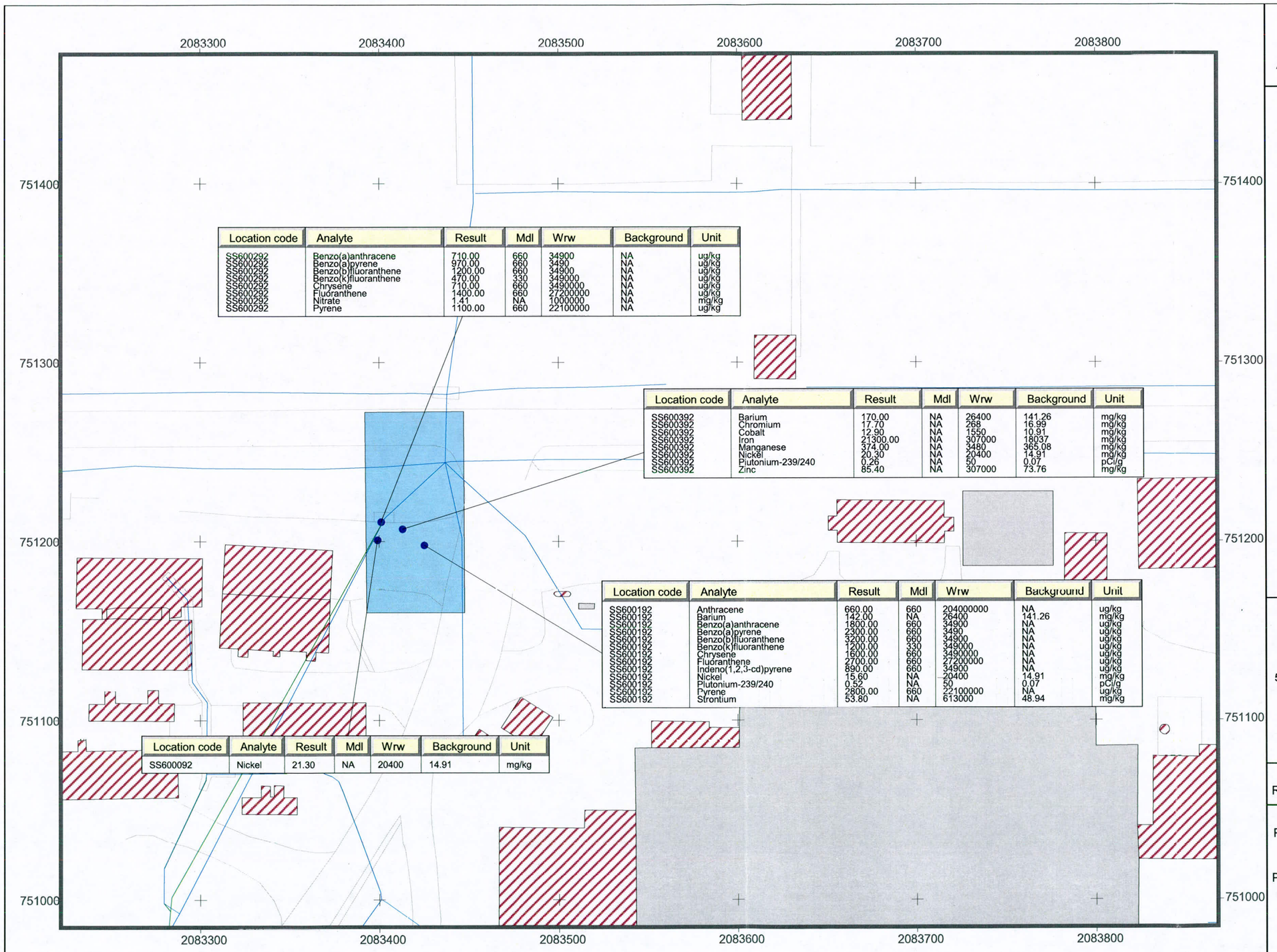
U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
RADMS

Prepared for:
KAISER-HILL COMPANY

Date: June 2004

File: w:\projects\fy2004\central_ave_ditch\IHSS143\ihss_143.apr




| Location code | Analyte | Result | Mdl | Wrw | Background | Unit |
|---|---|---|---|---|---|---|
| SS600292 | Benzo(a)anthracene | 710.00 | 660 | 34900 | NA | ug/kg |
| SS600292 | Benzo(a)pyrene | 970.00 | 660 | 3490 | NA | ug/kg |
| SS600292 | Benzo(b)fluoranthene | 1200.00 | 660 | 34900 | NA | ug/kg |
| SS600292 | Benzo(k)fluoranthene | 470.00 | 330 | 349000 | NA | ug/kg |
| SS600292 | Chrysene | 710.00 | 660 | 3490000 | NA | ug/kg |
| SS600292 | Fluoranthene | 1400.00 | 660 | 27200000 | NA | ug/kg |
| SS600292 | Nitrate | 1.41 | NA | 1000000 | NA | mg/kg |
| SS600292 | Pyrene | 1100.00 | 660 | 22100000 | NA | ug/kg |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit |
|---|---|---|---|---|---|---|
| SS600392 | Barium | 170.00 | NA | 26400 | 141.26 | mg/kg |
| SS600392 | Chromium | 17.70 | NA | 268 | 16.99 | mg/kg |
| SS600392 | Cobalt | 12.90 | NA | 1550 | 10.91 | mg/kg |
| SS600392 | Iron | 21300.00 | NA | 307000 | 18037 | mg/kg |
| SS600392 | Manganese | 374.00 | NA | 3480 | 365.08 | mg/kg |
| SS600392 | Nickel | 20.30 | NA | 20400 | 14.91 | mg/kg |
| SS600392 | Plutonium-239/240 | 0.26 | NA | 50 | 0.07 | pCi/g |
| SS600392 | Zinc | 85.40 | NA | 307000 | 73.76 | mg/kg |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit |
|---|---|---|---|---|---|---|
| SS600192 | Anthracene | 660.00 | 660 | 204000000 | NA | ug/kg |
| SS600192 | Barium | 142.00 | NA | 26400 | 141.26 | mg/kg |
| SS600192 | Benzo(a)anthracene | 1800.00 | 660 | 34900 | NA | ug/kg |
| SS600192 | Benzo(a)pyrene | 2300.00 | 660 | 3490 | NA | ug/kg |
| SS600192 | Benzo(b)fluoranthene | 3200.00 | 660 | 34900 | NA | ug/kg |
| SS600192 | Benzo(k)fluoranthene | 1200.00 | 330 | 349000 | NA | ug/kg |
| SS600192 | Chrysene | 1600.00 | 660 | 3490000 | NA | ug/kg |
| SS600192 | Fluoranthene | 2700.00 | 660 | 27200000 | NA | ug/kg |
| SS600192 | Indeno(1,2,3-cd)pyrene | 890.00 | 660 | 34900 | NA | ug/kg |
| SS600192 | Nickel | 15.60 | NA | 20400 | 14.91 | mg/kg |
| SS600192 | Plutonium-239/240 | 0.52 | NA | 50 | 0.07 | pCi/g |
| SS600192 | Pyrene | 2800.00 | 660 | 22100000 | NA | ug/kg |
| SS600192 | Strontium | 53.80 | NA | 613000 | 48.94 | mg/kg |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit |
|---|---|---|---|---|---|---|
| SS600092 | Nickel | 21.30 | NA | 20400 | 14.91 | mg/kg |

**Figure 2.10**
**IHSS 143**
**Distribution of Constituents Above Background in Surface Soil**

KEY

- Sample Location
- Paved roads
- Streams
- Surface water conveyances (storm drains, culverts ditches)
- IHSS
- Demolished building
- Standing building

N
W E
S

50 0 50 Feet

Scale = 1: 650

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Date: 04.27.04

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

File: W:\Projects\Fy2004\central_ave_ditch\IHSS143\IHSS_143.apr

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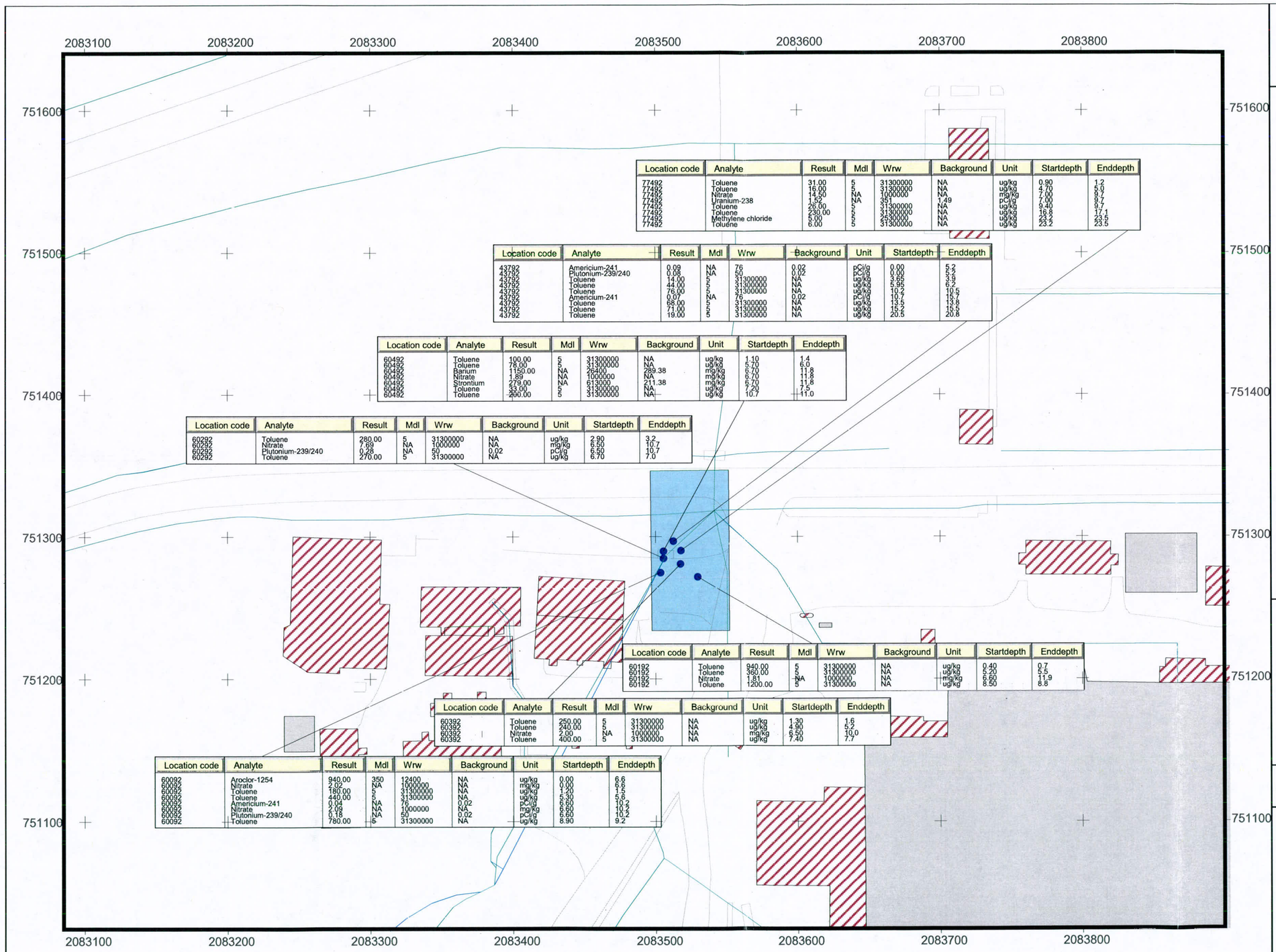


| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 77492 | Toluene | 31.00 | 5 | 31300000 | NA | ug/kg | 0.90 | 1.2 |
| 77492 | Toluene | 16.00 | 5 | 31300000 | NA | ug/kg | 4.70 | 5.0 |
| 77492 | Nitrate | 14.50 | NA | 1000000 | NA | mg/kg | 7.00 | 9.7 |
| 77492 | Uranium-238 | 1.52 | NA | 351 | 1.49 | pCi/g | 7.00 | 9.7 |
| 77492 | Toluene | 26.00 | 5 | 31300000 | NA | ug/kg | 9.40 | 9.7 |
| 77492 | Toluene | 230.00 | 5 | 31300000 | NA | ug/kg | 16.8 | 17.1 |
| 77492 | Methylene chloride | 5.00 | 5 | 2530000 | NA | ug/kg | 23.2 | 23.5 |
| 77492 | Toluene | 6.00 | 5 | 31300000 | NA | ug/kg | 23.2 | 23.5 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 43792 | Americium-241 | 0.09 | NA | 76 | 0.02 | pCi/g | 0.00 | 5.2 |
| 43792 | Plutonium-239/240 | 0.08 | NA | 50 | 0.02 | pCi/g | 0.00 | 5.2 |
| 43792 | Toluene | 14.00 | 5 | 31300000 | NA | ug/kg | 5.95 | 6.2 |
| 43792 | Toluene | 44.00 | 5 | 31300000 | NA | ug/kg | 5.95 | 6.2 |
| 43792 | Toluene | 76.00 | 5 | 31300000 | NA | ug/kg | 10.2 | 10.5 |
| 43792 | Americium-241 | 0.07 | NA | 76 | 0.02 | pCi/g | 10.7 | 15.7 |
| 43792 | Toluene | 68.00 | 5 | 31300000 | NA | ug/kg | 13.5 | 13.8 |
| 43792 | Toluene | 71.00 | 5 | 31300000 | NA | ug/kg | 15.2 | 15.5 |
| 43792 | Toluene | 19.00 | 5 | 31300000 | NA | ug/kg | 20.5 | 20.8 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 60492 | Toluene | 100.00 | 5 | 31300000 | NA | ug/kg | 1.10 | 1.4 |
| 60492 | Toluene | 76.00 | 5 | 31300000 | NA | ug/kg | 5.70 | 6.0 |
| 60492 | Barium | 1150.00 | NA | 26400 | 289.38 | mg/kg | 6.70 | 11.8 |
| 60492 | Nitrate | 1.89 | NA | 1000000 | NA | mg/kg | 6.70 | 11.8 |
| 60492 | Strontium | 279.00 | NA | 613000 | 211.38 | mg/kg | 6.70 | 11.8 |
| 60492 | Toluene | 33.00 | 5 | 31300000 | NA | ug/kg | 7.20 | 7.5 |
| 60492 | Toluene | 200.00 | 5 | 31300000 | NA | ug/kg | 10.7 | 11.0 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 60292 | Toluene | 280.00 | 5 | 31300000 | NA | ug/kg | 2.90 | 3.2 |
| 60292 | Nitrate | 7.89 | NA | 1000000 | NA | mg/kg | 6.50 | 10.7 |
| 60292 | Plutonium-239/240 | 0.28 | NA | 50 | 0.02 | pCi/g | 6.50 | 10.7 |
| 60292 | Toluene | 270.00 | 5 | 31300000 | NA | ug/kg | 6.70 | 7.0 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 60192 | Toluene | 940.00 | 5 | 31300000 | NA | ug/kg | 0.40 | 0.7 |
| 60192 | Toluene | 360.00 | 5 | 31300000 | NA | ug/kg | 5.20 | 5.5 |
| 60192 | Nitrate | 1.81 | NA | 1000000 | NA | mg/kg | 6.50 | 11.9 |
| 60192 | Toluene | 1200.00 | 5 | 31300000 | NA | ug/kg | 8.50 | 8.8 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 60392 | Toluene | 250.00 | 5 | 31300000 | NA | ug/kg | 1.30 | 1.6 |
| 60392 | Toluene | 240.00 | 5 | 31300000 | NA | ug/kg | 4.90 | 5.2 |
| 60392 | Nitrate | 2.00 | NA | 1000000 | NA | mg/kg | 6.50 | 10.0 |
| 60392 | Toluene | 400.00 | 5 | 31300000 | NA | ug/kg | 7.40 | 7.7 |

| Location code | Analyte | Result | Mdl | Wrw | Background | Unit | Startdepth | Enddepth |
|---|---|---|---|---|---|---|---|---|
| 60092 | Aroclor-1254 | 940.00 | 350 | 12400 | NA | ug/kg | 0.00 | 6.6 |
| 60092 | Nitrate | 2.02 | NA | 1000000 | NA | mg/kg | 0.00 | 6.6 |
| 60092 | Toluene | 180.00 | 5 | 31300000 | NA | ug/kg | 1.20 | 1.5 |
| 60092 | Toluene | 440.00 | 5 | 31300000 | NA | ug/kg | 5.30 | 5.6 |
| 60092 | Americium-241 | 0.04 | NA | 76 | 0.02 | pCi/g | 6.60 | 10.2 |
| 60092 | Nitrate | 2.09 | NA | 1000000 | NA | mg/kg | 6.60 | 10.2 |
| 60092 | Plutonium-239/240 | 0.18 | NA | 50 | 0.02 | pCi/g | 6.60 | 10.2 |
| 60092 | Toluene | 780.00 | 5 | 31300000 | NA | ug/kg | 8.90 | 9.2 |

**Figure 2.11**
**IHSS 143**
**Distribution of Constituents Above Background in Subsurface Soil**

KEY

- Sample Location
- Paved roads
- Streams
- Surface water conveyances (storm drains, culverts ditches)
- IHSS
- Demolished building
- Standing building

N
W E
S

50 0 50 Feet

Scale = 1: 820

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Date: 04.27.04

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

File: W:\Projects\Fy2004\cen... IHSS143\IHSS_143.apr

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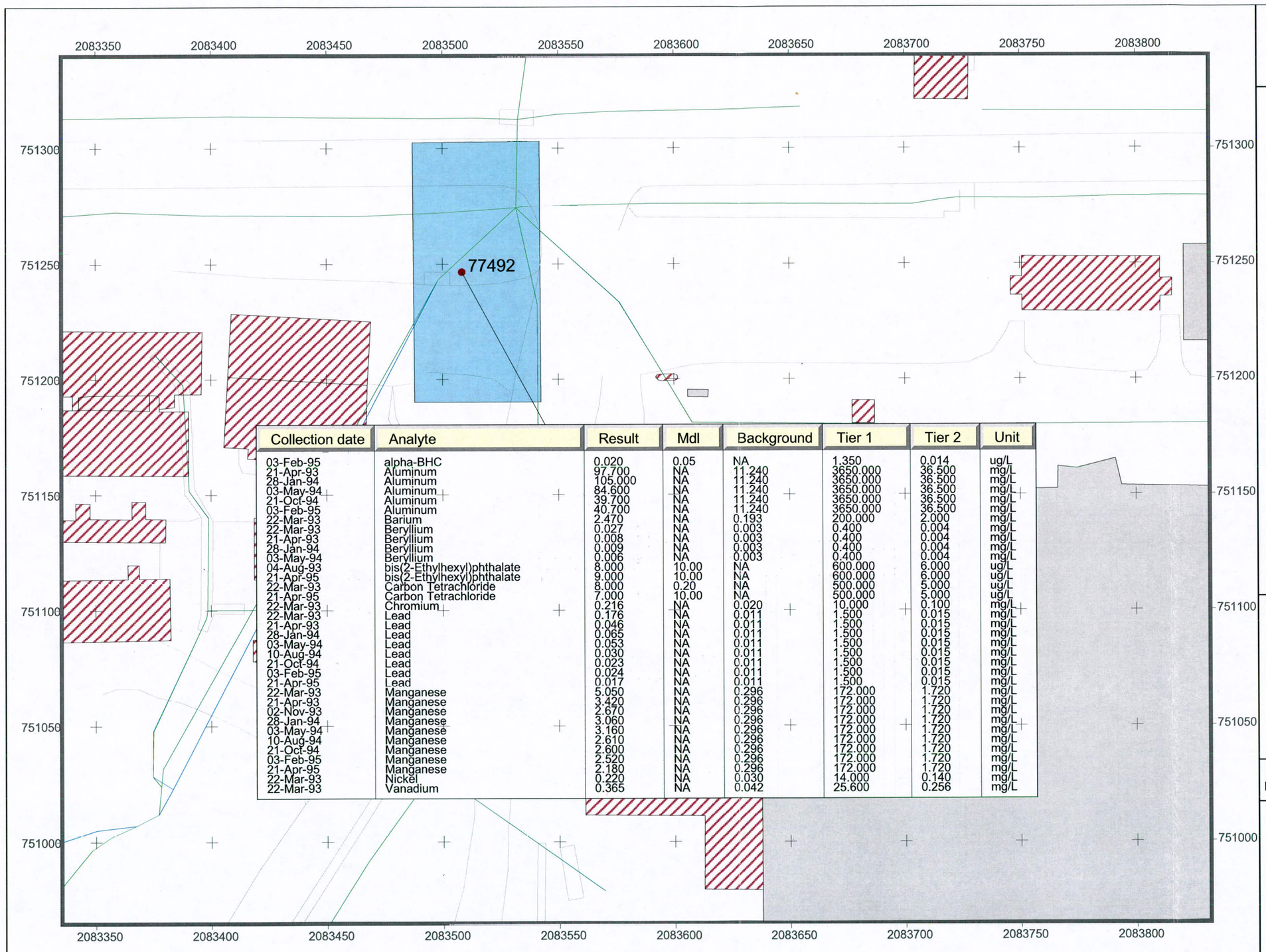
# Figure 2.12
# Constituents Above Tier II Action Levels in Groundwater




| Collection date | Analyte | Result | Mdl | Background | Tier 1 | Tier 2 | Unit |
|---|---|---|---|---|---|---|---|
| 03-Feb-95 | alpha-BHC | 0.020 | 0.05 | NA | 1.350 | 0.014 | ug/L |
| 21-Apr-93 | Aluminum | 97.700 | NA | 11.240 | 3650.000 | 36.500 | mg/L |
| 28-Jan-94 | Aluminum | 105.000 | NA | 11.240 | 3650.000 | 36.500 | mg/L |
| 03-May-94 | Aluminum | 84.600 | NA | 11.240 | 3650.000 | 36.500 | mg/L |
| 21-Oct-94 | Aluminum | 39.700 | NA | 11.240 | 3650.000 | 36.500 | mg/L |
| 03-Feb-95 | Aluminum | 40.700 | NA | 11.240 | 3650.000 | 36.500 | mg/L |
| 22-Mar-93 | Barium | 2.470 | NA | 0.193 | 200.000 | 2.000 | mg/L |
| 22-Mar-93 | Beryllium | 0.027 | NA | 0.003 | 0.400 | 0.004 | mg/L |
| 21-Apr-93 | Beryllium | 0.008 | NA | 0.003 | 0.400 | 0.004 | mg/L |
| 28-Jan-94 | Beryllium | 0.009 | NA | 0.003 | 0.400 | 0.004 | mg/L |
| 03-May-94 | Beryllium | 0.006 | NA | 0.003 | 0.400 | 0.004 | mg/L |
| 04-Aug-93 | bis(2-Ethylhexyl)phthalate | 8.000 | 10.00 | NA | 600.000 | 6.000 | ug/L |
| 21-Apr-95 | bis(2-Ethylhexyl)phthalate | 9.000 | 10.00 | NA | 600.000 | 6.000 | ug/L |
| 22-Mar-93 | Carbon Tetrachloride | 8.000 | 0.20 | NA | 500.000 | 5.000 | ug/L |
| 21-Apr-95 | Carbon Tetrachloride | 7.000 | 10.00 | NA | 500.000 | 5.000 | ug/L |
| 22-Mar-93 | Chromium | 0.216 | NA | 0.020 | 10.000 | 0.100 | mg/L |
| 22-Mar-93 | Lead | 0.176 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 21-Apr-93 | Lead | 0.046 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 28-Jan-94 | Lead | 0.065 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 03-May-94 | Lead | 0.053 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 10-Aug-94 | Lead | 0.030 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 21-Oct-94 | Lead | 0.023 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 03-Feb-95 | Lead | 0.024 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 21-Apr-95 | Lead | 0.017 | NA | 0.011 | 1.500 | 0.015 | mg/L |
| 22-Mar-93 | Manganese | 5.050 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 21-Apr-93 | Manganese | 3.420 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 02-Nov-93 | Manganese | 2.670 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 28-Jan-94 | Manganese | 3.060 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 03-May-94 | Manganese | 3.160 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 10-Aug-94 | Manganese | 2.610 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 21-Oct-94 | Manganese | 2.600 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 03-Feb-95 | Manganese | 2.520 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 21-Apr-95 | Manganese | 2.180 | NA | 0.296 | 172.000 | 1.720 | mg/L |
| 22-Mar-93 | Nickel | 0.220 | NA | 0.030 | 14.000 | 0.140 | mg/L |
| 22-Mar-93 | Vanadium | 0.365 | NA | 0.042 | 25.600 | 0.256 | mg/L |

KEY

- Sample Location
- Paved road
- Streams
- Surface water conveyances (storm drains, culverts, ditches)
- IHSS
- Demolished building
- Standing building

N
W E
S

30 0 30 Feet

Scalc = 1: 500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Date: 04.27.04

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

File: W:\Projects\Fy2004\central_ave_ditch\IHSS143\IHSS_143.apr

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Surface Soil Assessment

As shown in Table 2.6 and Figure 2.10, surface soil at PAC 700-143 contains above-background concentrations of several metals, plutonium, and several SVOCs. The metal and plutonium concentrations, above background levels, were of the same order of magnitude as the background levels and well below the WRW ALs. SVOC concentrations were all below the WRW ALs, generally by a large margin.

Application of the Subsurface Soil Risk Screen

**Screen 1 – Are contaminant of concern (COC) concentrations below RFCA Attachment 5, Table 3 wildlife refuge worker (WRW) soil action levels?**

Yes. As shown in Table 2.7a and Figure 2.11, the subsurface soil at PAC 700-143 contains above-background concentrations of barium, strontium, Aroclor-1254, radionuclides, and VOCs. The metals were detected above background infrequently, and their concentrations are well below the WRW ALs. Aroclor-1254 was detected only once and at a concentration an order of magnitude lower than the WRW AL. The radionuclides were detected more frequently above background than the metals, but at concentrations two orders of magnitude below the WRW ALs. Methylene chloride and toluene were the VOCs detected in subsurface soil. Methylene chloride was detected in only 1 of the 26 samples and at a very low concentration (5 micrograms per kilogram [ug/kg]). Toluene was detected in all the subsurface soil samples. The toluene concentrations do not portray a clear vertical or horizontal distribution pattern; however, concentrations tend to be highest at depth intervals greater than 8 to 10 ft. Regardless, the toluene concentrations are several orders of magnitude lower than the WRW AL.

Because contamination is expected in the native material beneath the 6.5 ft of fill in the area, subsurface soil data for sample intervals greater than 6.5 ft were summarized and are presented in Table 2.7b. Comparing Tables 2.7a and 2.7b, the chemical and radiological characteristics of the underlying native material and all subsurface soil are very similar. This further supports that residual contamination remaining after the removal of soil at the Building 771 outfall (1971 and 1980) is minimal.

In accordance with Figure 3 of RFCA Attachment 5, Screen 4 is performed next given a "yes" response to Screen 1.

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

No. As discussed below, the soil and groundwater data indicate this PAC is unlikely to cause an exceedance of surface water ALs.

Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by PAC 700-143. At the present time, erosion is an insignificant pathway because subsurface soil with contaminant concentrations greater than background at PAC 700-143 is covered with 6.5 ft of fill, and the surface soil constituent concentrations are at levels just above background (inorganics) or well below WRW ALs

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(organics). In addition, the organic compounds were only detected in one-half the samples. However, in the future, it is proposed that culverts be removed and the area be significantly recontoured as part of the final land reconfiguration for the Site. Subsurface soil beneath the fill will become exposed. Nevertheless, contaminant levels in subsurface soil, including the native material, are similar (and in many cases less) to that of surface soil (compare Tables 2.6, 2.7a, and 2.7b). Therefore the conclusion is the same - this IHSS is unlikely to cause an exceedance of surface water ALs due to erosion.

With respect to the groundwater pathway, alluvial well 77492 is directly downgradient of PAC 700-143. (Groundwater flows toward the unnamed drainage and North Walnut Creek.). As can be seen from Table 2.8 and Figure 2.12, only a few metals, one pesticide (alpha-BHC), one SVOC (bis[2-ethylhexyl]phthalate), and one VOC (carbon tetrachloride) were detected above Tier II groundwater ALs. These organic compounds were not detected in subsurface soil (or surface soil) and, therefore, PAC 700-143 does not appear to be a source of these constituents in groundwater. As for the metals, aluminum and manganese are major components of clay, and are likely present in the groundwater as finely divided clay particles. The other metal concentrations were near the Tier II groundwater ALs. Beryllium and lead, the metals most frequently detected above the Tier II groundwater ALs, were not present above background in surface or subsurface soil at PAC 700-143. Lastly, the concentrations of all the above noted constituents in groundwater are well below the Tier I groundwater ALs. In accordance with RFCA Attachment 5, exceedances of Tier I groundwater ALs are used to identify groundwater "sources" that may need to be addressed with an accelerated action to protect surface water quality. Therefore, PAC 700-143 is not a candidate for such an accelerated action.

NFAA Summary

PAC 700-143 is proposed for No Further Accelerated Action (NFAA). The Subsurface Soil Risk Screen (SSRS) and ALs in RFCA Attachment 5 (DOE et al. 2003) have been applied to the characterization data for this PAC. The risk screen does not indicate that soil removal is necessary. Surface and subsurface soil constituents that are above background are at concentrations well below the WRW ALs. Constituents above background in local alluvial groundwater are at concentrations well below the Tier I groundwater ALs, and almost all of these constituents were not identified as being above background in surface and subsurface soil at the PAC. It appears that previous remedial activities at this IHSS effectively addressed the release of contamination, and it is concluded that NFAA is required at PAC 700-143.

After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS 700-143 on September 7, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action (NFAA) Request for IHSS 143 (B771) - Approval, September 29, 2004.

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DOE, 1971a, DOW Chemical Company memorandum to J.M. Joshel entitled "Contamination at the Outfall of Building 771 Storm Drain", February 18, 1971.

DOE, 1971b, Memorandum to E. A. Putzier entitled "Building 771 Outfall", August 31, 1971.

DOE, 1992a, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1992b, Final Phase I RFI/RI Work Plan, Rocky Flats Plant Walnut Creek Priority Drainage (Operable Unit No. 6), Rocky Flats Plant, Golden, Colorado, May.

DOE, 1993, Background Geochemical Characterization Report, Golden, Colorado, September.

DOE, 1995, Geochemical Characterization of Background Surface Soils: Background Soils Characterization Program, Golden, Colorado, May.

DOE, 1996, Final Phase I RFI/RI Report Walnut Creek Priority Drainage, Operable Unit 6, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, CDPHE, EPA, and 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

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## PAC REFERENCE NUMBER: 700-146.1 - 700-146.6

IHSS Reference Number: 146.1 - 146.6

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Concrete Process Waste Tanks

Approximate Location: N751,000;E2,084,100

Date(s) of Operation or Occurrence

Prior to 1956 - 1972

Description of Operation or Occurrence

Six underground process waste holding tanks were located southern of the original Building 774. Building 774, a liquid waste processing facility, had been modified several times since its construction in 1952. During the construction of a south addition in 1972, the tanks were removed. These tanks overflowed frequently (DOE 1992).

PAC 700-146 represents a six-chambered reinforced concrete structure south of Building 774. The chambers of the structure were referred to as Tanks 30, 31, 32, 33, 34W, and 34E. Tanks 30 and 33 had a 3,000-gallon capacity, and the others had a 6,000-gallon capacity. The tanks were included in a 1952 engineering drawing, but it is unclear when they were first placed into service. Liquid waste was transferred to or from the tanks through pipes connected with the OPWL. Manholes were located at the top of each chamber. The tanks were 11 ft, 8 inches high, and had walls that were approximately 10 inches thick. The area occupied by the tanks was 22.5 ft (east-west) by 32.5 ft (north-south). The elevation of the bottoms of the tanks was approximately 5,955 ft. The floors of the tanks were at the same approximate height as the second floor of Building 774. Ground elevation to the south of the tanks was approximately 5,965 ft. The ground surface south of Building 774, slopes steeply to the north and levels out near the top of the tanks. RFP drawing #1-5392-74 indicates the six tanks were immediately west of Tanks #66, #67, and #68, which are discussed under PACs 700-124 and 700-125 (DOE 1992).

In October 1956, the process waste tanks at Building 774 overflowed resulting in minor environmental impact. In August 1957, some of the tanks leaked, resulting in minor environmental impact with levels up to 2,500 dpm/g. The release was subsequently cleaned up. One of the overflows reportedly flowed down the East Road toward North Walnut Creek (DOE 1992).

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Minor leakage from the six tanks was suspected to have been the cause of contamination found in footing drain water north of Building 774 (DOE 1992).

Physical/Chemical Description of Constituents Released

The process waste stored in the tanks was an aqueous solution with plutonium, uranium, acids, and caustics. Water from the Building 774 footing drains contained activities as high as 500 dpm/L. Approximately 200 cy of soil removed from around the tanks contained contamination levels up to 2,500 dpm/g gross alpha activity. Another 60 cy of soil removed averaged approximately 250 dpm/g (DOE 1992).

Responses to Operation or Occurrence

Excavation for the Building 774 addition construction began in February 1972. Contamination resulting from the overflow of the tanks was detected. At the time, the waste disposal policy required soil samples in excess of 34 dpm/g plutonium activity be disposed of as contaminated waste. Radiometric monitoring procedures included an alpha survey evaluation of the site to be excavated. Readings in excess of 250 cpm required that specific soil samples be collected for further analysis. Soil contamination in the excavation was identified as being slightly below the 34 dpm/g limit, and by April 1972, 101 barrels of contaminated soil were reportedly shipped to Idaho Falls. It was estimated that 30 to 40 more barrels would follow (DOE 1992).

Demolition of the concrete tanks began on May 8, 1972. A wet-saw cutting method was used for removal of the tanks. The disposition of the concrete is unknown. Approximately 200 cy of contaminated soil were removed in 1972 at the time the tanks were decommissioned, as well as during construction of the southern addition to Building 774. The soil was piled north of Building 334 (PAC 300-156.1). The soil was then moved to the eastern end of the Triangle Area by June 1973 (PAC 900-165). Another 60 cy of soil removed from around the tanks were buried under 3 ft of fill dirt east of Building 881 (PAC 900-130). This soil averaged approximately 250 dpm/g (PAC 900-130) (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 146, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

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Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 146, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

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DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report for IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-150.1

IHSS Reference Number: 150.1

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Radioactive Site North of Building 771

Approximate Location: N751,250; E2,083,750

Date(s) of Operation or Occurrence

September 1957 - 1974

Description of Operation or Occurrence

The northern side of Building 771 has been paved since 1952. The drive along the northern side of the building served as the main access road to Buildings 771 and 774. Building 771 was one of the original buildings and had several additions built onto it since it was first constructed. The building's main function was plutonium recovery. Building 770 was placed into service in 1953. The building housed waste storage facilities for radioactive operations. Building 770 had its main entrance on the western side. The western and northern sides were initially paved. The southern side of the building was paved later. A grass-lined ditch is beyond the eastern side of the former building location. The area north of Building 770 was altered during construction of the PA and a road, even though it is not known whether any soil was removed. A small prefabricated building used for storage was located west of Building 770. This building was present in 1969 photographs and had been used for equipment storage. No documentation was found relating any incidents of contamination to this small building (DOE 1992).

During the course of heavy use, several unrelated incidents have occurred in the area north of Building 771 that impacted the area. Brief descriptions of these follow (DOE 1992):

- On September 11 and 12, 1957, a fire in Building 771 caused the HEPA filters in the plenum to be breached. An unknown amount of radioactivity was released, primarily north and southwest of the building.

- In September 1966, a leaking barrel containing washables was found to be the source of contamination west of Building 770 and on the east dock and ramp of Building 771. The contamination was spread when the leaking barrel was moved from west of Building 770 to the east dock of Building 771. The area of the Building 771 east dock and ramp was contaminated up to 100,000 cpm. The ground west of Building 770 was contaminated up to 60,000 cpm.

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- In October 1967, contamination was again spread from Building 770 to the east dock of Building 771 during the transport of a leaking barrel containing contaminated washables. Contamination levels were as high as 100,000 cpm.

- A barrel leak in October 1964 resulted in contamination of the ground near the carpenter shack and Building 770. The east dock of Building 774 was also contaminated.

- From approximately 1962 until approximately 1968, a 5,000-gallon stainless steel tank was located approximately 30 ft north of Building 771. The tank was on 6-ft legs and was approximately 8 ft in diameter. Two overhead pipes from Room 114 in Building 771 connected to the tank; one of which was a vacuum vent to control transfer in and out of the tank. The tank was used in the Filtrate Recovery Ion Exchange system that concentrated plutonium and americium for recovery. Americium was concentrated on an ion-exchange column and then transferred at a predetermined concentration to the tank. The resulting liquid contained in the tank was a nitrate solution high in americium with some plutonium. In approximately 1968, a pinhole leak developed in the tank and liquid dripped onto the slab foundation. The tank was temporarily sealed to mitigate the leak until the tank could be emptied through processing of the contained solution. Once emptied, the tank was taken out of service, size-reduced, and then disposed of as radioactive waste. When the tank was removed, the concrete slab was decontaminated until smear samples did not detect further removable radioactivity. Paint was applied to the concrete to secure the fixed radioactivity. The slab was moved to a ditch directly north of the area and buried (PAC 700-163.2). The area was paved sometime prior to June 1969.

- On June 11, 1968, during the removal of drums from the 903 Pad, a drum leaked on the roadway as it was being transported from the 903 Pad to Building 774. The drum was a solvent drum or a rinse drum. The forklift that carried the drum to Building 774 traveled across the northern side of Building 771. The leak resulted in contamination of 500 $ft^2$ of ground surface north of the Building 771 west dock to levels up to 50,000 cpm. Four barrels of soil were removed. This incident and other incidents impacting the RFP roadways are discussed as PAC 000-172.

- A drum leak incident in July 1968 contaminated the concrete slab outside Building 771. One small area contaminated to 1,500 cpm remained following the cleanup.

- On July 30, 1969, a proposal was made to store drums east of Building 770 prior to processing in Building 771. The drums had previously been stored east of the SEP in the Triangle Area (PAC 900-165). Also, barrels of waste from the 1969 fire were stacked in the paved area north of Building 771 for counting before shipment.

- On November 16, 1970, contamination leaked from a hole in the bottom of a barrel of ful-flo filters as it was being transported from the storage area east of the SEP to Building 771 for processing. The ground surface near the dock at Building 771, the truck, and the cargo container in which the drum had been stored were contaminated. The drum was placed on the ground in the northeastern corner of the fenced former car parking area. The workers monitored themselves after returning to the building and found their booties contaminated. It was noted that the drum did not have the required heavy-duty drum liner.

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- On March 9, 1971, a monthly status report noted a significant increase in the number of "hot waste" drums stored in the open, north of Building 771. It was noted that 10 more cargo containers had been ordered and wastes being removed from existing cargo containers for incineration in Building 771 were replaced with other drums. The number of drums in storage in this area was becoming problematic for the Health Physics Operations Group.

- On June 8, 1971, a waste barrel leaked in the storage yard north of Building 771. The rigid liner and plastic bag within the drum had been punctured allowing liquid to corrode the barrel. Between 115 and 200 $ft^2$ of asphalt were contaminated. A monthly status report for June 1971 states that approximately 1,000 drums were being stored on the asphalt slab north of Building 771, unprotected from the environment. These drums were awaiting recovery and/or shipment.

- On July 2, 1971, a waste drum was discovered to be leaking on the pad outside Building 771. The employee that discovered the spill tracked contamination around the area while retrieving a monitor. The leak was determined to be caused by nitric acid in the "non-line generated" waste. A subsequent rainstorm spread the contamination. The waste drum leak incident resulted in contamination of an area between 2,300 and 2,500 $ft^2$ in size. The contamination included both asphalt and gravel surfaces with levels ranging from 500 to 1,000,000 cpm. Other documentation reports that contamination from these two incidents in June and July 1971 ranged from 100,000 to 300,000 dpm/100$cm^2$ on the asphalt.

- In August 1972, a punctured scrap box stored inside Building 770 contaminated 3,600 $ft^2$ inside the building and 500 $ft^2$ outside. Levels of radioactivity ranged up to 200,000 dpm/$cm^2$. Removal of asphalt and soil for off-site disposal began immediately following the incident.

- On September 15, 1972, a 55-gallon drum containing spent ion-exchange residue leaked inside of Building 770 onto the concrete floor. Contamination was tracked between Building 771 and Building 770. The incident resulted in the tracking of contamination over 600 $ft^2$ at levels ranging from 5,000 to 100,000 cpm.

Use of this area for material storage ceased in approximately 1974 when storage operations were moved to Building 776. This change was due to environmental concerns related to clean-up activities at the 903 storage area and the triangle storage area. Efforts were made sitewide in the early 1970s to move all radioactively contaminated materials to indoor storage (DOE 1992).

Physical/Chemical Description of Constituents Released

The materials stored in this area (which would also represent the types of materials released during the various events) consisted primarily of residues as well as materials awaiting counting. The residues were destined for plutonium recovery in Building 771, whereas the materials to be counted were awaiting shipment off site. Materials were typically stored in drums on pallets or in cargo containers, even though some boxed wastes were also present in this area.

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Responses to Operation or Occurrence

In response to the contamination found in September 1966 due to a leaking barrel, the area west of Building 770 was roped off, the east dock of Building 771 was partially decontaminated, and the ramp was marked (DOE 1992).

The contaminated ground in front of Building 770 was covered with plastic in response to the October 1967 leaking drum. All other resulting contamination was cleaned up (DOE 1992).

In response to the leaking barrel transported to Building 774 in June 1968, four barrels of contaminated soil were removed from the area north of the west dock (DOE 1992).

The contamination resulting from the July 1968 drum leak incident was cleaned up with the exception of one small area that was covered with plastic (DOE 1992).

In October 1969, soil contaminated by a leaking barrel at Building 770 was removed and barreled (DOE 1992).

In response to the leaking barrel of ful-flo filters in November 1970, the area was decontaminated, and the floor of the cargo container was replaced. In addition, the contaminated soil was removed (DOE 1992).

In response to the June 1971 incident involving a leaking waste barrel in the storage yard north of Building 771, soil and approximately 200 $ft^2$ of asphalt were removed for off-site disposal. A recommendation to lease cargo carriers to protect the drums was made to Manufacturing and Facilities Planning (DOE 1992).

In response to the leaking waste barrel in July 1971, strippable paint was applied to the spill area and the area where the employee tracked contamination. Approximately 2,300 $ft^2$ of asphalt and an undetermined amount of soil were removed for off-site disposal. Arrangements were made following this incident to procure additional cargo carriers and utilize Building 776 for storage (DOE 1992).

Removal of asphalt and soil for off-site disposal began immediately following the August 1972 punctured scrap box incident (DOE 1992).

Decontamination activities occurred in response to the September 1972 leaking drum incident; however, the reference is unclear as to the nature of these activities (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 150.1, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents released to the environment.

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For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 150.1, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-150.2

IHSS Reference Number: 150.2

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Radioactive Site West of Buildings 771 and 776

Approximate Location: N751,000; E2,084,000

Date(s) of Operation or Occurrence

September 11, 1957 and May 11, 1969

Description of Operation or Occurrence

On September 11, 1957, a fire was discovered in Room 108 of Building 771. Fires in the box exhaust booster filters and main filter plenum were discovered soon after. An explosion in the main exhaust duct probably contributed to the release of plutonium from the stack. During firefighting and decontamination activities at Building 771, access to the main filter plenum was gained through a hatchway on the western side of the building. This activity was the main cause of the spread of contamination on the western side of Building 771. In general, the fire released radioactive contamination primarily north and southwest of the building (DOE 1992).

On May 11, 1969, a fire occurred in Buildings 776/777. Plutonium was tracked outside Building 776 by firefighting and support personnel and was detectable on the ground around the building. The tracking of contamination was confined to an area of 20 by 100 ft adjacent to the west of the building. Another source states that the contaminated area extended from the south wall of Building 778 to the north wall of the maintenance addition to Building 776 in a strip approximately 30 ft wide along the west wall of Building 776. Following the fire, rain carried contamination into the soil. Airborne contamination from the May 1969 fire was carried predominately to the west-southwest, the average wind direction at the time. Contamination was detected outside the building up to 200 ft away (DOE 1992).

Physical/Chemical Description of Constituents Released

Soil and asphalt removed from the western side of Building 776 contained 7 dpm/g when analyzed in August 1969. Contamination was from plutonium. In May 1971, a study of the steps, dock, and ramp areas on the western side of Building 776 indicated radioactive contamination as high as 6,000 cpm (DOE 1992).

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Responses to Operation or Occurrence

In June 1969, an estimated 320 tons of asphalt and soil contaminated by plutonium at the time of the May 1969 fire were removed and buried in trenches. In December 1969, contaminated soil and asphalt were removed from behind Building 776 to fill an area east of Building 881 (PAC 900-130). In May 1971, contaminated steps, the dock, and ramp areas on the western side of Building 776 were covered with an epoxy paint. Areas of contamination outside Building 776 were covered with asphalt. In June 1980, contaminated asphalt was removed from the western side of Building 776 and boxed as radioactive waste.

For the purpose of characterization, the IHSS was divided into a northern area (150.2[n] )and a southern area (150.2[s]). The northern and southern areas are in IHSS Groups 700-4 and 700-3, respectively, which includes northern area of IHSS 150.2, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes the northern area of IHSS 150.2, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.
- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.
- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.
- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

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- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report for IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-150.3

IHSS Reference Number: 150.3

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Radioactive Site Between Buildings 771 and 774

Approximate Location: N750,950; E2,084,000

Date(s) of Operation or Occurrence

August, September, and December 1971, and late 1970s or early 1980s

Description of Operation or Occurrence

During excavation for construction between Buildings 771 and 774 in August 1971, a cement tunnel containing process waste lines was exposed. At one time, the tunnel had also been used as an exhaust ventilation duct for Building 774. Three cracks in the concrete walls were found to be contaminated. In September 1971, construction excavation resulted in further exposure of the tunnel. In December 1971 (or possibly early January 1972), construction activities in this area resulted in a broken process waste line. Samples of the process wastewater indicated an activity of approximately 1,000 pCi/L. Soil samples from the area were found to be only slightly contaminated (DOE 1992).

Personnel recall an incident in this area in the late 1970s or early 1980s. A flange in a line separated releasing an unspecified amount of aqueous process waste that reached the ground surface (DOE 1992).

Physical/Chemical Description of Constituents Released

The August 1971 incident resulted in the release of plutonium contamination to the soil. The September 1971 incident resulted in 24 dpm per gram contamination of soil. The incident involving a wastewater line in December 1971 released wastewater with an activity of approximately 1,000 pCi/L. This resulted in slightly contaminated soil. It is not clear whether this was process, laundry, or sanitary wastewater (DOE 1992).

The leak resulting from the separated flange would have released liquid waste containing low-levels of radionuclides as well as nitrate and other chemical contaminants (DOE 1992).

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Responses to Operation or Occurrence

The August 1971 incident resulted in sealing of the cracks that were contaminated and the removal of eight drums of soil. The soil removal was completed prior to September 8, 1971, the date of the referenced document. The September 1971 incident also resulted in sealing of the cracks and removal of eight drums of soil. The soil was removed for off-site disposal in January 1972. No response beyond soil and water sampling is mentioned regarding the wastewater line break in December 1971. Personnel recalled that the area impacted by the leak from the loose flange was cleaned up (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 150.3, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents released to the environment.

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 150.3, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.
- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.
- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the AL. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.

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- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-163.1

IHSS Reference Number: 163.1

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Radioactive Site - 700 Area Site #3 - Wash Area

Approximate Location: N751,150; E2,084,250

Date(s) of Operation or Occurrence

Unknown

Description of Operation or Occurrence

CEARP Phase 1 interviewees indicated the area north of Building 774 was used to wash radioactively contaminated equipment. The wash water flowed onto the ground. Building 774 personnel did not recall this area ever being used to wash equipment. Aerial photos from 1971 and 1969 show two areas east of this IHSS that were covered with mounds of soil. RFP personnel interviewed for CEARP did not recall these mounds. The eastern half of the area depicted as IHSS 163.1 is mostly flat and paved. The area was repaved in 1987 or 1988 (DOE 1992).

Physical/Chemical Description of Constituents Released

Wash water from radioactively contaminated equipment would be expected to have low levels of radionuclides and may also have contained various organic and inorganic compounds (DOE 1992).

Responses to Operation or Occurrence

A sitewide radiometric survey was performed from 1977 through 1984. The purpose of the survey was to identify extremely contaminated radioactive areas (500,000 to 1,000,000 pCi/g) (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 163.1, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

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Fate of Constituents Released to Environment

No radioactivity above background levels was indicated at this location by the radiological survey (DOE 1992).

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 163.1, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.
- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.
- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.
- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.
- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-215

IHSS Reference Number: 215

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Process Waste Tank Unit 55.13 (Tank T-40)

Approximate Location: N751,000; E2,084,000

Date(s) of Operation or Occurrence

1963 - September 1989

Description of Operation or Occurrence

The concrete mixed-waste storage tank (Tank T-40), adjacent to Room 103 of Building 771, was constructed in 1963. The roof of the tank serves as the floor of Room 203. The tank held sludge from second-stage precipitation of liquid process waste from Building 771. Effluent from a silver recovery unit in Building 774 was also stored in the tank. No documentation was found that details releases from this unit (DOE 1992).

Physical/Chemical Description of Constituents Released

If the tank had released waste to the environment, waste constituents would have included, but not be limited to, radionuclides and metals.

Responses to Operation or Occurrence

Use of Tank T-40 ceased when the tank was replaced in September 1989. No documentation was found that details releases from this unit (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002), which includes IHSS 215, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment.

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For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 700-4, which includes IHSS 215, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBC 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and radionuclides beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23, and will be addressed in the closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report IHSS Group for 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: 700-1102

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer Leak - 776-4

Approximate Location: N750,500; E2,083,500

Date(s) of Operation or Occurrence

Prior to January 1986

Description of Operation or Occurrence

Prior to January 1986, Transformer 776-4 was located approximately 100 ft west of the northwestwern corner of Building 776. The transformer pad at this location was positioned on an incline with drainage toward an access road 15 ft east. In January 1986, a Plant employee reported that a leak was observed from Transformer 776-4. In February 1986, the transformer was again reported to be leaking on the radiator and around the gauges, valves, and bushing compartment. There was an oily film on most of the transformer surfaces and the transformer pad. In an August 1986 photograph, staining was visible on the concrete pad beneath the transformer. Further leaking was reported in August and September 1986. Samples collected in November 1986 of the concrete under the transformer drain valve as well as soil at the southern edge of the transformer pad, were found to be contaminated with PCBs (DOE 1992). The transformer was moved to a new pad several ft north in 1987 (DOE 1996).

Physical/Chemical Description of Constituents Released

In September 1976, the oil in Transformer 776-4 had a PCB concentration of approximately 5 percent (using a PCB test kit). Samples of the oil collected in November 1977 indicated the fluid in the transformer had a PCB concentration of approximately 3 percent. In October 1985, the oil was reported to have a PCB concentration greater than 500 ppm (test method unknown). In November 1986, wipe samples collected from a valve, sidewall, and the concrete pad were found to contain 29.8, 5.0, and 417.5 ppm PCBs, respectively. Also in November 1986, a wipe sample collected from the concrete pad beneath the drain valve was found to contain 498 $\mu g/cm^2$ PCBs. Soil samples collected in November 1986 from the south edge of the original transformer pad indicated 14,900 ppm PCB contamination (DOE 1992).

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Responses to Operation or Occurrence

In September 1976, Transformer 776-4 was documented as being drained and refilled with a non PCB silicone oil. The transformer was scheduled for replacement under the PCB Fire Hazard Elimination Project in FY 1988. The transformer was removed for retrofilling and relocated several ft north in 1987. The original transformer pad surface was partially removed (scabbled) to a depth of 4 inches and left in place. In March 1989, it was reported that Transformer 776-4 was replaced under the Environmental Hazards Elimination Project. Further cleanup of the site was scheduled on August 10, 1989 (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocol and analyzed for PCBs using EPA Method 8080. The highest PCB concentration found in soil adjacent to the old concrete transformer pad was 480 ppm (DOE 1995).

In accordance with the agency-approved Final PAM for Remediation of Polychlorinated Biphenyls (DOE 1995), additional samples were collected in 1995 and 1996 to verify the lateral and vertical extent of PCB migration. Soil samples were analyzed using EPA Draft Method 4020, and concrete samples were analyzed using EPA Method 8080. Based upon analytical results for the concrete samples, the highest PCB level on the concrete pad was 56 ppm. In accordance with the PAM (DOE 1995), approximately 177 cy of PCB-contaminated soil and 10.7 cy of PCB-contaminated concrete were excavated to a depth of 17 ft, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California, for disposal (DOE 1997). An area of soil approximately 20 ($ft^2$), at a depth of 17 ft PCB contaminated at levels of approximately 70 ppm (EPA Method 8080 results) as documented in the Closeout Report for the Source Removal of Polychlorinated Biphenyls (DOE 1997). Excavation was stopped due to health and safety concerns and equipment limitations. The excavation was filled with clean structural backfill in 1996.

This site was recommended for NFA in 1997; however, comments received from the regulatory agencies on July 19, 1999, concluded that additional groundwater samples should be collected to ensure that PCB contamination is not mobilized in the subsurface. Groundwater samples were collected for PCBs during FY2001 at two down-gradient locations: well 22696 and the Building 771/776 tunnel. The underground tunnel connecting Buildings 776 and 771 is immediately east of PAC 700-1102 and approximately 23 ft in depth. Groundwater samples did not contain detectable concentrations of PCBs.

Fate of Constituents Released to Environment

PAC 700-1102 was remediated from an initial PCB contaminant level of 480 ppm Aroclor-1260 in the soil to 70 ppm. Because the residual contamination is 17 ft bgs, and PCBs have not leached into the groundwater, the source removal significantly reduced risk to human health and the environment.

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE

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2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels;
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors; and
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Although the residual Aroclor concentration at this PCB site is high as 70 ppm, well above the 10 ppm level noted above, the contamination is at a depth of 17 ft, which will preclude direct human exposure to the soil. Therefore, there is no human health risk associated with the residual contamination.

PAC 700-1102 was recommended for NFA in 1997 based upon removal of the contaminant source. Comments received from the regulatory agencies on July 19, 1999 concluded that NFA of this PAC would be granted if downgradient groundwater samples were collected verifying that PCB contamination is not mobilized in the subsurface which could affect surface water quality. The groundwater samples were collected and analyzed, and PCBs were not detected. Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 700-1103

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Leaking Transformers - Building 707

Approximate Location: N750,000; E2,084,000

Date(s) of Operation or Occurrence

November 1986

Description of Operation or Occurrence

Transformers 707-1 through 707-6 were located on the eastern side of the Building 707 roof. Concrete under several of the transformer drain valves was found to be contaminated with PCBs in November 1986 (DOE 1992). A leak was discovered from Transformer 707-1 in 1987 during routine maintenance when the transformer was found to be low in dielectric coolant oil. Visible evidence of the leak was observed around the valve area and weld seams. Analytical data of soil and swipe samples confirmed that the pad on the roof and soil on the ground immediately east of Building 707 were contaminated with PCBs. The soil contamination resulted from rainwater collecting on the rooftop where the transformers were located, then being released through a downspout to the ground (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Wipe samples collected from the concrete under several of the transformer drain valves were analyzed in November 1986. PCB concentrations ranged from 135 to 7,200 ppm. The concentration of PCBs in the soil immediately under the downspout was 1,600 ppm (DOE 1992).

Responses to Operation or Occurrence

In March 1991, surface soil samples were collected immediately east of Building 707 under a downspout suspected of being a migration pathway from the contaminated rooftop directly above. The analytical data from these soil samples indicated the contamination (1,600 ppm) was most evident under the downspout and decreased in concentration with distance outward from

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the building to approximately 9.7 ppm. Subsurface soil samples collected at depths between 1.0 and 1.5 ft in the same locations measured 180 ppm and less than 1.0 ppm, respectively.

In 1992, an extensive TSCA cleanup of PCB contamination on the 707 rooftop was performed that included removal of the leaking 707-1 transformer, repair of the transformer, cleanup of the concrete rooftop to achieve a cleanup standard of 100 mg/100 cm (as required by EPA), and subsequent replacement of the repaired transformer. The 707-1 transformer was retrofilled with non-PCB dielectric oil and re-energized (DOE 1996).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), further sample screening was completed in July and August 1995 using MRI methods (EPA 1986) to verify the lateral and vertical extent of PCB migration. Approximately 67 cy of PCB-contaminated soil was excavated from the site. The soil was containerized and shipped to an EPA-licensed TSCA landfill in Kettleman, California, for disposal in September 1995 (DOE 1997). PCB levels remaining in the soil were less than 10 ppm using EPA Method 4020 (Immunoassay Field Technique) and less than 12 ppm (5 ppm Aroclor-1260 and 7 ppm Aroclor-1254) using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the Method 4020 Immunoassay Field Technique. The excavation was backfilled and regraded upon receipt of Method 8080 cleanup confirmation sampling in August 1995.

Fate of Constituents Released to Environment

The extensive soil sampling that took place in March 1991 and August 1995 prove that PCB-contaminated rainwater from the Building 707 rooftop did not migrate to an existing storm drain over 100 ft. downgradient.

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, and the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

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Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

EPA, 1986, Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup, Office of Toxic Substances, EPA-560/5-86-017, Washington, D.C., May.

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## PAC REFERENCE NUMBER: 700-1104

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Leaking Transformer - Building 708

Approximate Location: N750,000; E2,084,000

Date(s) of Operation or Occurrence

November 1986 through 1987.

Description of Operation or Occurrence

Transformer 708-1 is located on the western side of Building 708. In February 1987, concrete under the transformer 708-1 drain valve was found to be contaminated with PCBs. According to an interview with EG&G Utilities personnel, electrical equipment located west of Building 708 leaked PCB-contaminated oil prior to 1987 (DOE 1992).

Physical/Chemical Description of Constituents Released

Two wipe samples collected from the concrete under the transformer 708-1 drain valve were analyzed and found to contain 1,035 µg and 3,750 µg of PCBs (DOE 1992.

Responses to Operation or Occurrence

Four transformers were removed and retrofilled from this site in 1987. Rock and gravel fill were placed around the transformer pads prior to replacement of non-PCB transformers in 1987 or 1988. No historical documentation was found that further details response to this occurrence (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocols and analyzed for PCBs using EPA Method 8080. The highest PCB concentration was found in soil samples collected adjacent to the concrete transformer pads (860 ppm) (DOE 1995).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), additional sample screening was completed in 1995 to verify the lateral and vertical extent of PCB migration. Soil samples were analyzed using EPA Method 4020. In

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accordance with the PAM (DOE 1995), approximately 21 cubic yards of PCB-contaminated soil were excavated, containerized, and shipped to an EPA licensed TSCA landfill in Kettleman, California for disposal (DOE 1997). The cleanup verification analytical results for PCBs in the soil were less than 10 ppm using EPA Method 4020, and less than 3.2 ppm using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the EPA Method 4020 (Immunoassay Field Technique) analytical results. There were no detections of PCBs on the concrete transformer pad using EPA Method 8080.

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 700-1105

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|---|---|
| IHSS Number: | 700-1105 |
| Operable Unit: | Industrial Area |
| IHSS Group: | 700-7 |
| Unit Name: | Transformer Leak - 779-1/779-2 |
| Approximate Location: | N750,500; E2,084,500 |

Date(s) of Operation or Occurrence

Prior to June 1986.

Description of Operation or Occurrence

Prior to 1987, dielectric fluid containing polychlorinated biphenyls (PCBs) leaked from Transformers 779-1 and 779-2. The transformers were located on the northeastern side of Building 779 and adjacent to the southern side of the 779 loading dock (DOE 2004). In 1987, the transformers were retro-filled and then moved several ft east and north (DOE 1992).

Physical/Chemical Description of Constituents Released

Soil samples collected from around the transformer pads contained Aroclor-1260 concentrations ranging from 15,000 to 680,000 µg/kg. Plutonium-239/240 was detected in all the samples; the highest activity was 115 pCi/g (DOE 2004).

Responses to Operation or Occurrence

Accelerated action characterization activities were conducted at IHSS Group 700-7, which includes IHSS 700-1105, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-15 (DOE 2003a). Accelerated action soil removal activities were conducted at IHSS 700-1105 in accordance with the ER RSOP Notification #03-10 (DOE 2003b).

Fate of Constituents Released to Environment

Based on IHSS 700-1105 site history and historical soil sampling results, PCBs and radionuclides were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-4.5 ft bgs) soil samples were analyzed for COCs during characterization activities. Based on sampling results, Aroclor-1260 in surface and subsurface soil located in IHSS-1105 was identified as a potential source of contamination that required removal. Accelerated action soil removal activities were

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conducted at four sampling locations to remove surface and subsurface soil with concentrations exceeding the Aroclor-1260 WRW AL. Based on the results of confirmation sampling, removal objectives were accomplished (DOE 2004). Accelerated action activities (characterization and soil removal) and the rationale for NFAA at IHSS 700-1105 are discussed in detail in the Draft Closeout Report for IHSS Group 700-7 (DOE 2004). The rationale for NFAA at IHSS 700-1105 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 700-1105 based on the following:

- All residual contaminant concentrations in surface and subsurface soil are less than WRW ALs.
- The results of the SSRS showing acceptable residual risk

Based on the SSRS and stewardship evaluation, no additional accelerated actions are required, and no additional near- and long-term management actions are recommended beyond those generally applicable to the Site as follows: restrict access to the site, control soil excavation, and prohibit groundwater pumping. These management actions will be achieved through imposition of the physical and institutional controls generally applied to sites located in the IA Site. Additional environmental engineering or monitoring activities are not recommended for IHSS 700-138 (DOE 2004).

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-7, including PAC 700-1105, on October 1, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 700-7 (B779) - Approval, October 1, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-15, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-10, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Draft Closeout Report for IHHS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: 700-1101

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 700-10

Unit Name: Laundry Tank Overflow - Building 732

Approximate Location: N750,000; E2,084,000

Date(s) of Operation or Occurrence

June 26, 1979

Description of Operation or Occurrence

IHSS Group 700-10 (PAC 700-1101) consists of Building 732. Building 732 consists of two parts, including a reinforced-concrete stairwell approximately 7 by 17.6 ft (ft) in area and 8 ft high. The stairwell descends to the south and then opens to the east into an underground, reinforced-concrete room 14 by 27.7 ft in extent. Undisturbed soil below the room is approximately 13.7 ft below current grade. Within the room is a 1,000-gallon fiberglass holding tank (T-4), two pumps, and two banks of particulate filters. In the southeastern corner of the room is a sump that is 1.5 by 1.5 ft in area and 2 ft deep. There are no process lines or foundation drains under the building. At the time of construction, the walls of Building 732 were waterproofed on the inside and outside. In the early 1990s additional sealant was applied to all exterior-wall, ceiling, and floor joints (DOE 2004a).

In the past, under normal operations laundry water and water from floor drains in Building 778 were pumped to Building 732, filtered, and then passed on to Valve Vault 9, eventually reaching Building 374 for treatment. Water collected in the Building 732 sump was pumped back to a secondary containment sump in Building 778. From there it was returned to the tank in Building 732 (DOE 2004a).

In June 1979 laundry wastewater in Tank T-4 overflowed onto the room floor because of malfunctioning pumps that normally send the wastewater through the filters. Records do not indicate whether the sump was able to pump the overflow back to Building 778 or whether additional secondary pumping was necessary. It is possible that laundry wastewater was released to the environment (DOE 2004a).

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Physical/Chemical Description of Constituents Released

Because of the nature of building activities, it is probable that laundry water released to the environment may have been a low-level waste (DOE 1992).

Responses to Operation or Occurrence

Accelerated action characterization activities were conducted at IHSS Group 700-10, which consists of PAC 700-1101, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-04-07 (DOE 2004b).

Fate of Constituents Released to Environment

Based on the 700-1101 site history, radionuclides, and VOCs were identified as COCs. No COCs were detected at concentrations or activities greater than WRW ALs. The characterization results and the rationale for NFAA at PAC 700-1101 are discussed in detail in the Data Summary Report for IHSS Group 700-10 (DOE 2004a). The rationale for NFAA at PAC 700-1101 is summarized below.

Action/No Further Accelerated Action Recommendation

Based on the analytical results and the SSRS, action is not required. An NFAA determination is justified for IHSS Group 700-10, PAC 700-1101, given the following:

Contaminant concentrations were less than WRW ALs.

Migration of contaminants to surface water through erosion is unlikely because the area is not in an area prone to landslides or erosion and because potential contamination would be on the order of 10 to 12 ft below ground surface.

Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination detected in IHSS Group 700-10. The groundwater is considered part of the IA Plume, which will be further evaluated in the groundwater IM/IRA.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-10 (PAC 700-1101) on September 21, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 700-10, PAC 700-1101 Laundry Tank Overflow – Building 732, dated September 2004, September 21, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, 2004a, Data Summary Report for IHHS Group 700-10, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004b, Industrial Area Sampling and Analysis Plan Addendum #IA-04-07, IHSS Group 700-10, PAC 700-1101 (Laundry Tank Overflow – Building 732), Rocky Flats Environmental Technology Site, Golden, Colorado, January.

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## PAC REFERENCE NUMBER: 700-1111

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Leaking Transformer - Building 750

Approximate Location: N750,000; E2,084,500

Date(s) of Operation or Occurrence

Prior to 1987

Description of Operation or Occurrence

Transformer 750-1 was located on the northeastern side of Building 750, approximately 80 ft from a cafeteria entrance. In August 1985, Transformer 750-1 was reported as a potential PCB "exposure risk to food or feed." The exposure risk was related to a small crack in the berm surrounding the transformer, and the proximity of the transformer to the cafeteria entrance. According to interviews with Utilities personnel, prior to 1987 this transformer leaked dielectric fluid containing PCBs (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

It was reported that Transformer 750-1 contained 465 gallons of PCB fluid weighing 2,533 kg. In October 1985, it was reported that Transformer 750-1 contained PCB fluid exclusively.

Responses to Operation or Occurrence

In August 1985, it was recommended that the concrete berm surrounding the transformer be sealed. In January 1986, it was anticipated that Transformer 750-1 would be removed and replaced under the FY1986 Environmental Hazards Elimination project. In 1987, the transformer was retrofilled and relocated on a new concrete pad several ft east of its previous location (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA

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sampling protocol and analyzed for PCBs using EPA Method 8080. The highest PCB concentration was detected in a soil sample collected adjacent to the old concrete transformer pads (160 ppm) (DOE 1995).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), additional sample screening was completed in 1995 to verify the lateral and vertical extent of PCB migration. Soil samples were analyzed using EPA Method 4020 and concrete samples were analyzed using EPA Method 8080.

In accordance with the PAM (DOE 1995), approximately 26 cy of PCB-contaminated soil were excavated, containerized, and shipped to an EPA-licensed TSCA landfill in Kettleman, California, for disposal (DOE 1997). Cleanup verification analytical results for PCBs in the soil were less than 10 ppm using EPA Method 4020, and less than 5.9 ppm using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the EPA Method 4020 (Immunoassay Field Technique) analytical results. There were no detections of PCBs on the concrete transformer pad using EPA Method 8080 (DOE 1996).

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 700-1112

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Leaking Transformer – Building 776-5

Approximate Location: N750,000; E2,084,500

Date(s) of Operation or Occurrence

June 1986 to August 1989

Description of Operation or Occurrence

Transformer 776-5 was located west of Building 714 within the PA. The 1500 KVA transformer was manufactured in 1969 and was reported as leaking coolant oil in June 1986 (DOE 1992).

Physical/Chemical Description of Constituents Released

The 308 gallons of dielectric fluid in Transformer 776-5 contained 807 ppm PCBs at one point prior to 1989 (DOE 1992).

Responses to Operation or Occurrence

Transformer 776-5 was scheduled for cleanup on August 12, 1989. No documentation could be found to verify what cleanup was performed at this site if any.

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July of 1991, soil samples were collected in accordance with approved EPA sampling protocols and analyzed for PCBs using EPA Method 8080 (DOE 1995). The highest PCB detection in soil samples collected adjacent to the concrete transformer pad was 0.088 ppm (DOE 1996).

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to

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render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 700-1115

IHSS Number: No Applicable

Operable Unit: Industrial Area

IHSS Group: 700-1

Unit Name: Identification of Diesel Fuel in Subsurface Soil

Approximate Location: N749, 08; E2,083,887

Date(s) of Operation or Occurrence

Discovered May 31, 1997

Description of Operation or Occurrence

PAC 700-1115 is a subsurface diesel fuel spill of unknown origin that was discovered near the northeastern corner of Building 708. On May 31, 1997, diesel fuel was observed in the soil dug from a 2-ft-deep trench (DOE 1997). Samples were collected from the trench and analyzed for benzene, toluene, ethylbenzene, xylene (BTEX), and total recoverable petroleum hydrocarbons (TRPH). None of the BTEX constituents were detected at concentrations greater than applicable soil ALs. TRPH was detected at a concentration of 2,435.9 mg/kg, less than one-half of the 5,000 mg/kg cleanup threshold outlined in the RFCA Attachment 13, Underground Storage Tank (UST) Closure Letter Agreement (DOE 1996).

Physical/Chemical Description of Constituents Released

A subsurface diesel fuel spill of unknown origin was discovered near the northeastern corner of Building 708. Samples collected at the time the diesel fuel spill was discovered contained very low concentrations of BTEX, and TRPH below that were below the ALs established in the RFCA Attachment 13, Underground Storage Tank (UST) Closure Letter Agreement (DOE 1996).

Responses to Operation or Occurrence.

Accelerated action activities were conducted at IHSS Group 700-1 to characterize the nature and extent of contamination in soil. PAC 1115 is the only member of this IHSS group. Characterization activities were conducted in accordance with the IASAP Addendum #IA-04-15 (DOE 2004a).

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Fate of Constituents Released to Environment

VOCs were identified as COCs, and were sampled and analyzed for during characterization activities.

Because VOCs were not detected in soil at concentrations greater than RLs, no remedial action was required. Accelerated action characterization activities and the rationale for NFAA at PAC 1115 are discussed in detail in the Draft Data Summary Report for IHSS Group 700-1 (DOE 2004b). The rationale for NFAA at PAC 1115 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for PAC 1115 based on the following:

- COCs were not detected at any of the sampling locations for IHSS Group 700-1.
- Migration of contaminants to surface water through erosion is unlikely because IHSS Group 700-1 is not located in an area prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because COCs were not detected in soil at any of the sampling locations for IHSS Group 700-1

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-1 (PAC 1115) on September 14, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 700-1 PAC 700-1115 – Identification of Diesel Fuel in Subsurface Soil, dated August 2004, September 14, 2004.

DOE,1996, Final Rocky Flats Cleanup Agreement, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1997, Annual Update to the Historical Release Reports for the Rocky Flats Plant, Golden, Colorado, September.

DOE, 2004a, Industrial Area Sampling and Analysis Plan Addendum #IA-04-15, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2004b, Draft Data Summary Report for IHHS Group 700-1, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

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## PAC REFERENCE NUMBER: 800-177

IHSS Reference Number: 177

Operable Unit: Industrial Area

IHSS Group: 800-5

Unit Name: Building 885 Drum and Paint Storage

Approximate Location: N748,000; E2,084,000

Date(s) of Operation or Occurrence

1953 - present

Description of Operation or Occurrence

The Building 885 Drum Storage Area was first used in 1953 when Building 881 was first occupied, and continued as a RCRA 90-day accumulation area. The storage area occupied two sections of Building 885, located south of Building 881. The western portion of the building was exposed to the north, and the eastern section was exposed to the north and east. A completely enclosed area that was used for paint storage was located between the two sections. The two exposed regions measured approximately 20 by 10 ft. Both had concrete floors; however, there were no berms around the storage areas. Both sections had drums stored on pallets and were used as satellite collection stations (DOE 1992).

In 1972, the drain water from the sump that drains the floor of Building 885 was found to have a temperature of 150 degrees Fahrenheit. The cause of the elevated temperature was unknown as was the source and destination of the liquid (DOE 1992).

Building 885 had been known to have "poor housekeeping" conditions in the past. Paint cans and drums were stored haphazardly and rainwater was allowed to flow through the building. Any spilled organics would have been carried outside of the building (DOE 1992).

Inadvertent dumping of radioactively contaminated oil sludge into an open top dumpster located at Building 885 was reported. It is not clear whether there was a release to the environment (DOE 1992).

Physical/Chemical Description of Constituents Released

Drums contained waste oil, waste paints, waste solvents, and low-level radioactive waste. There had been no documented releases (DOE 1992).

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Responses to Operation or Occurrence

This area was studied as part of the RI for the 881 Hillside. No volatile organics were detected in soil adjacent to this area. Housekeeping conditions were improved (DOE 1992).

In accordance with IASAP Addendum #IA-02-04 for IHSS Groups 800-2 and 800-5 (DOE 2002), which includes UBC 885, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 800-5 (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, SVOCs, and VOCs are considered COCs for UBC 885. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-02-04 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 800-5, which includes UBC 885, because of the following:

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

No long-term stewardship activities are recommended for IHSS Group 800-5 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-5 on June 21, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Data Summary Report IHSS Group 800-5 (B887 and B885), NFAA - Approval, June 21.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 2002, Industrial Area Sampling and Analysis Plan Fiscal Year 2002 Addendum #IA-02-04, IHSS Groups 800-2 and 800-5, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2004, Data Summary Report for IHSS Group 800-5, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

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## PAC REFERENCE NUMBER: 800-1204

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 800-1

Unit Name: Building 866 Spills

Approximate Location: N749,000; E2,084,000

Date(s) of Operation or Occurrence

1965 (date of building occupancy) – 1990?

Description of Operation or Occurrence

Building 866 contained five process waste tanks that serviced Buildings 865 and 889. Contamination releases originating from filling the tanks have been documented (DOE 1992).

***January, 1978 - Vent Pipe Overflow***

A faulty vacuum breaker for a process waste line vent pipe between Building 864 and Building 881 allowed liquid to be released to the environment. Apparently gravel caused the vent line to stick open and approximately two gallons spilled onto the ground. Approximately 16 $ft^2$ of soil were affected near the 865 Guard Post.

***1984 - Tank overflow***

A valve was left open while pumping decontamination water to a fill tank in Building 889. When the tank overfilled, the water ran to the sump pump and was then pumped to the process waste tanks in Building 865. These tanks also overfilled, and the water passed up through the vent to the roof where it drained to the ground through the downspouts. A similar incident occurred in 1983; however, the water apparently ran into Building 866 instead of outside the building.

***1986 - Tank overflow***

The filling of the process waste tanks in Building 866 resulted in an overflow of process waste through the roof vent and out the downspout, releasing approximately 20 gallons to the ground. No contamination was found on the ground or in the building.

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Physical/Chemical Description of Constituents Released

In 1978, laboratory analysis of the liquid indicated 410,000 dpm/L alpha activity, which consisted predominately of depleted uranium activity. A FIDLER survey of the soil did not display any above-background readings (DOE 1992).

In 1984, water samples collected from the north and south ditch revealed $2.2 \times 10^3$ µg/L for total uranium, and a maximum of $7.9 \times 10^2$ pCi/L and $5.8 \times 10^2$ pCi/L for total beta activity and tritium, respectively (DOE 1992).

In 1986, the spill consisted of process waste. No contamination was found on the ground or in the building (DOE 1992).

Responses to Operation or Occurrence

In 1978, samples of the liquid were collected and radiation surveys were conducted. A portable air sampler was utilized, and the day following the incident three inches of moist gravel were removed (DOE 1992).

In 1984, the drainage ditch west of Building 866 was dammed with gravel to contain the liquid. The interiors of Buildings 866 and 889 were reportedly decontaminated, but radiation monitoring indicated no contamination. Surface gravel from the area of the overflow was supposed to have been removed and shipped as waste. Forty to 45 gallons of liquid were vacuumed up and taken to the Building 889 waste drains (DOE 1992).

In 1986, liquid-level alarms were installed for each tank (DOE 1992).

The tanks in Building 866 were closed pursuant to RCRA and removed prior to building demolition, which occurred during 2003 (DOE 2004a).

Characterization of IHSS Group 800-1, which includes PAC 800-1204, was conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-12 (DOE 2003). (Note that Building 866 had been demolished and removed prior to the accelerated action activities.) Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004b).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and PCBs are considered COCs for IHSS Group 800-1, which includes UBC 865. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

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Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 800-1, which includes PAC 800-1204, because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (slabs, pits, a sump, transformer pads, and process waste lines) were removed.
- Contaminant concentrations are less than RFCA WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-12, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004a, Final Project Closeout Report for Building 865 Cluster, Draft, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2004b, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: 800-1207

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer 883-4

Approximate Location: N749,000; E2,084,000

Date(s) of Operation or Occurrence

1985 - 1987 or 1988

Description of Operation or Occurrence

Transformer 883-4 was located at the southeastern corner of Building 883. Utilities reported that it may have leaked prior to being drained and refilled with non-PCB dielectric oil in either 1986 or 1987. The original pad was partially removed, and the top was scarified to make room for a new pad that was constructed several ft west. After retrofilling, the transformer was relocated on the new pad. Documentation could not be found that details when these activities took place. The transformer was found to be leaking during an inspection on November 7, 1985. Leakage was also found on January 30, 1986, during an EPA inspection for compliance with TSCA. This transformer was on the list for cleanup and/or repair on February 11, 1986, because of oil leakage around the top and bottom valves, and the presence of oil on the surface of the pad, the concrete pad, and the transformer wall (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Historical records indicate that Transformer 883-4 contained dielectric oil with greater than 500 ppm PCBs prior to 1986 (DOE 1992); however, another document indicates the transformer oil was sampled in 1992 and found to contain 6 ppm PCBs. No documentation could be found as to whether smear samples were ever collected at this location (DOE 1996).

Responses to Operation or Occurrence

Based on the EPA audit in 1986, it was required that the transformer be removed or replaced by FY1987 or 1988 (DOE 1992). Transformer 883-4 was retrofilled with non-PCB dielectric oil

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and re-energized on a new foundation several ft west prior to or during FY1988. No documentation was found regarding a cleanup schedule for the surrounding soil (DOE 1996).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected and analyzed. The results indicated PCB contamination existed in the soil surrounding the old transformer pad. PCB concentrations were identified at 160 ppm in one location, and 12 ppm in another location (adjacent to the transformer pad).

Under the approved Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls (DOE 1995), further sampling was completed in July and August 1995 using MRI methods (EPA 1986) to verify the lateral and vertical extent of PCB migration. Approximately 28 cy of PCB-contaminated soil were excavated from the old transformer site. The soil was containerized and shipped to an EPA-licensed TSCA landfill in Kettleman, California for disposal (DOE 1997). PCB levels remaining in the soil following the 1995 excavation were less than 10 ppm using EPA Method 4020 (Immunoassay Field Technique) and less than 3.1 ppm using EPA Method 8080. Split samples were analyzed using EPA Method 8080 to provide confirmation of the Method 4020 Immunoassay Field Technique. Destructive concrete samples were collected from the old pad using an impact drill and analyzed using EPA Method 8080. Analytical results from the concrete sampling were below 2.5 ppm PCBs and the old pad was disposed of in the on-site landfill. The excavation site was backfilled and resurfaced with asphalt upon receipt of Method 8080 cleanup confirmation sample results in August 1995.

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

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Action/No Further Accelerated Action Recommendation

Based on the site remediation and confirmation data, and the White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the NFAA justification by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1997, Closeout Report for the Source Removal of PCBs, RF/RMRS-97-044, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

EPA, 1986, Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup, Office of Toxic Substances, EPA-560/5-86-017, Washington, D.C., May.

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## PAC REFERENCE NUMBER: 800-1208

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformer 881-4

Approximate Location: N749,000; E2,084,000

Date(s) of Operation or Occurrence

Unknown – 1987

Description of Operation or Occurrence

Transformer 881-4 was located on the northern side of Building 881. Utilities personnel reported the transformer may have leaked prior to being retrofilled in September 1986. Visual inspection of the transformer on February 11, 1986, revealed a leak on the top and bottom valves, tap changer, and pad. Another document indicates that residual stains existed on the concrete in January, 1987. In 1992, the transformer was located in a gravel-filled berm with no indication of leakage. The previously mentioned concrete may have existed beneath the gravel. There were no drains in the vicinity (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sample location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Transformer 881-4 contained 435 gallons of dielectric coolant oil while in service. Historical records indicate the oil contained 110 ppm PCBs prior to being retrofilled (DOE 1992).

Responses to Operation or Occurrence

The transformer was drained and replaced with non-PCB dielectric oil in September 1986 (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in accordance with approved EPA sampling protocols and analyzed for PCBs using EPA Method 8080 (DOE 1995). Based on the analytical results, PCB contamination levels in the soil were less than 4.5 ppm (DOE 1996).

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Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. DOE received concurrence from CDPHE on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 800-1209

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Leaking Transformers, 800 Area

Approximate Location: N749,000; E2,084,000

Date(s) of Operation or Occurrence

Unknown - 1991.

Description of Operation or Occurrence

Three active transformers (883-1, 883-2, and 883-3) and a switchgear apparatus were located on the northern side of Building 883. Utilities personnel reported that all components within this complex may have leaked prior to being retrofilled in 1987. Oil stains were visible at the valve on one of the transformers. The area was bermed, with rock and gravel placed inside and outside of the berm. There were no drains at this site (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

Utilities personnel suspected that PCBs may have leaked at this site (DOE 1992).

The 1985 analytical results for PCBs in the oil of transformers 883-1, 883-2, and 883-3 were 84, 42, and 17 ppm, respectively. Based on 1992 analytical results, PCB contamination levels in the oil of transformers 883-1, 883-2, and 883-3 were 3, 35, and 16 ppm, respectively. The transformers were retrofilled in 1987 (DOE 1996).

Responses to Operation or Occurrence

The transformers were retrofilled with non-PCB dielectric coolant oil in 1987 as part of a Plantwide compliance schedule driven by TSCA.

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted July of 1991, soil samples were collected in the vicinity of these transformers in

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accordance with approved EPA sampling protocols, and analyzed for PCBs using EPA Method 8080. Based on the analytical results, PCB levels in the soil were less than 6.8 ppm (DOE 1995).

Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site. After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, April 15.

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## PAC REFERENCE NUMBER: 800-1210

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 800-1

Unit Name: Transformers 865-1 and 865-2

Approximate Location: N749,000; E2,084,000

Date(s) of Operation or Occurrence

Unknown - 1987

Description of Operation or Occurrence

Transformers 865-1 and 865-2 were located north of Building 886 and west of Building 865. Utilities personnel indicated the transformers had leaked in the past. In 1987, the transformers were removed, retrofilled, and placed on a new pad with berms, several ft to the north. The old pad was partially removed to make room for the new pad. It is unknown whether the old pad had a secondary containment berm (DOE 1996).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

The fact that these transformers were retrofilled indicates PCBs may have been involved. No additional historical data could be found on PCB concentrations of dielectric coolant oils at this site.

Responses to Operation or Occurrence

The transformers were removed from the old pad, retrofilled and placed on a new pad.

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, surface soil samples were collected and analyzed in accordance with approved EPA protocols (DOE 1995). PCBs were analyzed using EPA Method 8080 (DOE 1996). PCB results were less than 1.3 ppm in the soil.

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Characterization of IHSS Group 800-1, which includes PAC 800-1210, was conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-12 (DOE 2003). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004).

In accordance with ER RSOP Notification #03-12 (DOE 2003), the transformer slabs were removed.

Fate of Constituents Released to Environment

Radionuclides and PCBs are considered COCs for PAC 800-1210 within IHSS Group 800-1. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 800-1, which includes PAC 800-1210, because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (slabs, pits, a sump, transformer pads, and process waste lines) were removed.

- Contaminant concentrations are less than RFCA WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

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DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-12, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden Colorado, March.

## PAC REFERENCE NUMBER: 800-1212

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 800-1

Unit Name: Building 866 Sump Spill

Approximate Location: N36,100; E21,100

Date(s) of Operation or Occurrence

1965 (date of building occupancy) - 1990?

Description of Operation or Occurrence

In 1992 liquid and sludge waste was found in the concrete sump pit within the secondary containment system for the waste collection tanks (RCRA Units 40.17, 40.18, 40.19, 40.32, and 40.33). Approximately 35 gallons of liquid waste and sludge were retrieved from the pit and determined to contain gross alpha and beryllium contamination. After visual inspection of the sump, Civil Engineering and Environmental Design Engineering noted that it appeared groundwater was seeping into the sump along the northwestern wall, and seepage was especially evident in the northwestern corner. It was concluded that the sump had a visible pathway for waste to enter the environment. Based on noted groundwater seepage into the sump, the possibility also exists that the material in the sump may have been remnant contamination from past spills documented in PAC 800-1204 (DOE 1992).

Physical/Chemical Description of Constituents Released

The analytical results for the liquid indicated it contained beryllium (4 to 5 ppm) and radioactive contamination (800 pCi/L gross alpha and 500 pCi/L gross beta). Additional laboratory analyses also indicated a residue of lubricating oil. The general consensus was that the waste had originated from the waste tanks and, therefore, the waste was characterized as containing all of the hazardous constituents the tanks were approved to store including EPA codes D001, D004, D005, D006, D007, D008, D011, and F003 (DOE 1992).

Responses to Operation or Occurrence

Responses to the occurrence included the following (DOE 1992):

- The generating processes in Buildings 865 and 889 were shut down.

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- The tanks in Building 866 were emptied with the exception of a very small amount of steam condensate.

- The sump in Building 866 was emptied, the sludge was removed, and the sump was cleaned.

Secondary containment for the tanks in Building 866 was provided by adequate epoxy sealing of the 2-ft curb surrounding the tanks, as well as the floor and walls of the building. The sump was sealed off from the activities of the building with a steel plate that had a glass window in place to monitor water levels in the sump pit (DOE 1992).

The tanks in Building 866 were closed pursuant to RCRA and removed prior to building demolition, which occurred during 2003 (DOE 2004a).

Characterization of IHSS Group 800-1, which includes PAC 800-1212, was conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-12 (DOE 2003). (Note that Building 866 had been demolished and removed prior to the accelerated action activities.) Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004b).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and PCBs are considered COCs for IHSS Group 800-1, which includes PAC 800-1212. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 800-1, which includes PAC 800-1212, because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (slabs, pits, a sump, transformer pads, and process waste lines) were removed.

- Contaminant concentrations are less than RFCA WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered

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controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-12, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004a, Final Project Closeout Report for Building 865 Cluster, Draft, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2004b, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: 900-173

IHSS Reference Number: 173

Operable Unit: Industrial Area

IHSS Group: 900-1

Unit Name: South Dock Building 991

Approximate Location: N750,000; E2,085,500

Date(s) of Operation or Occurrence

1952 - 2003

Description of Operation or Occurrence

IHSS 900-173 originally encompassed Building 991 and associated underground storage vaults/tunnels 996, 997, 998, and 999. However, the IHSS was revised to include only the southern dock area of Building 991. The "south dock" of Building 991 is located on the west side of the building and was a loading facility for the vaults/tunnels. The south dock was a loading facility for the vaults/tunnels. The area received moderate to heavy traffic and had been paved for more than 20 years (DOE 2004).

Products containing plutonium, uranium, and beryllium were received and shipped from the dock. Also, cleaning solvents were received at the dock, and spent solvents (stored in drums) were shipped from the dock. Reportedly, small parts and equipment were cleaned in the dock area along the northern wall of the asphalt-covered courtyard. In the late 1950s and early 1960s, cleaning of depleted uranium parts was conducted in the courtyard of Building 991, which is located on the western side of the building near the dock. According to Plant records, the dock and courtyard were often washed down with water that could have seeped into cracks and the edge of the asphalt. Spills and water could also have drained into the storm drains (DOE 2004).

Physical/Chemical Description of Constituents Released

Products containing plutonium, uranium and beryllium were received and shipped from the dock, solvents were received at the dock, and spent solvents were shipped from the dock. These constituents were potentially released.

Responses to Operation or Occurrence

No documentation was found that details responses to occurrences in the dock area.

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Characterization of IHSS Group 900-1, which includes PAC 900-173, was conducted in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-05 (DOE 2003b). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 900-1 (DOE 2004).

The accelerated action did not include removal of Building 991 (and its south dock). Removal of Building 991 and its utilities will be conducted by RISS as a D&D project (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS Group 900-1, which includes PAC 900-173. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 900-1, which includes PAC 900-173, because of the following:

- Potential sources of soil contamination that existed in IHSS Group 900-1 (that is, the Building 993 slab, explosive bonding pit, and concrete slab beneath the pit) were removed. The Building 993 area was regraded and revegetated.

- Building 991 is currently being demolished. Associated tunnels and vaults will remain because they do not require any further accelerated action. After the building has been demolished and the slab has been removed, any excavations will be backfilled and the site will be regraded.

- Surface and subsurface contaminant concentrations in soil are less than RFCA WRW ALs, except for one surface and two subsurface arsenic concentrations. The elevated arsenic concentration in surface soil was 25.2 mg/kg. The WRW AL for arsenic is 22.2 mg/kg. The elevated arsenic concentrations in subsurface soil were 25.1 and 40 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 900-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-1 on March 31, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-03, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report IHSS Group 900-1, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

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## PAC REFERENCE NUMBER: 900-184

IHSS Reference Number: 184

Operable Unit: Industrial Area

IHSS Group: 900-1

Unit Name: Radioactive Site Building 991 Steam Cleaning Area

Approximate Location: N750,000; E2,085,000

Date(s) of Operation or Occurrence

1952 - 1978

Description of Operation or Occurrence

Radioactively contaminated equipment and drums may have been steam cleaned at a location near Building 992 southwest of Building 991. The effluent from the steam cleaning process was collected in a sump and entered the original process waste system. An EPA aerial photograph from August 6, 1971, indicates a darkened area along the dirt road from Building 992. The connection between the darkened area in the photograph and this potential release is not known (DOE 1992).

The steam cleaning may have occurred between 1953 and 1978. IHSS 184 was originally defined as a 50- by 50-ft area near Building 992, southwest of Building 991 (DOE 1994). More recent information indicates the boundaries of this IHSS are approximately 55 by 77 ft; however, no documentation exists that defines the location of washing activities (DOE 2004).

Physical/Chemical Description of Constituents Released

No radioactive hot spots were detected in this area by a radiometric survey performed sitewide from 1977 through 1984. This survey was intended to detect extremely contaminated areas of the Plant site.

Responses to Operation or Occurrence

No documentation was found that detailed responses to this operation.

Characterization of IHSS Group 900-1, which includes PAC 900-184, was conducted in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-05 (DOE 2003b). Analytical results from the characterization and confirmation (post-accelerated action) sampling,

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as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 900-1 (DOE 2004).

The accelerated action did not include removal of Building 991. Removal of Building 991 and its utilities was conducted by RISS as a D&D project (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS Group 900-1, which includes PAC 900-184. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 900-1, which includes PAC 900-184, because of the following:

- Potential sources of soil contamination that existed in IHSS Group 900-1 (that is, the Building 993 slab, explosive bonding pit, and concrete slab beneath the pit) were removed. The Building 993 area was regraded and revegetated.

- Building 991 is currently being demolished. Associated tunnels and vaults will remain because they do not require any further accelerated action. After the building has been demolished and the slab has been removed, any excavations will be backfilled and the site will be regraded.

- Surface and subsurface contaminant concentrations in soil are less than RFCA WRW ALs, except for one surface and two subsurface arsenic concentrations. The elevated arsenic concentration in surface soil was 25.2 mg/kg. The WRW AL for arsenic is 22.2 mg/kg. The elevated arsenic concentrations in subsurface soil were 25.1 and 40 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 900-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-1 on March 31, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1994, Operable Unit 8 Phase I RCRA Facility Investigation/Remedial Investigation Work Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-03, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report for IHSS Group 900-1, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

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## PAC REFERENCE NUMBER: 900-213

IHSS Reference Number: 213

Operable Unit: Industrial Area

IHSS Group: 900-3

Unit Name: 904 Pad

Approximate Location: N750,000; E2,086,000

Date(s) of Operation or Occurrence

August 1987 - Present

Description of Operation or Occurrence

The 904 Pad was located west of the 903 Pad and south of Central Avenue. It was created in 1987 for the outdoor storage of various waste materials. The 904 Pad was used for storage of mixed solid waste, primarily consisting of pondcrete (precipitate from the SEP process), saltcrete (precipitate from the Building 774 evaporation process), sewage sludge, and miscellaneous materials in cargo containers. The asphalt pad occupies a 129,505-$ft^2$ rectangular area and is sloped approximately 0.7 percent to the northeast. Improvements to the original design have included a 6-inch asphalt berm and tent enclosures (DOE 1992).

Boxes of pondcrete were stacked three high and arranged in groups of 72. Each group was covered with a plastic-lined canvas tarpaulin for weather protection (not completely weatherproof). A passageway was left between stacks for emergency access, inspection, and operations. The triwalled boxes were designed for transportation rather than long-term storage (DOE 1992).

Several incidents have occurred on the pad; however, releases were below reportable quantities. In May, July, and September 1988, a small amount of softened pondcrete spilled from triwall boxes. The May 1988 incident involved a spill of approximately 0.25 $ft^3$ of pondcrete, affecting an area of 12 $ft^2$. Saltcrete spilled during two events in June and July 1989 and July and August 1989 (DOE 1992).

In September 1990, a waste box stored on a pallet, located along the western wall of Tent 10, was identified as being radioactively contaminated (DOE 1992).

Prior to the construction of the tent enclosures, small amounts of leakage under the berm were routinely observed due to inadequate sealing of the berm to the existing asphalt pad. Additionally, the asphalt berms have overflowed with runoff during periods of heavy rainfall.

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Elevated levels of gross alpha activity, gross beta activity, and nitrate have been identified in the runoff (DOE 1992).

Physical/Chemical Description of Constituents Released

Pondcrete is characterized by high nitrate, and low-level radiation, with traces of VOCs. Saltcrete is made from salts resulting from the Building 374 evaporator and contains a variety of materials (DOE 1992).

Routine monitoring of runoff water from the 904 Pad began in February 1988. In addition, soil samples from around the pad were also collected. It was concluded that it was not possible to collect samples for background plutonium and uranium levels because of prior contamination (PAC 900-112). Based on results for grab samples of water collected on and off the pad during a rain event that occurred on September 11, 1988, it was confirmed that low-level contamination escaping from the pad with runoff water that could not be contained. In December 1988, routine monitoring following precipitation events indicated RFP guideline values for gross beta activity and nitrate were often exceeded (DOE 1992).

Air monitoring was performed after several incidents in 1988. The air data indicated plutonium was present at a maximum concentration of $2.5 \times 10^{-4}$ pCi/m$^3$ of air for a period in May 1988. Additional data are available (DOE 1992).

Responses to Operation or Occurrence

Initially, the pad was intended to contain only solid wastes. The sludge-like consistency of the pondcrete that caused the spills prompted the construction of the 6-inch berm. The berm was constructed to contain runoff, not as a spill containment structure. Due to the berm's inability to handle a 25-year, 24-hour storm, a mobile fuel tanker equipped with pumps was moved to the pad to collect water and transport it to Building 371 for treatment. Water overflow from the pad entered the B-Series ponds in the South Walnut Creek drainage. A tent enclosure was constructed over the entire pad in 1990 (DOE 1992).

After the release incidents, the area was surveyed with a Ludlum #12 alpha survey instrument to determine the area affected. The area was decontaminated with water which was vacuumed and transferred to the pondcrete processing area for disposal. Subsequent to the first incident, procedures were developed to prevent future incidents and identify appropriate action in response to an event (DOE 1992).

Soil, water, and air were sampled regularly since the beginning of pad operations. It was determined from the sampling that fill material used to construct the facility was placed over native soil contaminated with radionuclides. The source of the radioactivity was attributed to the adjacent 903 Pad. "Background" soil samples were collected to evaluate nitrate concentrations that were not characteristic of the 903 Pad Area. Portable air samplers were set up on the pad following the May 1988 incident. Runoff was monitored after precipitation events (DOE 1992).

In response to the September 1990 incident, radiation surveys were performed to determine the level of contamination. The affected box and pallet were bagged and placed in a permacon storage area. Additional smear samples were collected that revealed approximately 15 pallets

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with high activity levels. The pallets were bagged and placed in storage. Contaminated spots on the floor were decontaminated to the procedural level of less than 20 dpm (DOE 1992).

Two RCIPs were implemented in response to potential releases to the environment occurring at the 904 Pad. RCIP 88-001 was in response to the May 23, 1988, incident of deformed boxes of pondcrete. RCIP 88-002 was in response to the July 22, 1988, incident of a deformed box (DOE 1992).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 900-3 (DOE 2002), which includes IHSS 213, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 900-3 (DOE 2003).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment.

For the characterization of IHSS Group 900-3, radionuclides, VOCs, cyanide, and nitrate are considered COCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Analytical results indicate NFAA for IHSS Group 900-3 is warranted. All but one of the COC concentrations are less than the WRW ALs. The exception is a single arsenic value (23.7 mg/kg) in surface soil that slightly exceeded the corresponding WRW AL (22.2 mg/kg) and background level (10.09 mg/kg). Also, there is no identified potential to exceed surface water standards at a POC from this IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-3 on December 17, 2003 (CDPHE 2003).

References

CDPHE, 2003. Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Final Approval, Data Summary Report, IHSS Group 900-3 (904 Pad), (November 2003), December 17.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2003, Data Summary Report for IHSS Group 900-3, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

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## PAC REFERENCE NUMBER: 900-1301

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 900-1

Unit Name: Building 991 Enclosed Area

Approximate Location: N750,000; E2,085,000

Date(s) of Operation or Occurrence

November 6, 1953 - approximately 1968

Description of Operation or Occurrence

An enclosed area believed to be approximately 50 ft wide along the southern side of Building 991 was used for storage of various radioactively contaminated waste and materials. The earliest document found regarding this area indicated in November 1953, 79 drums of concreted waste were stored. Monthly reports from the Waste Disposal Coordination Group document that no drums were added to the area or removed until January 1961, when the drums were moved to the mound (PAC 900-113) (DOE 1992).

Other materials were stored in the same general area. These materials included storage of shipping crates and carrying cases for assembled weapon components that may have been contaminated (DOE 1992).

Physical/Chemical Description of Constituents Released

The 79 drums stored from 1953 to 1961 contained concreted wastes from Building 991. These wastes were contaminated with enriched and depleted uranium. The shipping crates and carrying cases may have also been contaminated. No documentation was found that details a release to the environment from these items (DOE 1992).

Responses to Operation or Occurrence

No documentation was found that details responses to this operation.

Characterization of IHSS Group 900-1, which includes PAC 900-1301, was conducted in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-05 (DOE 2003b). Analytical results from the characterization and confirmation (post-accelerated action) sampling,

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as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 900-1 (DOE 2004).

The accelerated action did not include removal of Building 991. Removal of Building 991 and its utilities will be conducted by RISS as a D&D project (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS Group 900-1, which includes PAC 900-1301. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 900-1, which includes PAC 900-1301, because of the following:

- Potential sources of soil contamination that existed in IHSS Group 900-1 (that is, the Building 993 slab, explosive bonding pit, and concrete slab beneath the pit) were removed. The Building 993 area was regraded and revegetated.

- Building 991 is currently being demolished. Associated tunnels and vaults will remain because they do not require any further accelerated action. After the building has been demolished and the slab has been removed, any excavations will be backfilled and the site will be regraded.

- Surface and subsurface contaminant concentrations in soil are less than RFCA WRW ALs, except for one surface and two subsurface arsenic concentrations. The elevated arsenic concentration in surface soil was 25.2 mg/kg. The WRW AL for arsenic is 22.2 mg/kg. The elevated arsenic concentrations in subsurface soil were 25.1 and 40 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 900-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-1 on March 31, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

DOE, 1992,

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-03, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report IHSS Group 900-1, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

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## PAC REFERENCE NUMBER: 900-1306

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: Not Applicable

Unit Name: Transformers 991-1 and 991-2

Approximate Location: N748,000; E2,085,500

Date(s) of Operation or Occurrence

Prior to February 1986

Description of Operation or Occurrence

In February 1986, several leaks were observed on pipe flanges, valves, gages, and bushing compartments of Transformers 991-1 and 991-2. Large amounts of oil were noted on the ground under the two transformers (DOE 1992).

The boundaries of the original PAC location were estimated. For this 2004 Annual Update to the HRR, the boundaries have been revised based on sampling location surveys and field reconnaissance.

Physical/Chemical Description of Constituents Released

The oil in Transformers 991-1 and 991-2 contained PCBs at concentrations of 114 and 60 ppm, respectively (DOE 1992).

Responses to Operation or Occurrence

The PCBs were cleaned up and the transformers were repaired in February 1986. It is not clear whether the cleanup involved soil (DOE 1992).

As part of the Sitewide Evaluation of Known, Suspect, and Potential Environmental Releases of PCBs conducted in July 1991, soil samples were collected in the accordance with approved EPA sampling protocols and analyzed for PCBs using EPA Method 8080. The highest PCB detection in soil samples collected adjacent to the concrete transformer pads was 0.510 ppm.

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Fate of Constituents Released to Environment

Recently, there has been much toxicological research pertaining to dioxins and other compounds with dioxin-like properties. Although Aroclors (a mixture of PCB congeners) do not contain dioxins, they do contain a few PCB congeners with dioxin-like properties. A White Paper (DOE 2004) was prepared and submitted to CDPHE that evaluates whether cleanup of PCB-contaminated soil at a transformer site to less than 10 ppm Aroclor is sufficiently protective to render PCB sites NFAA in light of recent studies showing that a few PCB congeners have dioxin-like properties. The evaluation presented in the paper demonstrates that the past cleanup of the PCB sites at RFETS to achieve Aroclor levels less than 10 ppm, as well as the future cleanup of transformer sites to achieve the WRW AL of 12.4 ppm, adequately protects human health. Although dioxin-like compounds are present in the Aroclors released to soil, the White Paper demonstrates that:

- The health risk posed by the dioxin-like compounds is not a concern at these cleanup levels.
- Weathering of the Aroclors released to the soil is unlikely to significantly alter the congener distribution or the toxicity of the Aroclors.
- Congener-specific PCB analysis of soil samples, or analysis for dioxins and furans, is not required for characterizing transformer sites at RFETS.

Action/No Further Accelerated Action Recommendation

Based on the site data and White Paper findings noted above, NFAA is appropriate for this PCB site.

After review of the White Paper by the regulatory agencies, DOE received concurrence from CDPHE (the lead agency) on the NFAA status for the site on May 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 1995, Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls, RF/ER-95-0066.UN, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Dioxin-Like Compounds in Transformer Oil: An Evaluation of Their Potential Impact on Soil Cleanup Strategies at RFETS, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

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## PAC REFERENCE NUMBER: 900-1307

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 900-1

Unit Name: Explosive Bonding Pit

Approximate Location: N748,000; E2,086,500

Date(s) of Operation or Occurrence

1965 - approximately 1968

Description of Operation or Occurrence

Explosive bonding experiments were conducted at the explosive forming area near Building 993. At least seven events took place within a few days in March 1968 in an experiment to explosively bond together flat plates of stainless steel and uranium alloy. The explosive consisted of 192 grams of 40 percent dynamite. The energy released from the dynamite drove the stainless steel plate into the radioactive material to form a bonded laminate. An experiment conducted on March 6, 1968, caused a piece of aluminum used in the experiment to be thrown a distance of 525 ft (DOE 1992).

Other experiments of an unknown nature took place in this general location for at least 2 1/2 years. Until March 1968, experiments took place inside buried, sand-filled, 55-gallon drums. The explosive events took place below grade. Air shocks from the explosions were objectionable to Building 991 occupants until a pit was dug into a hillside near Building 993 to house the apparatus and mitigate air shocks. The 10- ft by 19-ft pit was approximately 4 ft deep (DOE 1992).

Physical/Chemical Description of Constituents Released

Uranium alloy and stainless steel were the materials used in the experiments. No documentation was found that details the physical and chemical characteristics of the constituents that may have been released to the environment (DOE 1992).

Responses to Operation or Occurrence

As a result of the incident of the aluminum being thrown from the pit, measures were to be evaluated to prevent malfunctions during experiments (DOE 1992).

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Characterization of IHSS Group 900-1, which includes PAC 900-1307, was conducted in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-05 (DOE 2003b). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 900-1 (DOE 2004).

The accelerated action did not include removal of Building 991. Removal of Building 991 and its utilities will be conducted by RISS as a D&D project (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for IHSS Group 900-1, which includes PAC 900-1307. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for IHSS Group 900-1, which includes PAC 900-1307, because of the following:

- Potential sources of soil contamination that existed in IHSS Group 900-1 (that is, the Building 993 slab, explosive bonding pit, and concrete slab beneath the pit) were removed. The Building 993 area was regraded and revegetated.

- Building 991 is currently being demolished. Associated tunnels and vaults will remain because they do not require any further accelerated action. After the building has been demolished and the slab has been removed, any excavations will be backfilled and the site will be regraded.

- Surface and subsurface contaminant concentrations in soil are less than RFCA WRW ALs, except for one surface and two subsurface arsenic concentrations. The elevated arsenic concentration in surface soil was 25.2 mg/kg The WRW AL for arsenic is 22.2 mg/kg. The elevated arsenic concentrations in subsurface soil were 25.1 and 40 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 900-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-1 on March 31, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-03, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report for IHSS Group 900-1, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

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## PAC REFERENCE NUMBER: UBC 439

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-1

Unit Name: Building 439 (UBC 439)

Approximate Location: N748,401; E2,082,362

Date(s) of Operation or Occurrence

1970 - 2004

Description of Operation or Occurrence

UBC 439, the Radiological Survey building, is approximately 100 ft by 50 ft, and is a sheet metal structure built on an at-grade concrete slab. The structure was a maintenance building, and was later used for PU&D operations. Specifically, building 439 was used to receive, process, and ship surplus equipment and materials released by Site custodians, and housed small portable counters to monitor alpha, beta, and gamma radiation. Sources were controlled through Site accountability procedures. Smear samples collected throughout RFETS were brought to Building 439 for counting. The building is currently being used as the break area for Building 440 operations personnel (DOE 2004).

There are no process lines or foundation drains under the building. There is one floor drain that is tied to the sanitary sewer system. No characterization of soil beneath the Building 439 foundation slab had been conducted prior to accelerated action activities (DOE 2004).

Physical/Chemical Description of Constituents Released

Radionuclides, metals, and VOCs may have been released beneath Building 439 (DOE 2003).

Responses to Operation or Occurrence

UBC 439 represents IHSS Group 400-1. In accordance with IASAP Addendum #IA-04-08 for IHSS Group 400-1 (DOE 2003), characterization samples were collected and analyzed. Analytical results from the characterization sampling are presented in the Data Summary Report for IHSS Group 400-1 (DOE 2004).

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Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for UBC 439. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-04-08 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required and an NFAA determination is justified for UBC 439 because of the following:

- Contaminant concentrations were below 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 to groundwater with subsequent impact to surface water is not likely because of the low levels of soil contamination found at UBC 439. The existing contaminated groundwater in the area is considered part of the IA Plume, which will be further evaluated in the Groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 400-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-1 on August 23, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Data Summary Report for IHSS Group 400-1 (UBC 439) - Radiological Survey - August 23.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-08, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, Data Summary Report for IHSS Group 400-1, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

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## PAC REFERENCE NUMBER: UBC 440

IHSS Number: UBC 440

Operable Unit: Industrial Area

IHSS Group: 400-2

Unit Name: Modification Center

Approximate Location: N748,300; E2,082,100

Date(s) of Operation or Occurrence

Late 1960s – 2004.

Description of Operation or Occurrence

Building 440 was constructed in the late 1960s for production control and shipping final assembly products and disposal wastes. Special nuclear materials (SNM) and depleted uranium were staged and shipped out of this building by truck and railcar. For a brief period, the building was used as a general warehouse and storage area for non-nuclear construction and fabrication materials (DOE 2001).

In the early 1970s, Building 440 was used to modify and repair vehicles to meet specific DOE requirements for transport of SNM and radioactive wastes. Building 440 was expanded three times to include a railcar bay, high bay, paint booths, storage areas, and locker rooms in support of transport modification efforts. Armor, communications equipment, and comfort features were added to transport vehicles. Vehicle modification work in Building 440 continued until 1994, when the mission was transferred to another DOE facility (DOE 2001).

Production processes in Building 440 included various welding, painting. Machining, pipefitting, metal working, and electrical work used to modify transports (DOE 2001).

Physical/Chemical Description of Constituents Released

Building 440 was known to contain low levels of uranium and chemical contamination. Hydraulic oil and carbon tetrachloride originating from the uranium machine tool storage area may have infiltrated the underlying soil (DOE 1992).

Responses to Operation or Occurrence

Accelerated action activities were conducted at IHSS Group 400-2, which is comprised of UBC 440, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-04-01 (DOE 2003).

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Fate of Constituents Released to Environment

Based on IHSS 400-2 site histories and historical soil sampling results, radionuclides, metals, and VOCs were identified as COCs. Surface (0-0.5 ft bgs) and subsurface (0.5-2.5 ft bgs) soil samples were analyzed for COCs. Only one analyte was detected at a concentration greater than the WRW AL. Arsenic was detected in the subsurface sample (0.5 to 2.5 ft bgs) collected from sampling location BW35-042 (located outside the northwest corner of Building 440) at a concentration of 28.0 mg/kg. The WRW AL for arsenic is 22.2 mg/kg. No other contaminants were detected at levels greater than the WRW ALs. The accelerated action characterization activities conducted at IHSS 400-2 and the rationale for NFAA are discussed in detail in the Draft Data Summary Report for IHSS Group 400-2 (DOE 2004). The rationale for NFAA at IHSS 400-2 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for IHSS 400-2 based on the following:

- Residual contaminant concentrations or activities in surface and subsurface soil are less than WRW ALs, except for the one exceedance of arsenic which was only slightly above the WRW AL.
- 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 at IHSS Group 400-2. The Integrated Monitoring Plan (IMP) will address the need for further groundwater monitoring. Groundwater remediation alternatives will be addressed in the Groundwater Interim Measure/Interim Remedial Action (IM/IRA).

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-2 (UBC 440) on September 27, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 400-2, UBC 440 – Modification Center, dated September 2004, September 27, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-04-01, IHSS Group 400-2, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

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DOE, 2004, Draft Data Summary Report for IHHS Group 400-2, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

# PAC REFERENCE NUMBER: UBC 441

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-8

Unit Name: Building 441 (UBC 441)

Approximate Location: N749,155; E2,081,914

## Date(s) of Operation or Occurrence

1952 (date Building 441 was placed into service) - 1990?

## Description of Operation or Occurrence

Building 441 is located in the northwestern portion of the 400 Area and was placed into service in 1952. The building footprint is approximately 17,075 $ft^2$. The building was originally used as a laboratory, and in 1966, was converted into an office building. Because the footprint of the building overlaps IHSS 122 (two OPWL tanks), soil beneath the building is potentially contaminated (DOE 2002a).

## Physical/Chemical Description of Constituents Released

Nitrates, VOCs, PCBs, and radioactive contaminants may have been released beneath Building 441 (DOE 2002a).

## Responses to Operation or Occurrence

UBC 441 is part of IHSS Group 400-8. In accordance with IASAP Addendum #IA-03-01 for IHSS Group 400-8 (DOE 2002b), characterization samples were collected and analyzed. Notification of planned accelerated action activities was provided in ER RSOP Notification #03-06 (DOE 2003). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 400-8 (DOE 2004).

In accordance with ER RSOP Notification #03-06 (DOE 2003), the entire Building 441 slab was removed, including the northern foundation slab and the southern addition foundation slab. A concrete-filled condensate return sump located under the southern third of the northern slab was also removed. All footer walls and caissons were completely removed, as were, the OPWL tanks. OPWL under the Building 441 slab and exiting the southern addition to Building 441

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(from Tanks T-2 and T-3) were exposed, tapped and drained, and removed. Most of the lines were cast iron. Two OPWL manholes west of Fourth Street were also removed.

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, SVOCs, nitrate, and PCBs are considered COCs for IHSS Group 400-8, which includes UBC 441. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for IHSS Group 400-8, which includes UBC 441, because of the following:

- Potential sources of contamination that existed in IHSS Group 400-8 (slabs, footers, manholes, asphalt, sump, tanks, and drain lines) were removed.
- Contaminant concentrations are less than RFCA WRW ALs, except for one elevated arsenic concentration at location BW38-004 (between 4.5 and 6.5 ft in depth) and one benzo(a)pyrene concentration at BV38-002 (between 10 and 11 ft in depth). The arsenic concentration was 23.0 mg/kg, and the WRW AL is 22.2 mg/kg. The detected arsenic concentration is within the range of background concentrations historically observed at the Site. The benzo(a)pyrene concentration was 3,700 µg/kg, and the WRW AL is 3,490 µg/kg.

No long-term stewardship activities are recommended for IHSS Group 400-8 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-8 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 400-8 (B441) - Approval, March 19.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report for IHSS Group 400-8, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: UBC 444

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Building 444 (UBC 444)

Approximate Location: N748,766; E2,082,331

Date(s) of Operation or Occurrence

1953 (date Building 444 was first occupied) - 1990

Description of Operation or Occurrence

Soil and/or groundwater beneath Building 444may have become contaminated because of the nature of activities within the building. Unplanned indoor events and routine operations may have led to contamination beneath the building. For example, leaking process waste lines could contribute to under-building contamination. Tanks associated with the building may have leaked or been overfilled causing a release to the environment. Building sumps, floors, and foundation walls may have cracks or be otherwise unsealed and have created a pathway for contamination of the environment beneath the building.

Originally called Plant A, Building 444 was one of the first buildings constructed at the Plant. Building 444 was the primary non-nuclear manufacturing facility at the Site. Manufacturing processes were used to fabricate weapons components and assemblies from a variety of materials, including depleted uranium, beryllium, stainless steel, aluminum, and vanadium (DOE 1992).

The production equipment located in Building 444 was used to support war reserve, special orders work, and manufacturing development. Operations included casting, machining, heat-treating, welding, brazing, chemical milling, plating, coating, and testing and inspection of weapons components made of depleted uranium, depleted uranium composites, beryllium, stainless steel, and ferric metals. Each material required different processing techniques.

When expansion of the Site took place in 1956 and 1957, additions were made to Building 444. The expansion was motivated by changes in trigger design and subsequent increased fabrication requirements.

The original building area contained a foundry and numerous shops and laboratories. Shops within the original portion of the building included depleted uranium, beryllium, and carbon (graphite) machine shops; and heat treating, coating, tool grinding, welding and brazing, and

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building maintenance shops. A portion of the precision shop was also housed in this building. Laboratories included pressure- and leak-testing, plating, precision measuring, and non-destructive testing. Some of the former shop areas were converted into storage areas for excess tools and materials.

Physical/Chemical Description of Constituents Released

Depleted uranium, beryllium, vanadium, and potentially solvents may have been released beneath Building 444.

Responses to Operation or Occurrence

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes UBC 444, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for UBC 444. The nature and extent of contamination were characterized in accordance with the IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes UBC 444, because of the following:

- With the exception of one sample, PCOC concentrations in soil were less than the WRW ALs. Although there was one soil sample with a lead concentration exceeding the WRW AL, in accordance with approved methodologies (resampling due to apparent cross-contamination and 95% UCL calculations), further investigation into the lead WRW AL exceedance resulted in an NFAA determination.

- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.

- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and

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prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003. Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: UBC 447

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 400-3

Unit Name: Building 447 (UBC 447)

Approximate Location: N748,575; E2,082,154

Date(s) of Operation or Occurrence

1956 (date Building 447 first occupied) - 1990

Description of Operation or Occurrence

Soil and/or groundwater beneath Building 447 may have become contaminated because of the nature of activities within the building. Unplanned indoor events and routine operations may have led to contamination beneath the building. For example, leaking process waste lines could contribute to under-building contamination. Tanks associated with the building may have leaked or been overfilled causing a release to the environment. Building sumps, floors, and foundation walls may have cracks or be otherwise unsealed and have created a pathway for contamination of the environment beneath the building.

Building 447 is part of the 444 Complex and was a depleted uranium fabrication facility. Ingots and semifinished/finished depleted uranium parts were heat-treated in the induction furnace. In 1956, the chip roaster in Building 447 became operational. Depleted uranium chips recovered from machining areas were collected in covered 55-gallon drums, transferred to Building 447, and burned to an oxide (more stable form) under controlled conditions in the chip roaster. The oxides were packaged and shipped off site for disposal (DOE 1992).

Physical/Chemical Description of Constituents Released

Depleted uranium, beryllium, vanadium, and solvents may have been released beneath Building 447.

Responses to Operation or Occurrence

In accordance with IASAP Addendum #IA-03-06 for IHSS Group 400-3 (DOE 2003a), which includes UBC 447, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 400-3 (DOE 2003b).

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Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered COCs for UBC 447. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-06 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 400-3, which includes UBC 447, because of the following:

- With the exception of one sample, PCOC concentrations in soil were less than the WRW ALs. Although there was one soil sample with a lead concentration exceeding the WRW AL, in accordance with approved methodologies (resampling due to apparent cross-contamination and 95% UCL calculations), further investigation into the lead WRW AL exceedance resulted in an NFAA determination.

- Migration of contaminants to surface water through erosion is unlikely because the exceedances are not in an area prone to landslides or erosion.

- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-3. The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document.

No long-term stewardship activities are recommended for IHSS Group 400-3 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 400-3 on December 18, 2003 (CDPHE 2003).

References

CDPHE, 2003. Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

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DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-06, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

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## PAC REFERENCE NUMBER: UBC 770

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 700-5

Unit Name: Building 770 (UBC 770)

Approximate Location: N751,239; E2,083,949

Date(s) of Operation or Occurrence

1965 - 2004

Description of Operation or Occurrence

UBC 770 is located north of Buildings 771 and 774. The UBC Site encompasses approximately 3,168 $ft^2$. Building 770 is a metal, prefabricated, modular building constructed in 1965 on a concrete foundation. The building is currently used to store tools, materials, and supplies for Building 771 decommissioning operations. Historically, Building 770 was used for equipment storage and also as a facility for equipment assembly prior to equipment installation inside other Site buildings. Building 770 was also used to store radioactive waste (DOE 2004).

In August 1972, a punctured scrap box stored inside Building 770 contaminated more than 3,000 $ft^2$ within the building and 500 $ft^2$ outside the building. Levels of radioactivity were measured up to 200,000 dpm. In September 1972, a 55-gallon drum containing spent radioactive ion exchange residue leaked onto the concrete floor inside Building 770 (DOE 2004).

Drums with spent radioactive ion exchange residue (for processing in Building 771) and cargo containers were stored on the surface area west of Building 770 from 1969 to 1974 when storage operations were moved to Building 776. Several contamination releases occurred on the ground surface west of Building 770 between 1965 and 1971 (PAC 700-150.1) (DOE 2004).

No characterization of soil beneath the Building 770 foundation slab had been conducted prior to the accelerated action activities (DOE 2004).

Physical/Chemical Description of Constituents Released

Radionuclides were released within the building and may have contaminated soil beneath the building. Other contaminants that may have been released include constituents of the radioactive waste stored in or near the building.

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Responses to Operation or Occurrence

In accordance with IASAP Addendum #IA-03-17 for IHSS Group 700-5 (DOE 2003), which represents UBC 770, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 700-5 (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and PCBs are considered COCs for UBC 770. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-17 (DOE 2003). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for UBC 770 because of the following:

- Contaminant concentrations were below 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 to groundwater with subsequent impact to surface water is not likely because of the low levels of soil contamination found at UBC 770. The existing contaminated groundwater in the area is considered part of the IA Plume, which will be further evaluated in the groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-5 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-5 on September 7, 2004 (CDPHE 2004).

References

CDPHE, 2004, Data Summary Report IHSS Group 700-5 (B770), NFAA - Approval, September 7.

DOE, 2003, Final Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-17, IHSS Group 700-5, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

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DOE, 2004, Data Summary Report for IHSS Group 700-5, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

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## PAC REFERENCE NUMBER: UBC 771

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Building 771 (UBC 771)

Approximate Location: N751,004; E2,083,780

Date(s) of Operation or Occurrence

1952 (date Building 771 was first occupied) - 1990

Description of Operation or Occurrence

Soil and/or groundwater beneath Building 771 may have become contaminated because of the nature of the activities within the building. Unplanned indoor events and routine operations could have led to contamination beneath the building. For example, leaking process waste lines could have contributed to under building contamination. Tanks associated with the building may have leaked or been overfilled causing a release to the environment. Building sumps, floors, and foundation walls may have cracks or be otherwise unsealed and have created a pathway for contamination of the environment beneath the building.

Building 771 is located in the north-central portion of the RFETS IA. The original building was a two-story structure built into the side of a hill with most of the three sides covered by earth. The fourth side, facing north, provides the main entrance to the building (DOE 2002a).

Since completion of the original building, six major additions were constructed. This series of expansion brings the total area of the building to approximately 151,000 $ft^2$. The first addition was Building 771A, which was constructed in 1962. This addition is separated from the process areas by a hallway and doors, and has a separate ventilation system.

Completed in 1966, the Building 771B office addition is a one-story building on the northern side of the main building, west of Building 771A. The Dock Number 1 addition was added to the northwestern side of the main building in 1968. The maintenance shop on the western side of the main building was constructed in 1970. The waste packaging facility, Building 771C, was built in 1972 and is a one-story addition to the eastern side of Building 771, extending to the western side of Building 774.

A plenum deluge catch tank shed, built in 1974, was added on the western side of the original building adjacent to the maintenance shop addition. Inside the shed is a 4,000-gallon-capacity

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filter drainage catch tank and support system to collect the water used while fighting fire inside the filter plenums or incinerator.

Building 771, the primary RFETS' facility for plutonium operations, was one of the four major buildings constructed and placed in operation at RFETS. Building 771 operations included chemical and physical operations for recovering plutonium and refining plutonium metal, plutonium chemistry and metallurgical research, and a radiochemical analytical laboratory. The following provides a chronology of Building 771:

| | |
|---|---|
| 1951 | Begin construction in November. |
| 1952 | Building 771 is occupied. |
| 1953 | First operations begin in Building 771 in May. |
| 1957 | On September 11, a glovebox fire occurs in the building, resulting in the transfer of the plutonium foundry, fabrication, and assembly operations to Buildings 776/777. |
| 1958 | A plutonium recovery Incinerator begins operations. |
| 1959 | The solvent extraction process for plutonium recovery is replaced with an anion exchange process. |
| 1963/64 | Building 771A is constructed to increase plutonium production. Processes were expanded to include americium recovery; plutonium dissolution lines; filtrate recovery; and batching, calcination, and fluorination operations. |
| 1967 | An office expansion: 771B is added to Building 771. |
| 1970 | An addition is completed on the western side of the building to consolidate all maintenance, pipe, sheet metal, and painting activities. |
| 1971 | Building 771C, a drum-handling facility, is completed. |
| 1979 | Plutonium recovery operations in Building 771 are discontinued. Cleanup operations begin in Building 771. |
| 1980 | Building 771 operations are restarted due to material accountability problems in Building 371. |
| 1989 | Building 771 plutonium operations are shut down in November as part of an overall plutonium operations shutdown ordered by DOE. |

The Building 771 stack is a reinforced concrete stack at the southeastern corner of Building 771. The stack has an inside diameter of 10 ft, the base is 19 ft underground, and the stack rises 150 ft aboveground. The exhaust stack provides exhaust for the main filter plenum, which receives exhaust from the HEPA filtration system; the HVAC system; and incinerator.

Physical/Chemical Description of Constituents Released

Plutonium, americium, metals, uranium, and solvents may have been released beneath Building 771.

Responses to Operation or Occurrence

A preliminary characterization of UBC 771 was conducted by collecting approximately 32 soil samples at 16 locations. The numbers and types of samples, coupled with their specific

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locations, were collected to determine whether contamination existed that would warrant removal of the building's foundation for final D&D/site closure, or whether the foundation may be left in place. The preliminary results did not suggest either a definitive point source of contamination or a potential source location (DOE 2001).

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002b), which includes UBC 771, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment.

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered PCOCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for IHSS Group 700-4, which includes UBC 771, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs include arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23 and will be addressed in closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

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No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2001, Annual Update for the Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report for IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: UBC-774

IHSS Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 700-4

Unit Name: Building 774 (UBC 774)

Approximate Location: N751,075; E2,084,105

Date(s) of Operation or Occurrence

1952 - 2004

Description of Operation or Occurrence

Soil and/or groundwater beneath Building 774 may have become contaminated because of the nature of activities within the building. Unplanned indoor events and routine operations could have led to contamination beneath the building. For example, leaking process waste lines could have contributed to under building contamination. Tanks associated with the building may have leaked or been overfilled causing a release to the environment. Building sumps, floors, and foundation walls may have cracks or be otherwise unsealed and have created a pathway for contamination of the environment beneath the building.

Building 774 was designed to treat the liquid process wastes generated in Building 771. Building 774 was originally a two-story rectangular structure of poured-in-place concrete. By 1989, seven additions had been made to the building, resulting in multiple levels varying from one to four stories in height. The facility is built on a steeply sloping site. The first floor on the northern side is 7.5 ft below grade, and the fourth floor on the southern side is 4 ft above grade (DOE 2002a).

As RFETS expanded to accommodate increased production of nuclear weapon triggers, Building 774 began processing radioactive acidic wastes; caustics, aqueous, and organic wastes; wastes oils; and nonradioactive waste photographic solutions. Buildings 111, 112, 130, 371, T371J, 441, 444, 460, 551, 559, 664, 707, 750, 771, 776, 777, 881, and 991 generated one or more waste streams that were processed in Building 774. In 1971, the waste treatment operations in Building 774 were enclosed to provide containment of radioactive airborne particles.

The goal of the Building 774 waste treatment process was to reduce liquid radioactive wastes and convert them into a form suitable for transport off site for storage and disposal. In general, wastes were either piped directly into Building 774, or transferred in drums, containers, or other types of packaging. The waste entered a series of interconnected tanks designed to treat acidic, caustic, and radioactive wastes, and separate relatively low-level radioactive effluent from

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contaminated solids or sludges. Each of the four processes used in the building was tailored to meet certain characteristics of the waste. The waste may have passed through one or more of the following processes:

- Neutralization and filtration of acidic wastes containing large quantities of metal ions or chloride ions. The main purpose of this process was to remove the large quantities of metal hydroxide solids from the waste stream, because these solids hampered the decontamination ability of the succeeding flocculation and clarification processes.

- Batch neutralization, precipitation, and filtration of acidic wastes containing only small quantities of metal ions or basic wastes containing large quantities of undissolved solids.

- Continuous radioactive decontamination of neutral and caustic wastes.

- Solidification of aqueous wastes containing complexing agents, certain radioactive isotopes, or hazardous chemicals that were undesirable in the regular waste system. These wastes were mixed with an absorbent material and Portland cement in barrels for disposal. This process was eventually replaced by the organic and sludge immobilization system. The organic and sludge immobilization system accepted waste oils from any building at the Site that contained TRU material and converted the liquid waste into solid waste.

The second stage of the decontamination process included two separate radioactive waste decontamination processes. The benefit of segregating the wastes was better utilization of the waste storage ponds based on whether the wastes met standards for radioactive and/or chemical contamination.

The slurry from both processes was held in a slurry tank until it was processed by vacuum filtration to separate the solids from the liquid. The separated solids were mixed with a solidifying agent, and packaged for shipment and long-term storage as TRU-mixed waste.

The role of Building 774 diminished with the inauguration of the new process waste treatment facility in Building 374. Building 774 continued to process contaminated organic wastes that could not be incinerated, and the liquid process wastes generated in Building 771.

Physical/Chemical Description of Constituents Released

Plutonium, americium, metals, uranium, and solvents may have been released beneath Building 771.

Responses to Operation or Occurrence

In accordance with IASAP Addendum #IA-03-01 for IHSS Group 700-4 (DOE 2002b), which includes UBC 774, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the ER RSOP Notification and Closeout Report for IHSS Group 700-4 (DOE 2004).

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Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment.

For the characterization of IHSS Group 700-4, radionuclides, metals, VOCs, and SVOCs are considered PCOCs. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for IHSS Group 700-4, which includes UBC 774, because of the following:

- The potential source of contamination that had existed at IHSS Group 700-4 (that is, the plutonium-239/240 and americium-241 hot spot beneath Tank 16) was removed to an activity of less than 1 nCi/g and covered to grade with 4 ft of clean fill.

- Subsurface soil contaminant concentrations greater than RFCA WRW ALs includes arsenic at a depth of 4.5 to 6.5 ft bgs southeast of Building 774, radionuclides beneath UBCs 771 and 774 that will be at a depth of at least 6 ft bgs after D&D activities are complete, and beneath Tank 16 at a depth of approximately 4 ft bgs.

- The section of OPWL that exits Building 771 and runs due west is in the area of the locations that have SVOC concentrations in excess of three times the ALs. These locations are being transferred to IHSS Group 000-2 where they will become part of the OPWL removal action at Line P-23 and will be addressed in closure of that IHSS Group.

- Migration of subsurface contaminants to surface water through erosion is unlikely because the locations with results greater than WRW ALs will be well below the ground surface (at least 6 ft at Buildings 771 and 774) after D&D actions are complete.

- Migration of contaminants from groundwater to surface water is unlikely. Even though groundwater contamination exists in the area, the most likely source is IHSS Group 700-3 (IHSS 118.1). The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a Sitewide groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 700-4 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

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After review of the ER RSOP Notification and Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-4 on February 6, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2001, Annual Update for the Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, ER RSOP Notification and Closeout Report for IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

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## PAC REFERENCE NUMBER: UBC 779

IHSS Number: UBC 779

Operable Unit: Industrial Area

IHSS Group: 700-7

Unit Name: Main Plutonium Components Production Facility

Approximate Location: N750,550; E2,084,350

Date(s) of Operation or Occurrence

1965

Description of Operation or Occurrence

Building 779 was the former weapons research and development laboratory, built in 1965 to support plutonium (Pu) production and recovery processes. The building mission changed in 1989 to research and non-nuclear production support activities, such as liquid carbon dioxide cleaning, waste minimization and characterization, stockpile reliability evaluation, and surface analyses (DOE 2004).

Research, development, and support operations consisted of process chemistry technology, physical metallurgy, machining and gauging, joining technology, and hydriding (plutonium recovery) operations. The Process Chemistry Technology group engaged in weapons process development, stockpile reliability testing, testing of various material compatibilities, plutonium aging under various environmental conditions, and methods development for recovering, separating, and purifying actinides from waste streams and residues. The Physical Metallurgy group conducted research on various metals, alloys and other materials, which involved tensile testing, study of casting dynamics, electron microscopy, x-ray analyses, hardness testing, and dimensional dynamics. The Machining and Gauging group was involved in manufacturing of special order parts and test components, and had two shops and a laboratory for tool making, maintenance operations, and high-precision machining for special orders and tests. The Joining group developed sophisticated joining techniques, including welding and brazing, for nuclear materials. The Hydriding group was involved in Pu recovery experiments (DOE, 2004).

No specific release incidents are reported in the 1992 HRR (DOE 1992) or Appendix C of the IASAP (DOE 2001). However, contamination released at a number of associated sites are attributed to Building 779 as follows:

On May 11, 1969, a fire released plutonium to all of Buildings 776 and 777, and to areas of Building 771, Building 778, and Building 779 (DOE 1992).

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In June 1969, an improperly opened waste drum in Building 779 radioactively contaminated areas inside and near the building. The contamination was spread by pedestrian tracking to the walkways south (PAC 700-150.6) and east (PAC 150.8) as well as the dock and adjacent ground (DOE 1992).

An estimated 50 - 100 curies of tritium were inadvertently released from Building 779 to the sanitary sewer system in April and May 1973 (DOE 1992).

On December 8, 1976, about 400 gallons of cooling tower water containing chromium and some radioactivity leaked into a storm drain near Building 779. The spilled water was believed to have flowed toward collection Trench Number 6 (PAC 000-101). Utilities personnel at RFP recalled that the 1976 spill occurred when an underground cooling tower water line broke east of Building 779 and adjacent to the northwest of Building 727. The Building 779 cooling towers are covered in greater detail in PAC 700-138 (DOE 1992).

Pu-239/240 was detected in soil beneath Building 779 at activities of up to 97,320 pCi/g. Cooling tower water released in the 1976 incident contained 50 ppm total chromium and approximately 3,000 d/m/l alpha activity (DOE 2001).

Building 779 was erected over the site of one of the original solar evaporation ponds. During excavation in September 1962, radioactive readings from 11-75 dpm/l were noted, and later, pools of water in these excavations reached levels of 150 dpm/l. The radioactive material involved was mostly uranium (DOE 2001).

Responses to Operation or Occurrence

The cooling tower water released in the 1976 incident was analyzed. Trench Number 6 and Pond A-3 were sampled. The ruptured line was excavated and repaired. The cooling tower water line which ruptured in the incident was removed when the original cooling towers were replaced (DOE 2001).

Building 779 was demolished to its main foundation in FY00. Building components remaining included the building slab, an extensive network of OPWLs, process waste trenches, sanitary drains, and various site utilities. Process waste drains penetrating the foundation were filled to grade with grout. Pipe conduit openings in the building slab were plugged and grouted at the foundation level. Several pits were also present below the slab. Contaminated groundwater was encountered in one of the pits (DOE 2004).

A 35-ft by 2.5-ft area of concrete slab was removed to soil at the northern sides of Rooms 131 and 133. Soil samples were collected from beneath the concrete prior to backfilling the area with grout. Pu-239/240 was detected in soil at activities of up to 97,320 pCi/g. No soil remediation was conducted at that time (DOE 2004).

One 300-gallon diesel UST was located adjacent to the southern side of the former Building 779 loading dock area. The tank was closed in place in 1997 using polyurethane foam. The concrete ramp area around the dock was backfilled with soil to the foundation grade (DOE 2004).

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Soil sampling and groundwater monitoring have been conducted in the area since the incidents. Soil sampling was conducted as part of the Operable Unit (OU) 8 Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI). Historical soil and groundwater sampling results are summarized in IASAP Addendum #IA-03-15 (DOE 2003a).

Accelerated action activities were conducted at IHSS Group 700-7, which includes UBC 779, to characterize the nature and extent of contamination in soil. Characterization activities were conducted in accordance with the IASAP Addendum #IA-03-15 (DOE 2003a).

Fate of Constituents Released to Environment

Based on Building 779 site history and historical soil sampling results, radionuclides, metals, SVOCs, and VOCs were identified as COCs. Plutonim-239/240 activities greater than the WRW AL (50 pCi/g) were detected in surface and subsurface soil at two sampling locations. Activities greater than the WRW AL ranged from 119.2 to 670.3 pCi/g. Americium-241 activities exceeded the WRW AL (76 pCi/g) at one surface location within Building 779 (117.6 pCi/g). Based on these results, soil removal was required. Soil removal activities were conducted in accordance with the ER RSOP Notification #03-10 (DOE 2003b). Accelerated action activities (characterization and soil removal) and the rationale for NFAA at UBC 779 are discussed in detail in the Draft Closeout Report for IHSS Group 700-7 (DOE 2004). Removal of the Building 779 slab and associated components and utilities is also documented in the report. The rationale for NFAA at UBC 779 is summarized below.

Action/No Further Accelerated Action Recommendation

NFAA was recommended for UBC 779 based on the following:

- The building slab and underlying plutonium-contaminated soil was removed.
- Residual surface soil concentrations or activities are less than WRW ALs.
- The results of the SSRS.
- No further accelerated action is required by the stewardship evaluation.

Additional fill will be applied to the area to ensure that all remaining structural features (that is, the remaining structural upgrade foundations and the Building 782 tunnel) are at least 3 ft below final grade.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 700-7, including UBC 779, on October 1, 2004 (CDPHE 2004).

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References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 700-7 (B779) - Approval, October 1, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

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

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-15, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-10, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2004, Draft Closeout Report for IHHS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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## PAC REFERENCE NUMBER: UBC 865

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 800-1

Unit Name: Building 865 (UBC 865)

Approximate Location: N749,072; E2,084,151

Date(s) of Operation or Occurrence

1970 - 2003

Description of Operation or Occurrence

Building 865, built in 1970, was part of the RFETS research and development program. The building housed metalworking equipment for the study of non-plutonium metals and the development of alloys and prototype hardware (DOE 2002a). The building serviced not only RFETS requests, but also handled developmental work for other DOE facilities such as Los Alamos National Laboratory in New Mexico and Lawrence Livermore National Laboratory in California.

The building was used for fabricating prototype hardware and developing metal alloys and processes. Operations include metalworking, machining, and metallurgical laboratory work.

The most common metals processed were depleted uranium, steel, and aluminum. Other metals worked in the building included copper, molybdenum, beryllium, titanium, silver, niobium, tantalum, gold, iridium, platinum, vanadium, and tungsten, and alloys of these metals.

All metalworking operations were conducted in the High-Bay area. Metalworking processes included arc and vacuum induction melting, hammer forging, press forming, hydrospinning, swaging, extruding, drawing, rolling, diffusion bonding, furnace heat treating, salt bath and glovebox operations, and cutting and shearing. The salt baths were used to heat metal pieces to a high temperature in preparation for forging, rolling, or some other type of working. Operations involving beryllium powder were conducted inside the gloveboxes.

Machining operations included milling, grinding, drilling, and cutting. The machine shop contained standard equipment including surface grinders, drill presses, and saws. Other equipment in the machine shop was specialized; lathes and milling machines in the shop were equipped with tracers.

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A metallurgy laboratory, located in the northeastern corner of the building, conducted mechanical testing of metals and prepared metal samples for examination. Mechanical tests determined the tensile properties of the metals at room, elevated, and very low temperatures. Other tests measured hardness of the metals and alloys using various methods (Brinell, Rockwell, Knoop, and diamond pyramid). These test methods used the depth of indentation of a steel ball, or a diamond pyramid under pressure, to measure hardness.

The final use of the building was to conduct metallography laboratory work and decontamination activities for the product research and development group.

The building was demolished and removed during fall of 2003.

Physical/Chemical Description of Constituents Released

Uranium, beryllium, other metals, and solvents may have been released beneath Building 865.

Responses to Operation or Occurrence

Characterization of IHSS Group 800-1, which includes UBC 865, was conducted in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-12 (DOE 2003). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 800-1 (DOE 2004).

A predemolition survey indicated a portion of the High Bay slab was contaminated with depleted uranium; the portion of the slab was sprayed with Instacote™ prior to building demolition. Process waste drains penetrating the foundation were also filled to grade with grout, and pipe conduit openings in the building slab were plugged and grouted at the foundation level prior to building demolition.

Building 865 was demolished and the building slab (100 percent) was removed, as well as most of the footer walls and the top of the concrete caissons. The bottom of the footer wall on the western side of the High Bay remains, the top of which will be located at least 3 ft below final grade. The remaining portions of the caissons are at least 3 ft below current grade. All of the slab pits were emptied of debris (for example, rock fill), broken up, and removed. Pits removed include the Drop Hammer Pit, Extrusion Pit, Electronic Beam Welder Pit, and Erie Ram Pit. A thick (greater than 4 ft), reinforced concrete pedestal, which was used to support a rolling mill and the Hot Isostatic Press in the High Bay, was broken up and removed down to at least 3 ft below current grade. The sump located near the southwestern corner of the High Bay was also removed. In addition, the Building 865 dock, the transformer slabs and associated sump, telecommunication vault west of the High Bay, and supports for steam lines were removed, as well as electrical conduit and cabling (including the Power Instrumentation Alarm line) and gas, steam/condensate, and water lines encountered under the slabs within 3.5 ft from the ground surface. Items remaining below grade were free-released in accordance with DOE Order 5400.5 (Radiation Protection to the Public and Environment).

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Fate of Constituents Released to Environment

Radionuclides, metals, VOCs, and PCBs are considered COCs for IHSS Group 800-1, which includes UBC 865. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-01 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for IHSS Group 800-1, which includes UBC 865, because of the following:

- Potential sources of contamination that existed in IHSS Group 800-1 (slabs, pits, a sump, transformer pads, and process waste lines) were removed.
- Contaminant concentrations are less than RFCA WRW ALs with one exception. The arsenic concentration at sampling location CH38-003 was 25.5 mg/kg between 18.5 and 20.5 ft bgs, and the WRW AL is 22.2 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 800-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-1 on March 19, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

DOE, 1996, Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Addendum #IA-03-01, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-12, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

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## PAC REFERENCE NUMBER: UBC-887

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit: | Industrial Area |
| IHSS Group: | 800-5 |
| Unit Name: | Building 887 (UBC 887) |
| Approximate Location: | N748,104; E2,083,832 |

Date(s) of Operation or Occurrence

1953 (date Building 887 was first occupied) - ?

Description of Operation or Occurrence

Building 887 is located in the far southern portion of the 800 Area. The building footprint is approximately 336 $ft^2$. Building 887 was placed into service in 1953. The building houses the process and sanitary waste holding tanks. On October 27, 1989, a utility worker discovered that the process waste tanks had overflowed onto the floor with excess process water from the acid scrubbers. This incident resulted in the filing of a RCRA CPIR (DOE 2002a).

Physical/Chemical Description of Constituents Released

Aqueous process wastes containing low-level radioactive materials, nitrates, caustics, acids, metals, VOCs, oils and greases, and cleaning compounds are known to have been contained in the process waste tanks.

Responses to Operation or Occurrence

In accordance with IASAP Addendum #IA-02-04 for IHSS Groups 800-2 and 800-5 (DOE 2002b), which includes UBC 887, characterization samples were collected and analyzed. Analytical results from the characterization are presented in the Data Summary Report for IHSS Group 800-5 (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, SVOCs, and VOCs are considered COCs for UBC 887. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-02-04 (DOE 2002b). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 800-5, which includes UBC 887, because of the following:

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- Concentrations of COCs were not detected above RFCA WRW ALs except for arsenic and benzo(a)pyrene. Both COC concentrations were only slightly higher than their associated RFCA WRW ALs.

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

- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 800-5 (DOE 2004). No PAH exceedances were detected in surface water or groundwater locations downgradient of IHSS Group 800-5. Concentrations of tetrachloroethene were detected at two surface water locations above the surface water AL. Although tetrachloroethene was detected at two subsurface soil sampling locations (CF33-002 and CF33-007), the detected concentrations were only slightly higher than the RLs. Methylene chloride was detected in both groundwater and surface water at downgradient sampling locations in excess of the associated ALs. However, this analyte was not detected at any soil sampling location in IHSS Group 800-5. Further groundwater evaluation will be part of the groundwater IM/IRA.

No long-term stewardship activities are recommended for IHSS Group 800-5 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Data Summary Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 800-5 on June 21, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Data Summary Report IHSS Group 800-5 (B887 and B885), NFAA - Approval, June 21.

DOE, 2002a, Industrial Area Sampling and Analysis Plan, Appendix C, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002b, Industrial Area Sampling and Analysis Plan Fiscal Year 2002 Addendum #IA-02-04, IHSS Groups 800-2 and 800-5, Rocky Flats Environmental Technology Site, Golden, Colorado.

DOE, 2004, Data Summary Report for IHSS Group 800-5, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

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## PAC REFERENCE NUMBER: UBC 991

IHSS Reference Number: Not Applicable

Operable Unit: Industrial Area

IHSS Group: 900-1

Unit Name: Building 991 (UBC 991)

Approximate Location: N749,942; E2,085,461

Date(s) of Operation or Occurrence

1952 - 2003

Description of Operation or Occurrence

Building 991, constructed between 1951 and 1952, was the first major building completed at RFETS. Building 991 was designed for shipping and receiving, and final assembly of weapon components. Plutonium, enriched uranium, and depleted uranium components fabricated on site, along with components manufactured at the Hanford Site and Oak Ridge Reservation, were assembled into final products, inspected, tested, and placed back in storage prior to off-site shipment in Building 991. Radioactive and nonradioactive raw materials, special-order items, packaging items, components, and samples were stored in the Building 991 vaults. Administrative services for the Plant were also carried out in Building 991 until Building 111 was completed in 1953 (DOE 2004).

In 1957 final trigger assembly was moved to the newly constructed Building 777. Assembly of older uranium-based weapons continued in Building 991 until the 1960s. A limited number of plutonium-based triggers may have been assembled in Building 991 during the early 1960s. After 1957, the mission of Building 991 focused on shipping, receiving, and storage. Materials handled included special nuclear, nonradioactive raw, and classified materials; other metal components; partially finished products; purchase-order items; special-order items; samples; instruments; and documents. All radioactive materials received and stored in Building 991 were in DOT, DOE, or intra-Plant-approved shipping containers (DOE 1992).

In addition to material shipping, receiving, and storage, a number of R&D projects were conducted in Building 991 from the 1960s to the mid-1970s. These projects included radiation studies, beryllium-coating processes, and an explosives-forming project. Most special projects and R&D operations were moved out of the building by 1976 (DOE 2004).

A metallographic laboratory in Building 991 was used to test the quality of non-nuclear raw material and non-nuclear, nonclassified parts fabricated by off-site vendors. In the mid-1970s, Building 991 took over storage and inventory functions from Building 881 for these non-nuclear

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raw materials and non-nuclear, nonclassified parts. In the late 1980s, handling of nonclassified materials and parts was moved to Buildings 130 and 460. Materials and parts ready for assembly were moved directly to Building 460.

Until the mid-1980s, materials were shipped and received from the eastern dock areas. The western dock was added in the mid-1980s to provide a covered shipping area specifically designed for the safe, secure transports used to ship production materials. Until 1994, when a special loading dock was added to Building 371, Building 991 had the only shipping/receiving dock at the Plant capable of handling off-site shipments of special nuclear and classified materials.

The final activity in Building 991 was waste storage. However, all waste was removed from the building during fall of 2003.

Physical/Chemical Description of Constituents Released

Products containing plutonium, uranium (enriched and depleted) beryllium, and other metals were stored in the building. Solvents were received at the southern dock (see PAC 900-173), and spent solvents were shipped from the dock. These constituents were potentially released.

Responses to Operation or Occurrence

Characterization of IHSS Group 900-1, which includes UBC 991, was conducted in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). Notification of the planned accelerated action activities was provided in ER RSOP Notification #03-05 (DOE 2003b). Analytical results from the characterization and confirmation (post-accelerated action) sampling, as well as a summary of the accelerated action activities, are presented in the Closeout Report for IHSS Group 900-1 (DOE 2004).

Accelerated action did not include removal of Building 991. Removal of Building 991 and its utilities will be conducted by RISS as a D&D project (DOE 2004).

Fate of Constituents Released to Environment

Radionuclides, metals, and VOCs are considered PCOCs for IHSS Group 900-1, which includes UBC 991. The nature and extent of contamination were characterized in accordance with IASAP Addendum #IA-03-03 (DOE 2003a). The results are summarized under the Action/No Further Accelerated Action Recommendation section.

Action/No Further Accelerated Action Recommendation

Based on analytical results and the SSRS, further action is not required, and an NFAA determination is justified for IHSS Group 900-1, which includes UBC 991, because of the following:

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- Potential sources of soil contamination that existed in IHSS Group 900-1 (that is, the Building 993 slab, explosive bonding pit, and concrete slab beneath the pit) were removed. The Building 993 area was regraded and revegetated.

- Building 991 is currently being demolished. Associated tunnels and vaults will remain because they do not require any further accelerated action. After the building has been demolished and the slab has been removed, any excavations will be backfilled and the site will be regraded.

- Surface and subsurface contaminant concentrations in soil are less than RFCA WRW ALs, except for one surface and two subsurface arsenic concentrations. The elevated arsenic concentration in surface soil was 25.2 mg/kg. The WRW AL for arsenic is 22.2 mg/kg. The elevated arsenic concentrations in subsurface soil were 25.1 and 40 mg/kg.

No long-term stewardship activities are recommended for IHSS Group 900-1 beyond the generally applicable Site requirements that may be imposed on this area in the future. Institutional controls that will be used as appropriate for this area include prohibitions on construction of buildings in the IA, restrictions on excavation or other soil disturbance, and prohibitions on groundwater pumping in the area of the IHSS Group. No specific engineered controls or environmental monitoring are anticipated as a result of the conditions remaining at the IHSS Group.

After review of the Closeout Report by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the NFAA status for IHSS Group 900-1 on March 31, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003a, Industrial Area Sampling and Analysis Plan Addendum #IA-03-03, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2003b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation Notification #03-05, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2004, Closeout Report IHSS Group 900-1, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

## PIC REFERENCE NUMBER: 4

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Process Cooling Water Spill Buildings 776/777

Approximate Location: N750,500; E2,084,000

Date(s) of Operation or Occurrence

February 6, 1989

Description of Operation or Occurrence

On February 6, 1989, an alarm indicated a high liquid level in an unused production pit outside Buildings 776 and 777. A pipe froze and broke, spilling 1,200 gallons of process cooling water into the pit. The exact location of this occurrence could not be determined from documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

Process cooling water measuring 51 pCi/L of an unknown material was released to the environment (DOE 1992).

Responses to Operation or Occurrence

Supply and return valves to the production pit were closed, thereby isolating the pit from the system. The water in the production pit was analyzed and a determination was made to pump the liquid to the process waste drains. No documentation was found that further details response to this occurrence (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment (DOE 1992).

Action/No Action Recommendation

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence

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from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 4 on April 30, 2004 (CDPHE 2004).

Comments

Although Buildings 776/777 subsurface soil was sampled in accordance with IASAP Addendum IA-03-04 (IHSS Group 700-3) (DOE 2003), a sample was not collected below or near Building 781 (see Figure 2.13). However, considering the recent information gathered on the spill, sampling of the soil would not have been necessary.

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-04, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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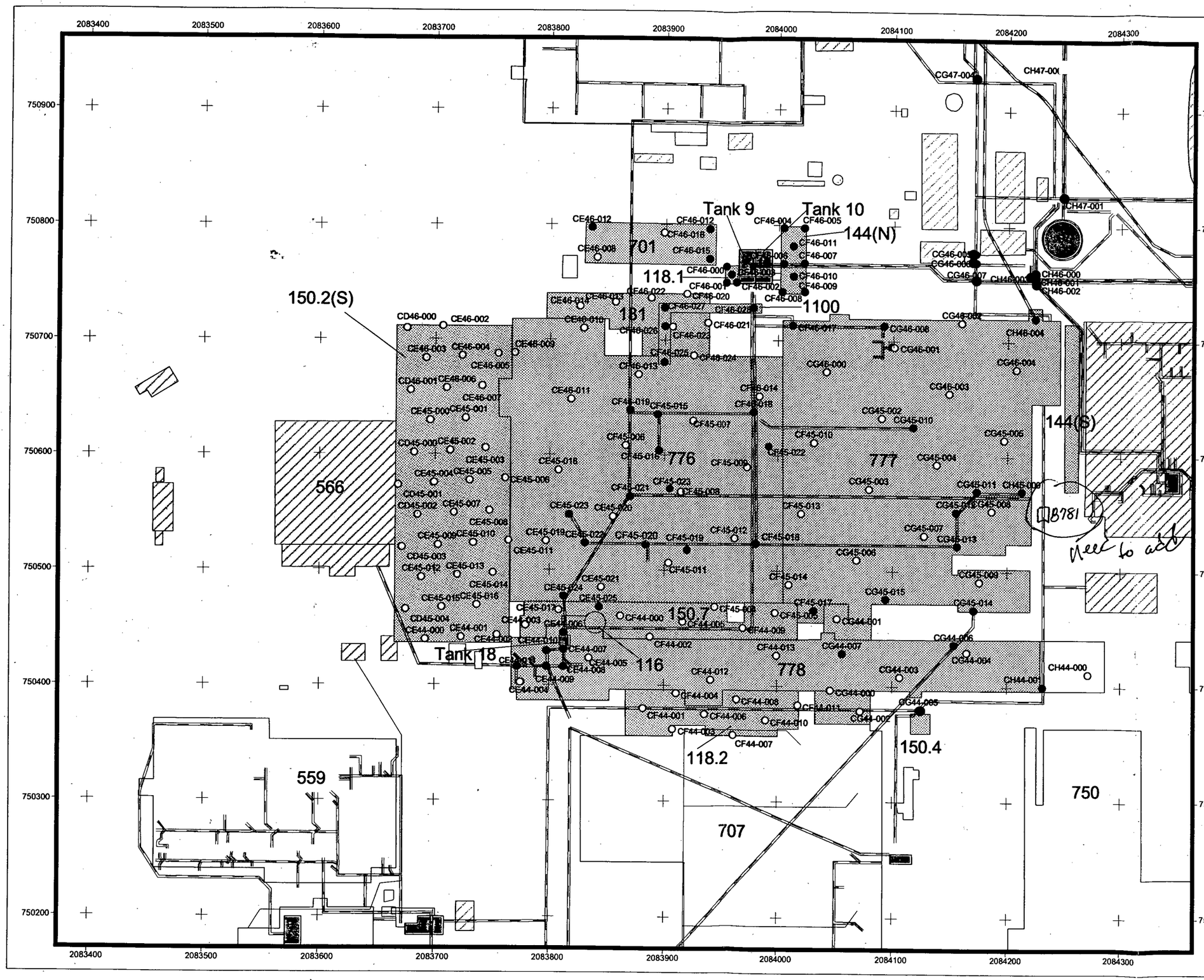
# Figure 5
2.13

## Proposed Sampling Locations for IHSS Group 700-3




## Key

- Biased Sampling Location
- Statistical Grid Sampling Location
- Known OPWL Leak
- OPWL
- NPWL
- Tank
- 700-3 IHSS
- 700-3 UBC

### Building

- Demolished
- Standing
- Sewer

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Scale = 1:1200

90 0 90 Feet

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

Prepared By: February 2003

RADMS

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## PIC REFERENCE NUMBER: 6

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Fuel Oil Spill - Building 707

Approximate Location: N750,000; E2,084,000

Date(s) of Operation or Occurrence

April 6, 1987

Description of Operation or Occurrence

A construction contractor was drilling a fence post hole when a fuel oil line was struck. The line ruptured and spilled approximately 28 gallons of diesel fuel. The exact location of this occurrence could not be determined from documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

Number 2 diesel fuel was released to the environment (DOE 1992).

Responses to Operation or Occurrence

CDH and the Colorado Oil Inspector were notified of the fuel oil spill. No documentation was found that detailed further response to this occurrence (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted.

- Pictures associated with the spill do not indicate Building 707 in the background. A recent site reconnaissance visit indicates that the spill took place on the northern side of Building 776 (see Figure 2.14). This figure is a photo looking south at Building 776, showing stairs to the east and a shed to the west, which are two prominent features in the photos of the spill

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(Figure 2.15). The photos of the spill (Figure 2.16) indicate the diesel flowed a short distance north and then west. Although not clear in the spill photos, the entire area was paved because asphalt was placed over this area (adjacent to the building and the road behind the building) as a radiation control measure in response to the Building 776 fire (Figure 2.17). It is unlikely that a release of 28 gallons of oil migrated to an unpaved area. It is likely that the spill was cleaned up for practical/safety purposes, given that this area appears well used.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 6 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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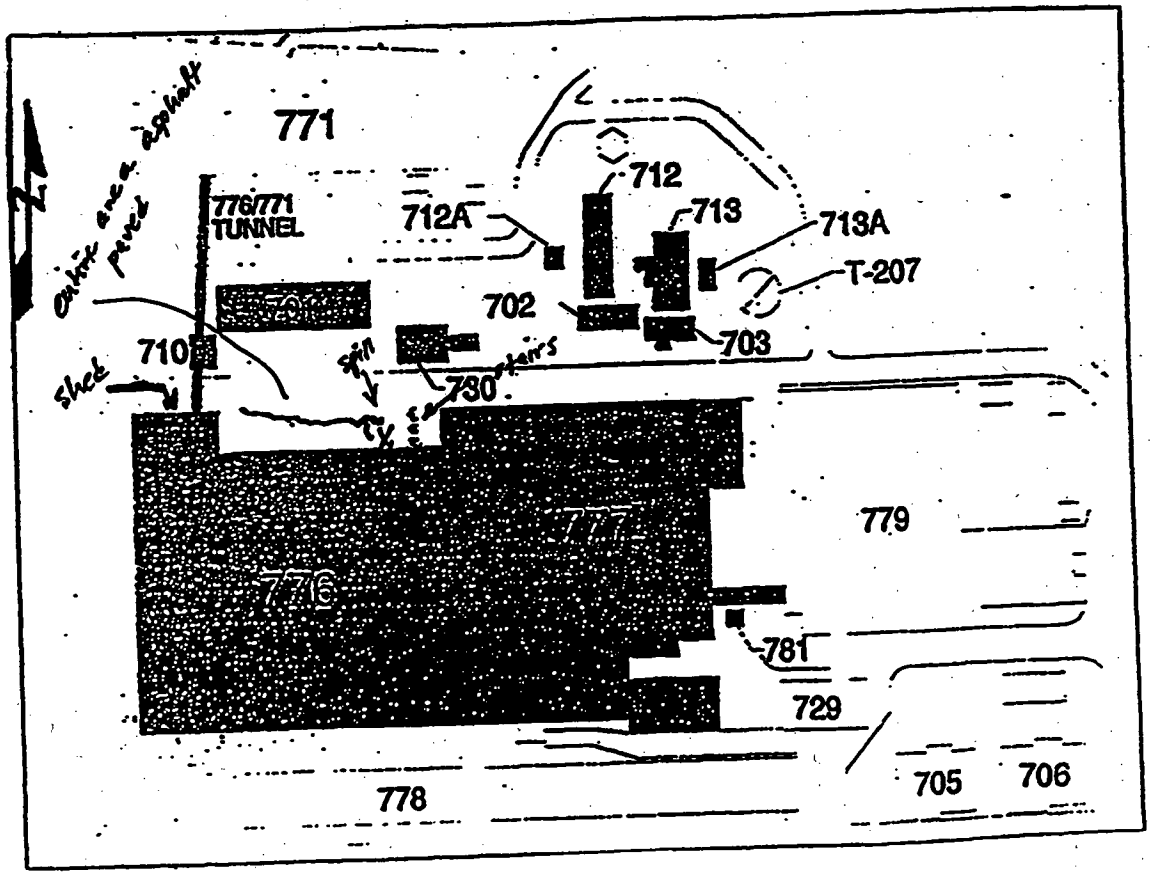
# Figure 2.14

## Building 776 Diesel Spill Map

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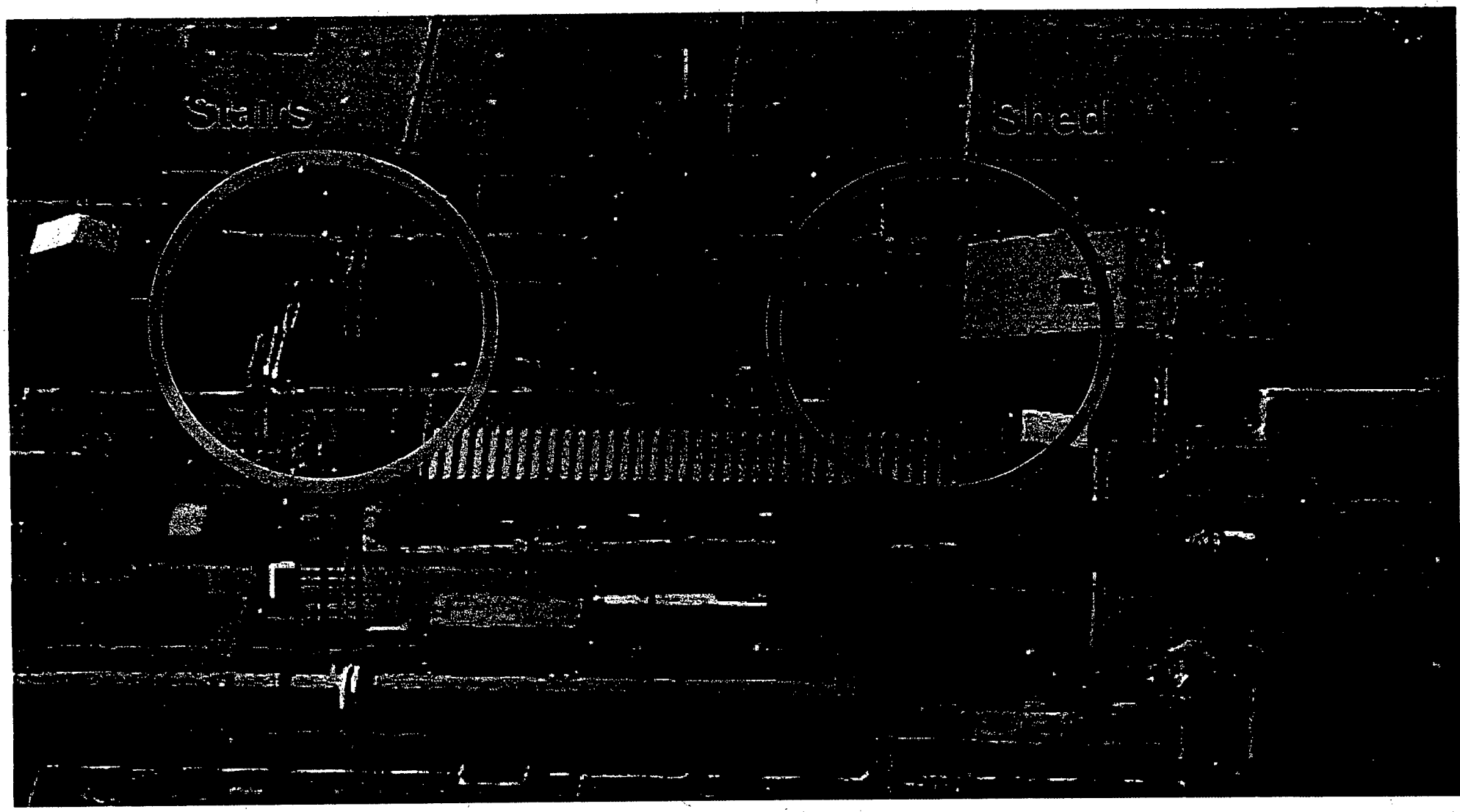
Unclassified




Best Available Copy

Figure 2.15

View of Building 776 Northside

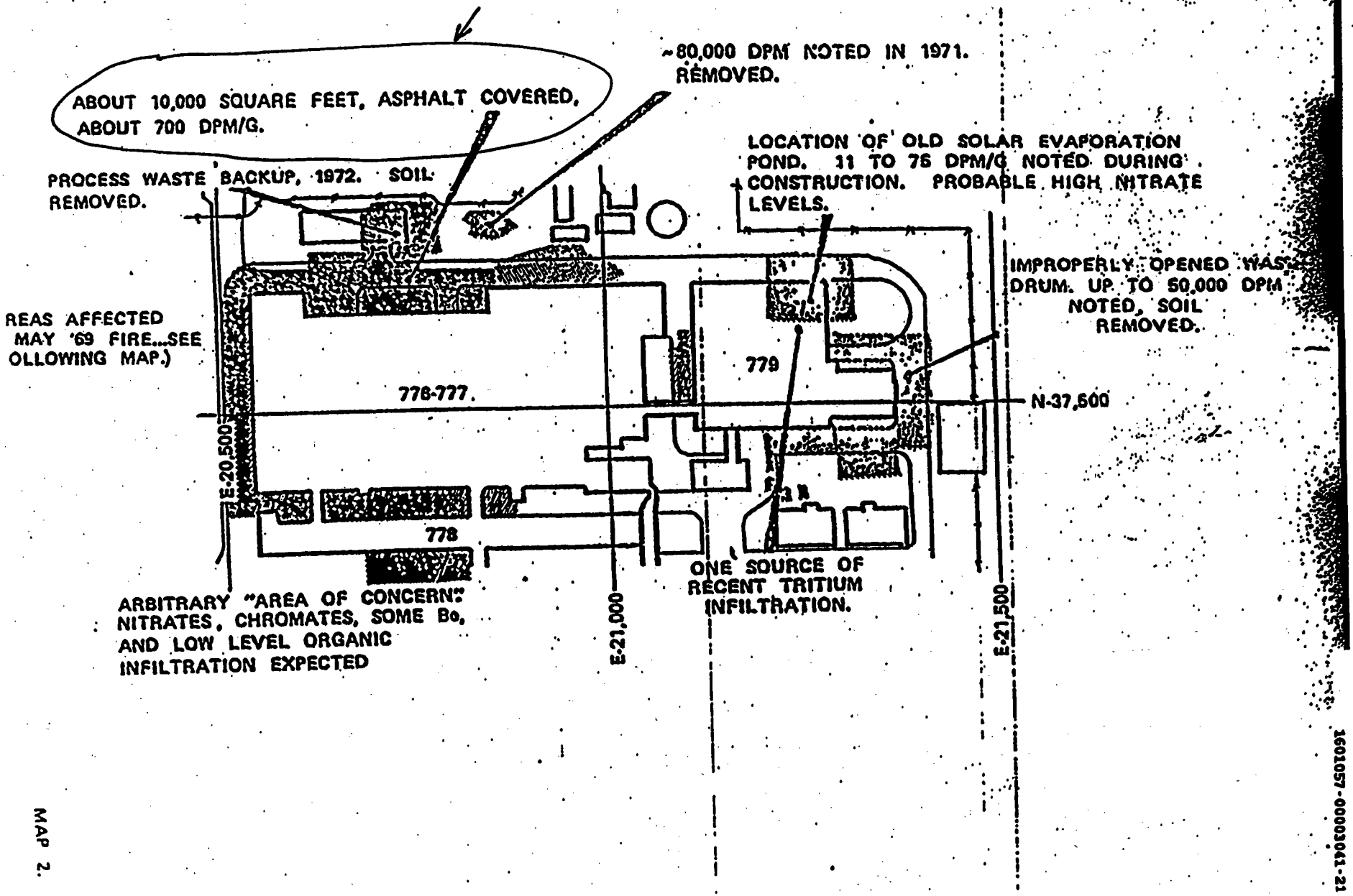
# Figure 2.16

Photos of Diesel Fuel Release

91HRR25 B 0001524

# Figure 2.17

Asphalt Paving on Building 776 Northside



## PIC REFERENCE NUMBER: 9

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Building 551 Chemical Leaks

Approximate Location: N750,000; E2,0830,000

Date(s) of Operation or Occurrence

April 1, 1965 and May 1974

Description of Operation or Occurrence

On April 1, 1965, aqueous ammonia in a railroad container car leaked from drums onto the ground at Building 551. A leaking drum of carbon tetrachloride was found outside Building 551 during an inspection in May 1974 (DOE 1992).

Physical/Chemical Description of Constituents Released

Ammonia and carbon tetrachloride were released to the environment (DOE 1992).

Responses to Operation or Occurrence

The leaking drum of carbon tetrachloride found outside of Building 551 was disposed of in an undescribed location. No documentation was found that detailed further response to the occurrences at this site (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that detailed the fate of the constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted-

- In accordance with the MSDS, aqueous ammonia is extremely alkaline (pH=11.6). At this pH, greater than 99 percent of the total ammonia (dissolved $NH_3$ and $NH_4^+$[ammonium]) exists as dissolved $NH_3$. The dissolved $NH_3$ is quickly released as $NH_3$ gas, which has an

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intense, pungent, and suffocating odor. Recognizing this potential danger, the worker unloading the ammonia from the railroad car wore a full face-respirator (DOE 1992). It can be concluded, therefore, that most of the ammonia released from the drum entered the atmosphere at the time of the release and the release is no longer a threat to human health or the environment.

- The exact location of the leaking drum of carbon tetrachloride is not known. It is only known that it was outside of Building 551. The IASAP Addendum #IA-03-07 for IHSS Group 500-2 (PAC 500-158) (DOE 2003) proposes many sampling locations surrounding Building 551 (see Figure 2.18), and samples are to be analyzed for VOCs. These locations are based on a statistical grid sampling design and represent a reasonable approach to site characterization that should serve to identify potential soil contamination arising from this leaking drum of carbon tetrachloride. As noted in the IASAP Addendum, the sampling locations are a starting point for characterization, and additional samples may be collected pending the initial results to more fully characterize the soil. Hence, PIC 9 is addressed under IHSS Group 500-2 and no action is warranted.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 9 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15,.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-07, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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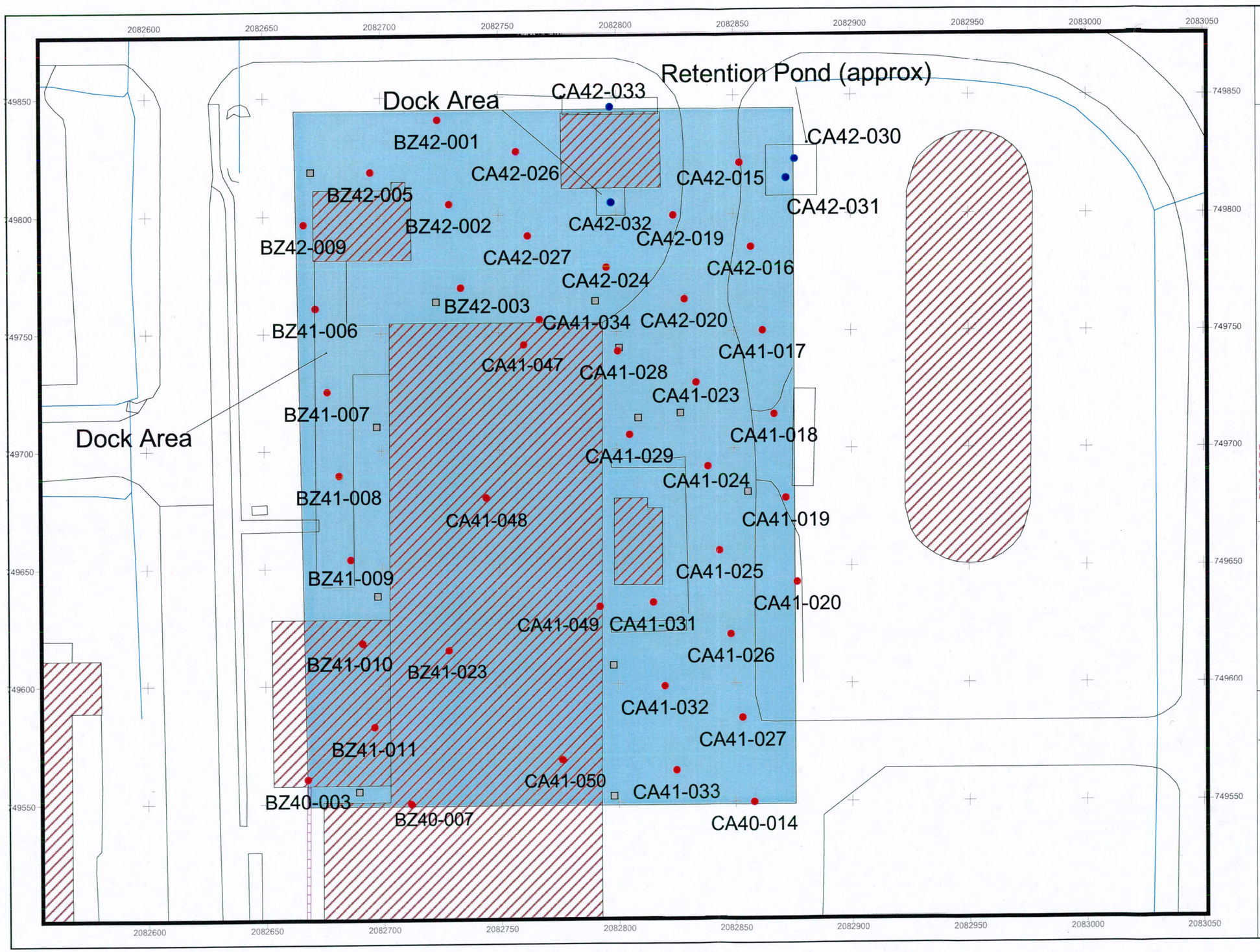


**Figure 2.18**
**Proposed Sample Locations for IHSS Group 500-2**

## KEY

- IHSS 158
- Building
  - Demolished
  - Standing
- Paved Road
- Dirt Road
- Streams
- Rail Line
- Statistical Sampling Location
- Biased Sampling Location

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N W E S

20 0 20 40 Feet

Scale = 1:500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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Prepared for: KAISER•HILL COMPANY

Prepared by: RADMS

projects/fy2003/500-2/characterization500-2.apr

October 2003

## PIC REFERENCE NUMBER: 11

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Ethylene Glycol Spill - Building 443

Approximate Location: N749,000; E2,082,000

Date(s) of Operation or Occurrence

June 25, 1989

Description of Operation or Occurrence

Approximately 15 gallons of ethylene glycol was released from Building 443's #1 emergency cooling system generator. Some of the liquid was contained on the concrete pad; however, there was evidence that some drained into the rocks surrounding the pad. The exact location of this occurrence could not be determined from the documentation reviewed. Review of site utility drawings, building floor plans, and interviews with past and present RFP employees were conducted but provided no additional location information (DOE 1992).

Physical/Chemical Description of Constituents Released

The release consisted of ethylene glycol (antifreeze) (DOE 1992).

Responses to Operation or Occurrence

The antifreeze that was contained on the pad was cleaned up. The RCRA and Environmental Management Groups were to be notified and asked to respond and evaluate (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted.

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- The release to soil appears to be minor (that is, most of the ethylene glycol was contained on the concrete pad).

- Ethylene glycol is not a RCRA Appendix VIII hazardous constituent, nor is it a U- or P-chemical product, that, if spilled, would make the contaminated soil a hazardous waste. The MSDS for ethylene glycol also indicates that if the product is discarded, it does not meet the definition of a characteristic hazardous waste.

- Using the IRIS reference dose of 2 mg/kg/day, and an HQ of 1.0, the calculated WRW AL for ethylene glycol in soil would be 2 million ppm, a concentration that cannot be achieved. This indicates that chronic exposure by a Wildlife Refuge Worker to soil saturated in ethylene glycol would not result in adverse health effects. The MSDS further states that ethylene glycol is practically nontoxic to aquatic life, has a moderate biodegradation rate, and has a low potential to bioconcentrate.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 11 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, April 15.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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## PIC REFERENCE NUMBER: 14

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit: | Not Applicable |
| IHSS Group: | Not Applicable |
| Unit Name: | Cooling Tower Water Discharge - Building 447 |
| Approximate Location: | N748,500; E2,082,000 - Surface ditch adjacent to Building 447 to the ditch along the roadway south of Building 991 |

Date(s) of Operation or Occurrence

December 2, 1958

Description of Operation or Occurrence

Cooling tower water from the Building 447 cooling tower was pumped into a surface ditch and allowed to flow across Plant site. Liquid was noticed in a ditch along the roadway south of Building 991. No documentation was found that further details the location of this occurrence (DOE 1992).

Physical/Chemical Description of Constituents Released

The constituents released consisted of Building 447 cooling tower water containing sodium chromate. The liquid, as sampled opposite Building 991, contained 29 ppm hexavalent chromium or 81 ppm sodium chromate (DOE 1992).

Responses to Operation or Occurrence

A temporary dam was placed across the ditch (in an unknown location) to contain the chromate water and allow it to seep into the ditch bottom. A liquid sample was collected opposite Building 991 and analyzed (DOE 1992).

The exact location of this occurrence could not be determined from documentation reviewed. Although aerial photographs were reviewed and a site visit conducted, no definitive information was obtained. It is surmised that the cooling tower water was discharged into the ditch that currently exists south of Building 447. It then flowed east to the railroad tracks, north to Cottonwood Avenue, and then east under Sixth Street to the western edge of Parking Lot Number 444. From this point, it is believed to have flowed north under Cottonwood Avenue and then east along the northern side of Cottonwood Avenue to Seventh Street. The flow is believed to have gone north along the western side of Seventh Street to a point adjacent to Tank 224,

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where it crossed under Seventh Street and flowed northeast into the Central Avenue Ditch at a point northwest of Building 675. The flow is then believed to have traveled east in the Central Avenue Ditch to a point south of Building 991. It is unknown how far beyond this point the flow may have traveled (DOE 1992).

Fate of Constituents Released to Environment

Although documentation was not found that details the fate of the constituents released in this incident, the reference states that sodium chromate, used as a corrosion inhibitor at RFP, is not adsorbed by soil and is readily leached out of soil (DOE 1992).

Action/No Action Recommendation

No action warranted.

- The measurement of 29 ppm of hexavalent chromium at Building 991 is likely representative of the concentration of this compound that was released at Building 447. Because the release took place in December, a traditionally dry and cold month, there would have been little to no water flowing in the ditches to dilute the cooling tower water. The fact that "liquid was noticed in a ditch along the roadway south of Building 991" implies that there was no other flow except the released cooling tower water. A typical concentration of zinc chromate used in cooling towers as a corrosion inhibitor is 20 mg/L, which further indicates the measured concentration of hexavalent chromium at Building 991 is representative of the hexavalent chromium in the cooling tower water.

- Even if the hexavalent chromium leached to the groundwater table, there is no hexavalent chromium contamination in groundwater near the cooling tower water flow pathway exceeding the RFCA Tier 1 AL (10 mg/L). As shown on Figure 2.19, which identifies locations where metals have exceeded the Tier I ALs for groundwater, chromium only exceeded its Tier I AL near the Solar Evaporation Ponds. As can be seen, the Solar Evaporation Ponds are not near the flow path of the released cooling tower water.

- Chromate is an anion and is weakly sorbed to soil (that is, it would not tend to concentrate). If the cooling tower water saturated the soil (filled the void space), the concentration of chromate per unit weight of soil would be less than the concentration in water because the water only occupies a fraction of the total volume of saturated soil. The concentration in the water (29 mg/L or 29 mg/kg) is one-tenth of the WRW AL for hexavalent chromium (268 mg/kg). Therefore, the concentration of chromate in the soil would be expected to be less than one-tenth of the WRW AL.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 14 on April 30, 2004 (CDPHE 2004).

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## References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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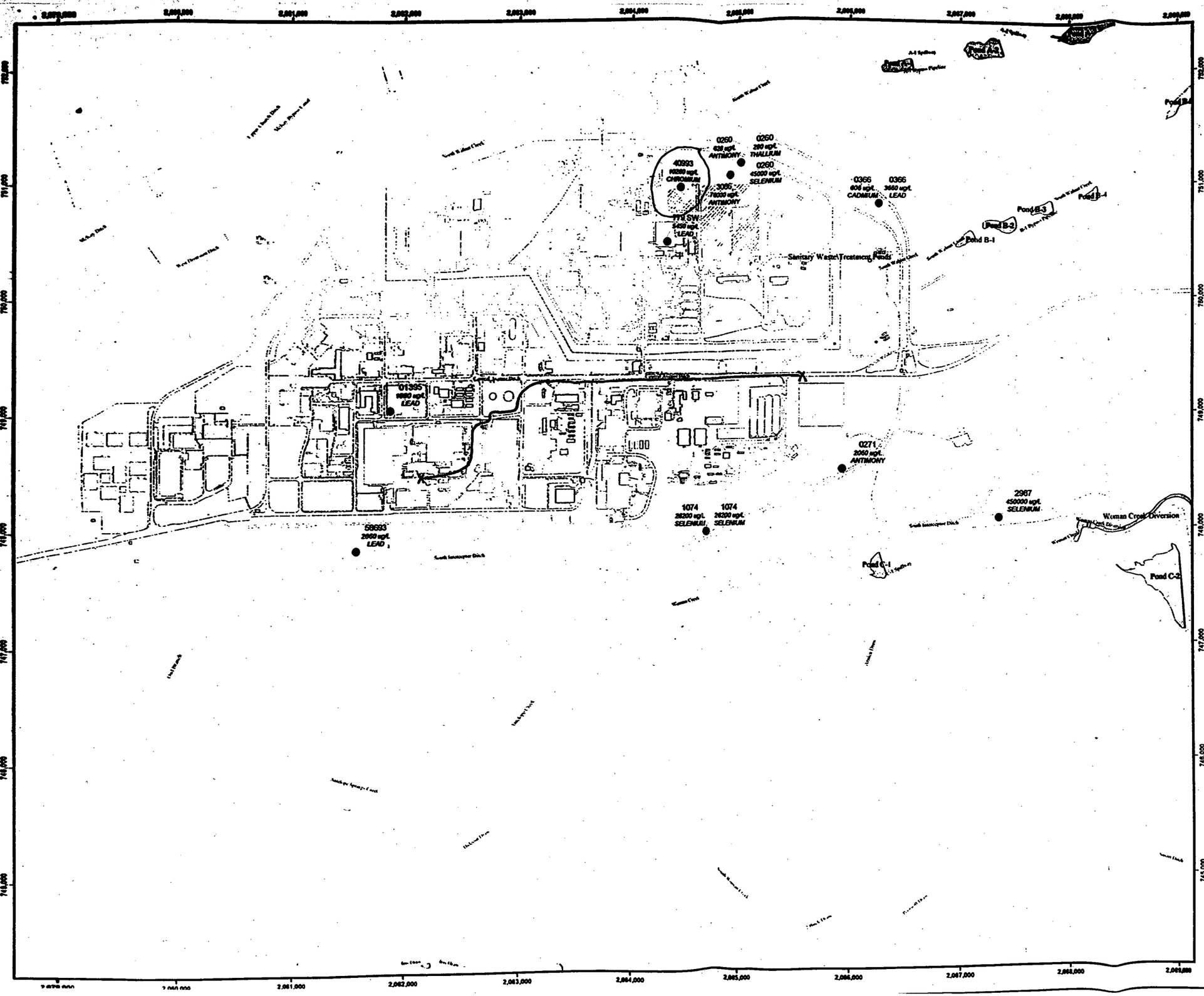
# Figure 2.19

**Metals greater than Tier I and Background**




## Legend

- UHSU Metals greater than Tier I
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Paved roads
- Dirt Roads
- X—X Spill Flow Path

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## PIC REFERENCE NUMBER: 15

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Process Waste Leak Between Buildings 881 and 559

Approximate Location: N749,5000; E2,083,500

Date(s) of Operation or Occurrence

January 1981

Description of Operation or Occurrence

Liquid was observed in a valve pit that services a process waste pipeline located between Buildings 881 and 559. After pumping out the pit, flow was observed between the inner pipeline and the outer containment pipeline. A leak was found in the inner process waste pipeline near Eighth Street and Central Avenue west of Building 881. Albeit the leak was said to be in the inner pipeline, airborne radioactivity was detected during the excavation. One total long-lived alpha activity concentration from a portable air sampler was above shut-down level. The exact location of this incident could not be determined from the documentation reviewed. It is known that the valve pit in question is located somewhere between Buildings 881 and 559 (DOE 1992).

Physical/Chemical Description of Constituents Released

An unknown quantity of liquid process waste was released in a valve pit. Although no documentation was found that further describes the constituents released in this incident, a general process waste description can be obtained from PAC 000-121 (DOE 1992).

Responses to Operation or Occurrence

The responses to this incident included pumping the liquid out of the valve pit, excavating and locating the inner pipeline leak, and repairing the pipeline (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment (DOE 1992).

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Action/No Action Recommendation

No action warranted.

- This PIC is described under IHSS 000-162. PIC 15 is also specifically cross-referenced in the IHSS 000-162 description. PIC 15 will be addressed under IHSS 000-162. IHSS 000-162 will be investigated per the IASAP Addendum #IA-03-11 for IHSS Group 000-2 (DOE 2003). Accordingly, no action is warranted for this PIC.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 15 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-11, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, May.

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## PIC REFERENCE NUMBER: 17

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit: | Not Applicable |
| IHSS Group: | Not Applicable |
| Unit Name: | Sewer Line Break - Building 771 |
| Location: | N751,000; E2,084,000 |

Date(s) of Operation or Occurrence

Approximately November 1977

Description of Operation or Occurrence

A water sample was collected from Gate 20 of Building 771 to determine the total long-lived alpha activity and gross beta activity of water released from a sewer line break. The exact location of this occurrence could not be determined from documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

The water sample results indicated 27 pCi/L total long-lived alpha activity and 68 pCi/L gross beta activity (DOE 1992).

Responses to Operation or Occurrence

A water sample was collected and analyzed (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted-

- PIC 17, a sewer line break, is part of IHSS 000-500 (Sanitary Sewer System). IHSS 000-500 will be investigated in accordance with an Addendum to the IASAP for IHSS Group 000-3. Accordingly, no action is warranted for this PIC.

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After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 17 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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## PIC REFERENCE NUMBER: 18

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Carbon Tetrachloride Spill - Building 776

Location: N750,000; E2,084,000

Date(s) of Operation or Occurrence

July 21, 1964

Description of Operation or Occurrence

Radioactively contaminated carbon tetrachloride spilled from a 5-gallon can in the storage area during sampling. Two square feet of ground were contaminated in the Building 776 solvent storage area. The exact location of this occurrence could not be determined from the documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

Radioactively contaminated carbon tetrachloride was released to the environment (DOE 1992).

Responses to Operation or Occurrence

The 5-gallon can of solvent in the storage area was double-bagged and sent to Building 771. The contaminated ground was covered with gravel. No documentation was found that further details responses to this occurrence (DOE 1992).

Fate of Constituents Released to the Environment:

No documentation was found that details the fate of constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted.

- The 5-gallon can was used to sample solvent in the Building 776 solvent storage area. The solvent storage area is PAC 700-118.1, underground carbon tetrachloride tanks on the

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western side of Building 730, north of Building 776. There have been numerous releases of carbon tetrachloride to the subsurface and ground surface at this location. PAC 700-118.1 is part of IHSS Group 700-3, and the area will be characterized through implementation of IASAP Addendum #IA-03-04 for IHSS Group 700-3 (see Figure 2.20) (DOE 2003). Because PIC 18 is within PAC 700-118.1, which is addressed under IHSS Group 700-3, no action is warranted for this PIC.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 18 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Industrial Area Sampling and Analysis Plan Addendum #IA-03-04, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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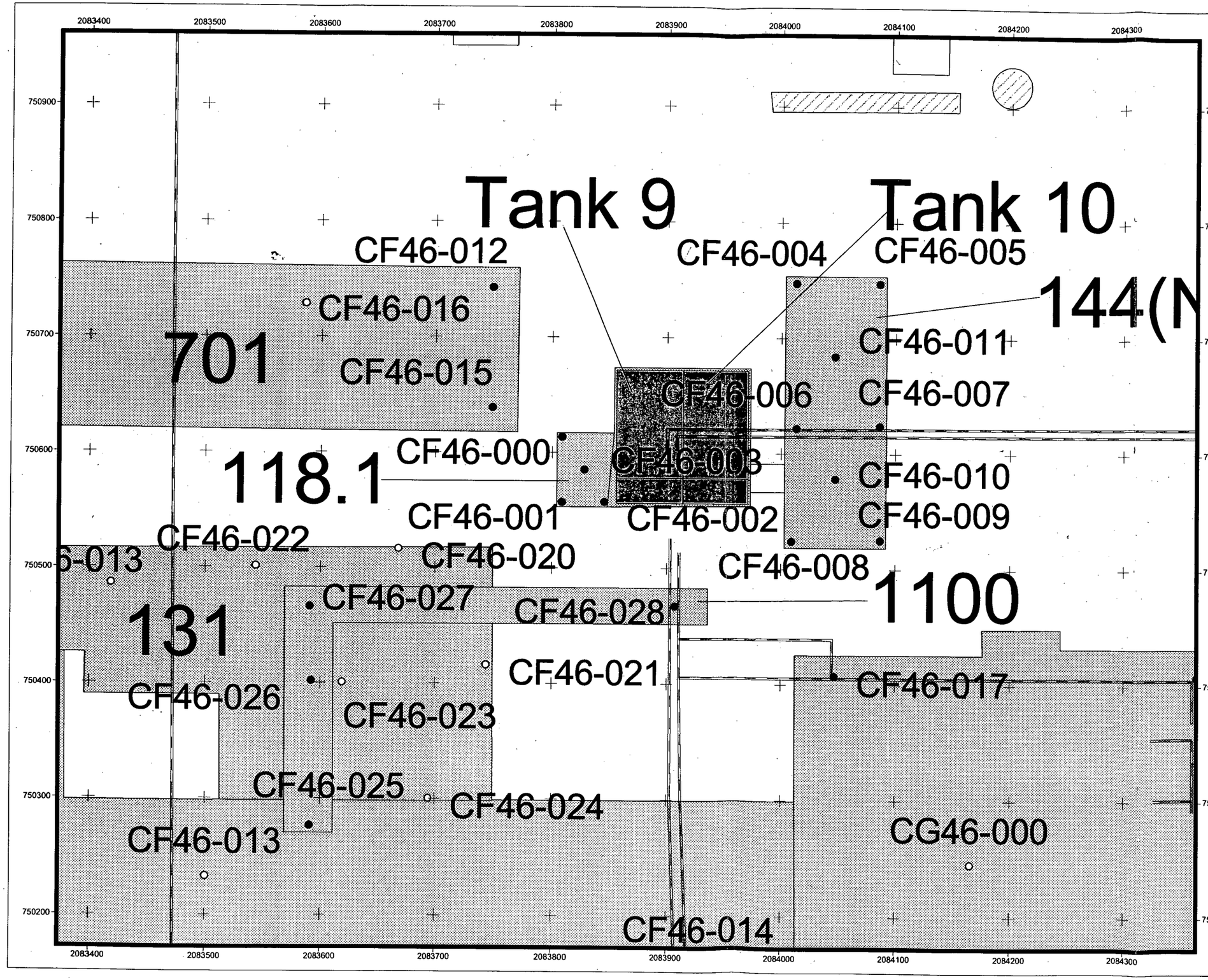


**Figure 5** 2.20

**Proposed Sampling Locations for IHSS Group 700-3**

## Key

- Biased Sampling Location
- Statistical Grid Sampling Location
- Known OPWL Leak
- OPWL
- NPWL
- Tank
- 700-3 IHSS
- 700-3 UBC

**Building**

- Demolished
- Standing
- Sewer

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Scale = 1:1200

20 0 20 Feet

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

Prepared By: October 2003

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## PIC REFERENCE NUMBER: 41

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Leaking Transformer - 777-1

Approximate Location: N751,000; E2,084,000

Date(s) of Operation or Occurrence

1980 to August 1989

Description of Operation or Occurrence

In 1980 it was reported that transformer 771-1 was leaking at the drain valve. In November 1985 and again in June and September 1986, transformer 771-1 was reported as leaking (DOE 1992).

Physical/Chemical Description of Constituents Released

The dielectric fluid of transformer 777-1 contains 56 ppm PCBs (DOE 1992).

Responses to Operation or Occurrence

In October 1986, the drain valve and case near the valve of transformer 771-1 was scheduled for recleaning. Transformer 777-1 was scheduled for cleanup to take place on August 14, 1989 (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of the constituents (DOE 1992).

Action/No Action Recommendation

No action warranted.

- Based on review of the references, the transformer in question is 777-1, as identified above in the Unit Name. It is incorrectly identified as 771-1 in the Description of Operation or Occurrence.

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- Transformer 777-1 contained mineral oil with just enough PCBs (56 ppm) to be classified as PCB-contaminated under TSCA (50 – 500 ppm). In 1986, leaks were repaired and cleaned up, and PCB- contaminated transformers were drained and refilled with clean mineral oil. The replacement oil in transformer 777-1 had a PCB concentration of 2.9 ppm (DOE 1992).

- Although transformer 777-1 was scheduled for cleanup to take place on August 14, 1989, the transformer was not removed until November 2003. Analysis of the transformer oil indicated a PCB concentration of only 2 ppm (DOE 1992). In an E-mail from Matt Francis to Michael Anderson dated March 4, 2004, it is noted that an inspection of the area on March 4, 2004 indicated no visible signs of significant contamination on the pad or the surrounding soil.

- The low concentration of PCBs in the original oil, combined with the reported cleanup operation in 1986 that was confirmed by the noted absence of staining on the pad in March 2004, indicates a no action warranted is justified.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 41 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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## PIC REFERENCE NUMBER: 42

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit: | Not Applicable |
| IHSS Group: | Not Applicable |
| Unit Name: | Diesel Fuel Leak - Building 460 |
| Approximate Location: | No documentation was found that indicates the exact location of this site. |

Date(s) of Operation or Occurrence

August 3, 1986

Description of Operation or Occurrence

A report was made of a diesel fuel leak from a tanker truck by Plant Protection. The leak occurred south of Building 460 along the drainage excavation site. The exact location of this occurrence could not be determined from the documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

An estimated 100 to 150 gallons of diesel fuel leaked from the truck (DOE 1992).

Responses to Operation or Occurrence

Fire department personnel constructed a dike to prevent the spread of the spill. Dirt was used to absorb the standing fuel. The report mentions that cleanup operations were necessary; however, it is unknown whether removal of the contaminated soil took place (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted-

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- Under Responses to Operation or Occurrence, the Original HRR notes that cleanup operations were necessary. However, the reference specifically states that cleanup will be conducted during the day shift, which is considerably stronger language.

- In an E-mail from Michael Crossett to Michael Anderson dated March 2, 2004, it is noted that in a recent conversation between Michael Crossett and Don Hughes (Mr. Hughes works in the RFETS garage), Mr. Hughes recalled the specific event in question. He noted that the spill was cleaned up, the rock and soil were loaded into a dump truck, and the material was hauled off. He does not know for certain where the material was disposed.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 42 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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## PIC REFERENCE NUMBER: 44

| | |
|---|---|
| IHSS Number: | Not Applicable |
| Operable Unit: | Not Applicable |
| IHSS Group: | Not Applicable |
| Unit Name: | Distillate Release - Building 374 |
| Approximate Location: | No documentation was found that indicates the exact location of this site. |

Date(s) of Operation or Occurrence

September 30, 1977

Description of Operation or Occurrence

While transferring distillate from Building 374 to Building 774 a contractor broke a flange connected to the sump pump. Liquid was pumped to the ground south of Building 374. No personnel were contaminated. The exact location of this occurrence could not be determined from the documentation reviewed (DOE 1992).

Physical/Chemical Description of Constituents Released

The liquid consisted of distillate that had been transferred to Building 774 on September 29. It was returned to Building 374 on September 30 because it was contaminated to 6,700 dpm/L (DOE 1992).

Responses to Operation or Occurrence

Soil samples were taken for analysis. No cleanup was mentioned (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that details the fate of constituents released to the environment (DOE 1992).

Action/No Action Recommendation

No action warranted.

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- The area south of Building 374 is IHSS 188, the site of a leaking drum of acid, thought to be a metal leaching solution. Five surface soil samples were collected in this area and the metal concentrations were found to be well below WRW ALs (see Figure 2.21). The IHSS was approved for NFAA in 1999.

- The distillate, if containing radionuclides, probably also contained metals. As discussed above, metal contamination is not a concern in this area.

- The concentration of radionuclides in the distillate that was released is very low relative to the WRW ALs. Because there are 2.2 dpm/pCi; the solution had a radionuclide concentration of 3,000 pCi/L or 3 pCi/mL (3 pCi/g). WRW ALs are significantly higher than this concentration.

- A surface soil sample collected in this area indicated americium, uranium-235, and uranium-238 were present at concentrations of 0.058 pCi/g, 0.23 pCi/g, and 3.3 pCi/g, respectively (see Figure 2.22). These concentrations are well below the respective WRW ALs.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 44 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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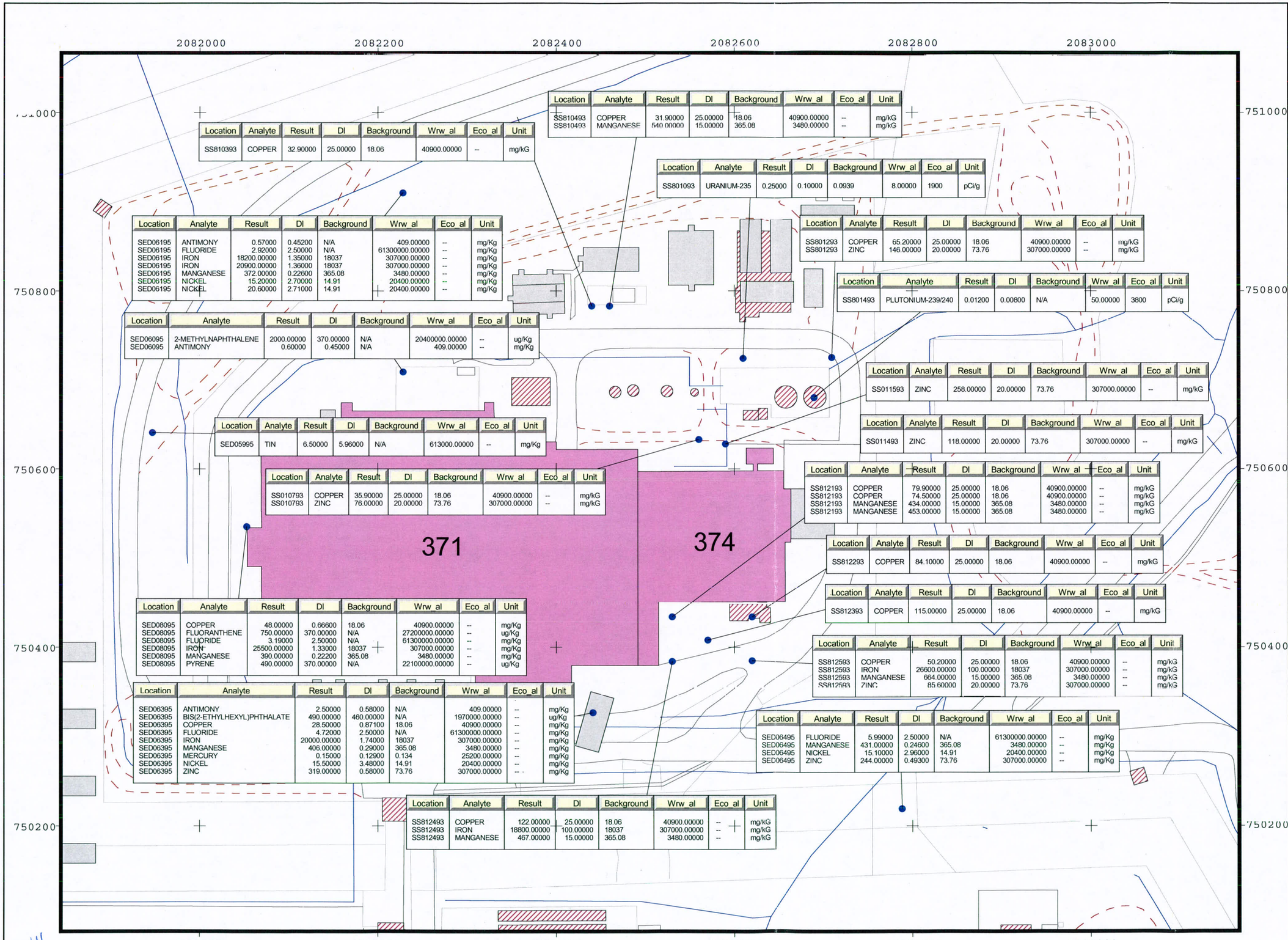
# Figure 2.21
# Existing Surface Soil Sampling Results Greater Than Background Mean Plus Two Standard Deviations or MDLs for IHSS Groups 300-3 and 300-4




| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS810393 | COPPER | 32.90000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS810493 | COPPER | 31.90000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS810493 | MANGANESE | 540.00000 | 15.00000 | 365.08 | 3480.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS801093 | URANIUM-235 | 0.25000 | 0.10000 | 0.0939 | 8.00000 | 1900 | pCi/g |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED06195 | ANTIMONY | 0.57000 | 0.45200 | N/A | 409.00000 | -- | mg/Kg |
| SED06195 | FLUORIDE | 2.92000 | 2.50000 | N/A | 61300000.00000 | -- | mg/Kg |
| SED06195 | IRON | 18200.00000 | 1.35000 | 18037 | 307000.00000 | -- | mg/Kg |
| SED06195 | IRON | 20900.00000 | 1.36000 | 18037 | 307000.00000 | -- | mg/Kg |
| SED06195 | MANGANESE | 372.00000 | 0.22600 | 365.08 | 3480.00000 | -- | mg/Kg |
| SED06195 | NICKEL | 15.20000 | 2.70000 | 14.91 | 20400.00000 | -- | mg/Kg |
| SED06195 | NICKEL | 20.60000 | 2.71000 | 14.91 | 20400.00000 | -- | mg/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS801293 | COPPER | 65.20000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS801293 | ZINC | 146.00000 | 20.00000 | 73.76 | 307000.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS801493 | PLUTONIUM-239/240 | 0.01200 | 0.00800 | N/A | 50.00000 | 3800 | pCi/g |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED06095 | 2-METHYLNAPHTHALENE | 2000.00000 | 370.00000 | N/A | 20400000.00000 | -- | ug/Kg |
| SED06095 | ANTIMONY | 0.60000 | 0.45000 | N/A | 409.00000 | -- | mg/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS011593 | ZINC | 258.00000 | 20.00000 | 73.76 | 307000.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS011493 | ZINC | 118.00000 | 20.00000 | 73.76 | 307000.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED05995 | TIN | 6.50000 | 5.96000 | N/A | 613000.00000 | -- | mg/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS010793 | COPPER | 35.90000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS010793 | ZINC | 76.00000 | 20.00000 | 73.76 | 307000.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS812193 | COPPER | 79.90000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS812193 | COPPER | 74.50000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS812193 | MANGANESE | 434.00000 | 15.00000 | 365.08 | 3480.00000 | -- | mg/kG |
| SS812193 | MANGANESE | 453.00000 | 15.00000 | 365.08 | 3480.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS812293 | COPPER | 84.10000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS812393 | COPPER | 115.00000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS812593 | COPPER | 50.20000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS812593 | IRON | 26600.00000 | 100.00000 | 18037 | 307000.00000 | -- | mg/kG |
| SS812593 | MANGANESE | 664.00000 | 15.00000 | 365.08 | 3480.00000 | -- | mg/kG |
| SS812593 | ZINC | 85.60000 | 20.00000 | 73.76 | 307000.00000 | -- | mg/kG |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED08095 | COPPER | 48.00000 | 0.66600 | 18.06 | 40900.00000 | -- | mg/Kg |
| SED08095 | FLUORANTHENE | 750.00000 | 370.00000 | N/A | 27200000.00000 | -- | ug/Kg |
| SED08095 | FLUORIDE | 3.19000 | 2.50000 | N/A | 61300000.00000 | -- | mg/Kg |
| SED08095 | IRON | 25500.00000 | 1.33000 | 18037 | 307000.00000 | -- | mg/Kg |
| SED08095 | MANGANESE | 390.00000 | 0.22200 | 365.08 | 3480.00000 | -- | mg/Kg |
| SED08095 | PYRENE | 490.00000 | 370.00000 | N/A | 22100000.00000 | -- | ug/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED06395 | ANTIMONY | 2.50000 | 0.58000 | N/A | 409.00000 | -- | mg/Kg |
| SED06395 | BIS(2-ETHYLHEXYL)PHTHALATE | 490.00000 | 460.00000 | N/A | 1970000.00000 | -- | ug/Kg |
| SED06395 | COPPER | 28.50000 | 0.87100 | 18.06 | 40900.00000 | -- | mg/Kg |
| SED06395 | FLUORIDE | 4.72000 | 2.50000 | N/A | 61300000.00000 | -- | mg/Kg |
| SED06395 | IRON | 20000.00000 | 1.74000 | 18037 | 307000.00000 | -- | mg/Kg |
| SED06395 | MANGANESE | 406.00000 | 0.29000 | 365.08 | 3480.00000 | -- | mg/Kg |
| SED06395 | MERCURY | 0.15000 | 0.12900 | 0.134 | 25200.00000 | -- | mg/Kg |
| SED06395 | NICKEL | 15.50000 | 3.48000 | 14.91 | 20400.00000 | -- | mg/Kg |
| SED06395 | ZINC | 319.00000 | 0.58000 | 73.76 | 307000.00000 | -- | mg/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SED06495 | FLUORIDE | 5.99000 | 2.50000 | N/A | 61300000.00000 | -- | mg/Kg |
| SED06495 | MANGANESE | 431.00000 | 0.24600 | 365.08 | 3480.00000 | -- | mg/Kg |
| SED06495 | NICKEL | 15.10000 | 2.96000 | 14.91 | 20400.00000 | -- | mg/Kg |
| SED06495 | ZINC | 244.00000 | 0.49300 | 73.76 | 307000.00000 | -- | mg/Kg |

| Location | Analyte | Result | Dl | Background | Wrw_al | Eco_al | Unit |
|---|---|---|---|---|---|---|---|
| SS812493 | COPPER | 122.00000 | 25.00000 | 18.06 | 40900.00000 | -- | mg/kG |
| SS812493 | IRON | 18800.00000 | 100.00000 | 18037 | 307000.00000 | -- | mg/kG |
| SS812493 | MANGANESE | 467.00000 | 15.00000 | 365.08 | 3480.00000 | -- | mg/kG |

## KEY

- Surface Soil Sampling Locations
- UBC
- Stream, ditch, or other drainage
- Paved area
- Dirt road
- Demolished building
- Standing building
- Fence

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N W E S

50 0 50 100 Feet

Scale = 1:1,250

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: RADMS Remedial Action Decision Management System

Prepared for: Kaiser-Hill Company

W:\Projects\Fy2003\300-3\Characterization\
300-3,300-4-char-08-26-02.apr

Date: 07/29/03

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# Figure 2.22
# Soil Sampling Results Greater Than Background or Detection Limits at IHSS Groups 300-3 and 300-4, East Side

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY46-002 | 0.00000 | 0.50000 | ALUMINUM | 21000.00000 | MG/KG | 2.40000 | 228000.00000 | -- | 16902.000 |
| BY46-002 | 0.00000 | 0.50000 | AM241 | 0.20600 | PCI/G | 0.07830 | 76.00000 | 1900 | 0.023 |
| BY46-002 | 0.00000 | 0.50000 | ARSENIC | 13.30000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BY46-002 | 0.00000 | 0.50000 | BARIUM | 604.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY46-002 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 62.00000 | UG/KG | 45.00000 | 34900.00000 | 800000 | NA |
| BY46-002 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 86.00000 | UG/KG | 59.00000 | 3490.00000 | 25700 | NA |
| BY46-002 | 0.00000 | 0.50000 | CHROMIUM | 66.60000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY46-002 | 0.00000 | 0.50000 | CHRYSENE | 75.00000 | UG/KG | 39.00000 | 3490000.00000 | -- | NA |
| BY46-002 | 0.00000 | 0.50000 | COPPER | 74.90000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY46-002 | 0.00000 | 0.50000 | FLUORANTHENE | 170.00000 | UG/KG | 45.00000 | 27200000.00000 | -- | NA |
| BY46-002 | 0.00000 | 0.50000 | IRON | 39100.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY46-002 | 0.00000 | 0.50000 | LITHIUM | 12.00000 | MG/KG | 0.13000 | 20400.00000 | -- | 11.550 |
| BY46-002 | 0.00000 | 0.50000 | MANGANESE | 498.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY46-002 | 0.00000 | 0.50000 | NICKEL | 51.60000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY46-002 | 0.00000 | 0.50000 | PYRENE | 160.00000 | UG/KG | 65.00000 | 22100000.00000 | -- | NA |
| BY46-002 | 0.00000 | 0.50000 | STRONTIUM | 205.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY46-002 | 0.00000 | 0.50000 | U-235 | 0.37200 | PCI/G | 0.26900 | 8.00000 | 1900 | 0.094 |
| BY46-002 | 0.00000 | 0.50000 | U-238 | 4.39900 | PCI/G | 1.99413 | 351.00000 | 1600 | 2.000 |
| BY46-002 | 0.00000 | 0.50000 | VANADIUM | 131.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY46-002 | 0.00000 | 0.50000 | ZINC | 141.00000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-007 | 0.00000 | 0.50000 | ARSENIC | 12.60000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BY45-007 | 0.00000 | 0.50000 | BARIUM | 757.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-007 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 370.00000 | UG/KG | 40.00000 | 34900.00000 | 800000 | NA |
| BY45-007 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 640.00000 | UG/KG | 53.00000 | 3490.00000 | 25700 | NA |
| BY45-007 | 0.00000 | 0.50000 | CHROMIUM | 31.90000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-007 | 0.00000 | 0.50000 | CHRYSENE | 810.00000 | UG/KG | 35.00000 | 3490000.00000 | -- | NA |
| BY45-007 | 0.00000 | 0.50000 | COPPER | 255.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-007 | 0.00000 | 0.50000 | DIBENZ(A,H)ANTHRACENE | 190.00000 | UG/KG | 64.00000 | 3490.00000 | -- | NA |
| BY45-007 | 0.00000 | 0.50000 | INDENO(1,2,3-CD)PYRENE | 140.00000 | UG/KG | 46.00000 | 34900.00000 | -- | NA |
| BY45-007 | 0.00000 | 0.50000 | IRON | 33400.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-007 | 0.00000 | 0.50000 | MANGANESE | 900.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY45-007 | 0.00000 | 0.50000 | NICKEL | 36.60000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-007 | 0.00000 | 0.50000 | PYRENE | 130.00000 | UG/KG | 58.00000 | 22100000.00000 | -- | NA |
| BY45-007 | 0.00000 | 0.50000 | STRONTIUM | 570.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-007 | 0.00000 | 0.50000 | U-238 | 3.46600 | PCI/G | 1.35079 | 351.00000 | 1600 | 2.000 |
| BY45-007 | 0.00000 | 0.50000 | VANADIUM | 76.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY45-007 | 0.00000 | 0.50000 | ZINC | 117.00000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BZ45-000 | 0.00000 | 0.50000 | ARSENIC | 10.40000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BZ45-000 | 0.00000 | 0.50000 | BARIUM | 742.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BZ45-000 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 240.00000 | UG/KG | 41.00000 | 34900.00000 | 800000 | NA |
| BZ45-000 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 450.00000 | UG/KG | 53.00000 | 3490.00000 | 25700 | NA |
| BZ45-000 | 0.00000 | 0.50000 | BENZO(B)FLUORANTHENE | 180.00000 | UG/KG | 66.00000 | 34900.00000 | 1010000 | NA |
| BZ45-000 | 0.00000 | 0.50000 | CHROMIUM | 26.20000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BZ45-000 | 0.00000 | 0.50000 | CHRYSENE | 470.00000 | UG/KG | 36.00000 | 3490000.00000 | -- | NA |
| BZ45-000 | 0.00000 | 0.50000 | COPPER | 73.30000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BZ45-000 | 0.00000 | 0.50000 | DIBENZ(A,H)ANTHRACENE | 130.00000 | UG/KG | 65.00000 | 3490.00000 | -- | NA |
| BZ45-000 | 0.00000 | 0.50000 | INDENO(1,2,3-CD)PYRENE | 99.00000 | UG/KG | 46.00000 | 34900.00000 | -- | NA |
| BZ45-000 | 0.00000 | 0.50000 | IRON | 34100.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BZ45-000 | 0.00000 | 0.50000 | MANGANESE | 679.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BZ45-000 | 0.00000 | 0.50000 | NICKEL | 37.60000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BZ45-000 | 0.00000 | 0.50000 | PYRENE | 82.00000 | UG/KG | 59.00000 | 22100000.00000 | -- | NA |
| BZ45-000 | 0.00000 | 0.50000 | STRONTIUM | 351.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BZ45-000 | 0.00000 | 0.50000 | U-235 | 0.19790 | PCI/G | 0.16719 | 8.00000 | 1900 | 0.094 |
| BZ45-000 | 0.00000 | 0.50000 | U-238 | 3.50300 | PCI/G | 1.68254 | 351.00000 | 1600 | 2.000 |
| BZ45-000 | 0.00000 | 0.50000 | VANADIUM | 88.90000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BZ45-000 | 0.00000 | 0.50000 | ZINC | 111.00000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-004 | 0.00000 | 0.50000 | ARSENIC | 11.90000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BY45-004 | 0.00000 | 0.50000 | BARIUM | 794.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-004 | 0.00000 | 0.50000 | CHROMIUM | 33.40000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-004 | 0.00000 | 0.50000 | COPPER | 46.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-004 | 0.00000 | 0.50000 | IRON | 32300.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-004 | 0.00000 | 0.50000 | MANGANESE | 493.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY45-004 | 0.00000 | 0.50000 | NICKEL | 35.00000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-004 | 0.00000 | 0.50000 | STRONTIUM | 335.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-004 | 0.00000 | 0.50000 | U-235 | 0.12250 | PCI/G | 0.11524 | 8.00000 | 1900 | 0.094 |
| BY45-004 | 0.00000 | 0.50000 | VANADIUM | 74.40000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY46-001 | 0.00000 | 0.50000 | BARIUM | 683.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY46-001 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 51.00000 | UG/KG | 46.00000 | 34900.00000 | 800000 | NA |
| BY46-001 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 66.00000 | UG/KG | 60.00000 | 3490.00000 | 25700 | NA |
| BY46-001 | 0.00000 | 0.50000 | CHROMIUM | 35.30000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY46-001 | 0.00000 | 0.50000 | CHRYSENE | 61.00000 | UG/KG | 40.00000 | 3490000.00000 | -- | NA |
| BY46-001 | 0.00000 | 0.50000 | COPPER | 35.90000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY46-001 | 0.00000 | 0.50000 | IRON | 21200.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY46-001 | 0.00000 | 0.50000 | NAPHTHALENE | 6.34000 | UG/KG | 5.42000 | 3090000.00000 | -- | NA |
| BY46-001 | 0.00000 | 0.50000 | NICKEL | 27.70000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY46-001 | 0.00000 | 0.50000 | STRONTIUM | 131.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY46-001 | 0.00000 | 0.50000 | U-238 | 3.56600 | PCI/G | 1.91039 | 351.00000 | 1600 | 2.000 |
| BY46-001 | 0.00000 | 0.50000 | VANADIUM | 113.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY46-001 | 0.00000 | 0.50000 | ZINC | 80.40000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BZ45-002 | 0.00000 | 0.50000 | BARIUM | 749.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BZ45-002 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 67.00000 | UG/KG | 41.00000 | 34900.00000 | 800000 | NA |
| BZ45-002 | 0.00000 | 0.50000 | CHRYSENE | 130.00000 | UG/KG | 36.00000 | 3490000.00000 | -- | NA |
| BZ45-002 | 0.00000 | 0.50000 | COPPER | 354.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BZ45-002 | 0.00000 | 0.50000 | FLUORANTHENE | 49.00000 | UG/KG | 41.00000 | 27200000.00000 | -- | NA |
| BZ45-002 | 0.00000 | 0.50000 | IRON | 26600.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BZ45-002 | 0.00000 | 0.50000 | NICKEL | 29.80000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BZ45-002 | 0.00000 | 0.50000 | PU239240 | 0.13000 | PCI/G | 0.11400 | 50.00000 | 3800 | 0.066 |
| BZ45-002 | 0.00000 | 0.50000 | STRONTIUM | 347.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BZ45-002 | 0.00000 | 0.50000 | U-235 | 0.18980 | PCI/G | 0.13704 | 8.00000 | 1900 | 0.094 |
| BZ45-002 | 0.00000 | 0.50000 | U-238 | 3.81600 | PCI/G | 1.76049 | 351.00000 | 1600 | 2.000 |
| BZ45-002 | 0.00000 | 0.50000 | ZINC | 207.00000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BZ45-003 | 0.00000 | 0.50000 | ARSENIC | 23.90000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.09000 |
| BZ45-003 | 0.00000 | 0.50000 | BARIUM | 435.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.25999 |
| BZ45-003 | 0.00000 | 0.50000 | CHROMIUM | 25.80000 | MG/KG | 20.00000 | 268.00000 | -- | 16.99000 |
| BZ45-003 | 0.00000 | 0.50000 | COPPER | 104.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.06000 |
| BZ45-003 | 0.00000 | 0.50000 | STRONTIUM | 415.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.94000 |
| BZ45-003 | 0.00000 | 0.50000 | U-235 | 0.18690 | PCI/G | 0.11955 | 8.00000 | 1900 | 0.09390 |
| BZ45-003 | 0.00000 | 0.50000 | U-238 | 3.64100 | PCI/G | 1.89110 | 351.00000 | 1600 | 2.00000 |
| BZ45-003 | 0.00000 | 0.50000 | VANADIUM | 84.70000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.59000 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY46-000 | 0.00000 | 0.50000 | BARIUM | 869.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY46-000 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 79.00000 | UG/KG | 40.00000 | 34900.00000 | 800000 | NA |
| BY46-000 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 91.00000 | UG/KG | 52.00000 | 3490.00000 | 25700 | NA |
| BY46-000 | 0.00000 | 0.50000 | CHROMIUM | 39.60000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY46-000 | 0.00000 | 0.50000 | CHRYSENE | 93.00000 | UG/KG | 35.00000 | 3490000.00000 | -- | NA |
| BY46-000 | 0.00000 | 0.50000 | COPPER | 32.10000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY46-000 | 0.00000 | 0.50000 | FLUORANTHENE | 52.00000 | UG/KG | 40.00000 | 27200000.00000 | -- | NA |
| BY46-000 | 0.00000 | 0.50000 | IRON | 33600.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY46-000 | 0.00000 | 0.50000 | METHYLENE CHLORIDE | 1.40000 | UG/KG | 0.85000 | 2530000.00000 | 39500 | NA |
| BY46-000 | 0.00000 | 0.50000 | NICKEL | 37.90000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY46-000 | 0.00000 | 0.50000 | PYRENE | 70.00000 | UG/KG | 57.00000 | 22100000.00000 | -- | NA |
| BY46-000 | 0.00000 | 0.50000 | STRONTIUM | 429.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY46-000 | 0.00000 | 0.50000 | U-235 | 0.22530 | PCI/G | 0.14740 | 8.00000 | 1900 | 0.094 |
| BY46-000 | 0.00000 | 0.50000 | U-238 | 3.85400 | PCI/G | 1.77942 | 351.00000 | 1600 | 2.000 |
| BY46-000 | 0.00000 | 0.50000 | VANADIUM | 126.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BZ45-001 | 0.00000 | 0.50000 | BARIUM | 795.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BZ45-001 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 130.00000 | UG/KG | 41.00000 | 34900.00000 | 800000 | NA |
| BZ45-001 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 140.00000 | UG/KG | 53.00000 | 3490.00000 | 25700 | NA |
| BZ45-001 | 0.00000 | 0.50000 | BENZO(B)FLUORANTHENE | 79.00000 | UG/KG | 66.00000 | 34900.00000 | 1010000 | NA |
| BZ45-001 | 0.00000 | 0.50000 | BENZO(K)FLUORANTHENE | 76.00000 | UG/KG | 71.00000 | 349000.00000 | 1010000 | NA |
| BZ45-001 | 0.00000 | 0.50000 | CHRYSENE | 180.00000 | UG/KG | 36.00000 | 3490000.00000 | -- | NA |
| BZ45-001 | 0.00000 | 0.50000 | COPPER | 57.50000 | MG/KG | 4.00000 | 40900.00000 | -- | 38.21 |
| BZ45-001 | 0.00000 | 0.50000 | FLUORANTHENE | 190.00000 | UG/KG | 41.00000 | 27200000.00000 | -- | NA |
| BZ45-001 | 0.00000 | 0.50000 | METHYLENE CHLORIDE | 3.20000 | UG/KG | 0.82000 | 2530000.00000 | 39500 | NA |
| BZ45-001 | 0.00000 | 0.50000 | NAPHTHALENE | 12.00000 | UG/KG | 0.88000 | 3090000.00000 | -- | NA |
| BZ45-001 | 0.00000 | 0.50000 | PYRENE | 180.00000 | UG/KG | 59.00000 | 22100000.00000 | -- | NA |
| BZ45-001 | 0.00000 | 0.50000 | STRONTIUM | 481.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 211.38 |
| BZ45-001 | 0.00000 | 0.50000 | U-235 | 0.18120 | PCI/G | 0.10646 | 8.00000 | 1900 | 0.12 |
| BZ45-001 | 0.00000 | 0.50000 | U-238 | 4.05400 | PCI/G | 1.95518 | 351.00000 | 1600 | 1.49 |
| BZ45-001 | 0.00000 | 0.50000 | VANADIUM | 94.30000 | MG/KG | 31.00000 | 7150.00000 | 433 | 88.49 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-003 | 0.00000 | 0.50000 | BARIUM | 472.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BY45-003 | 0.00000 | 0.50000 | COPPER | 41.30000 | MG/KG | 4.00000 | 40900.00000 | -- | 38.21 |
| BY45-003 | 0.00000 | 0.50000 | U-235 | 0.28670 | PCI/G | 0.13744 | 8.00000 | 1900 | 0.12 |
| BY45-003 | 0.00000 | 0.50000 | U-238 | 4.58500 | PCI/G | 2.39336 | 351.00000 | 1600 | 1.49 |
| BY45-003 | 0.00000 | 0.50000 | VANADIUM | 176.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 88.49 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-000 | 0.00000 | 0.50000 | BARIUM | 699.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BY45-000 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 450.00000 | UG/KG | 45.00000 | 34900.00000 | 800000 | NA |
| BY45-000 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 740.00000 | UG/KG | 59.00000 | 3490.00000 | 25700 | NA |
| BY45-000 | 0.00000 | 0.50000 | CHRYSENE | 970.00000 | UG/KG | 39.00000 | 3490000.00000 | -- | NA |
| BY45-000 | 0.00000 | 0.50000 | COPPER | 160.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 38.21 |
| BY45-000 | 0.00000 | 0.50000 | PYRENE | 130.00000 | UG/KG | 64.00000 | 22100000.00000 | -- | NA |
| BY45-000 | 0.00000 | 0.50000 | STRONTIUM | 312.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 211.38 |
| BY45-000 | 0.00000 | 0.50000 | U-235 | 0.25660 | PCI/G | 0.14074 | 8.00000 | 1900 | 0.12 |
| BY45-000 | 0.00000 | 0.50000 | U-238 | 4.56400 | PCI/G | 1.85239 | 351.00000 | 1600 | 1.49 |
| BY45-000 | 0.00000 | 0.50000 | VANADIUM | 109.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 88.49 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-008 | 0.00000 | 0.50000 | BARIUM | 737.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BY45-008 | 0.00000 | 0.50000 | BENZO(A)ANTHRACENE | 130.00000 | UG/KG | 40.00000 | 34900.00000 | 800000 | NA |
| BY45-008 | 0.00000 | 0.50000 | BENZO(A)PYRENE | 210.00000 | UG/KG | 52.00000 | 3490.00000 | 25700 | NA |
| BY45-008 | 0.00000 | 0.50000 | BENZO(B)FLUORANTHENE | 89.00000 | UG/KG | 64.00000 | 34900.00000 | 1010000 | NA |
| BY45-008 | 0.00000 | 0.50000 | CHRYSENE | 280.00000 | UG/KG | 35.00000 | 3490000.00000 | -- | NA |
| BY45-008 | 0.00000 | 0.50000 | COPPER | 144.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 38.21 |
| BY45-008 | 0.00000 | 0.50000 | INDENO(1,2,3-CD)PYRENE | 47.00000 | UG/KG | 45.00000 | 34900.00000 | -- | NA |
| BY45-008 | 0.00000 | 0.50000 | PYRENE | 91.00000 | UG/KG | 57.00000 | 22100000.00000 | -- | NA |
| BY45-008 | 0.00000 | 0.50000 | STRONTIUM | 348.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 211.38 |
| BY45-008 | 0.00000 | 0.50000 | U-235 | 0.17410 | PCI/G | 0.12649 | 8.00000 | 1900 | 0.12 |
| BY45-008 | 0.00000 | 0.50000 | U-238 | 3.49100 | PCI/G | 1.56851 | 351.00000 | 1600 | 1.49 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-001 | 0.00000 | 0.50000 | ARSENIC | 11.30000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BY45-001 | 0.00000 | 0.50000 | BARIUM | 800.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-001 | 0.00000 | 0.50000 | CHROMIUM | 41.40000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-001 | 0.00000 | 0.50000 | COPPER | 47.10000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-001 | 0.00000 | 0.50000 | IRON | 31600.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-001 | 0.00000 | 0.50000 | MANGANESE | 416.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY45-001 | 0.00000 | 0.50000 | METHYLENE CHLORIDE | 1.40000 | UG/KG | 0.93000 | 2530000.00000 | 39500 | NA |
| BY45-001 | 0.00000 | 0.50000 | NAPHTHALENE | 2.80000 | UG/KG | 1.00000 | 3090000.00000 | -- | NA |
| BY45-001 | 0.00000 | 0.50000 | NICKEL | 42.60000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-001 | 0.00000 | 0.50000 | STRONTIUM | 129.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-001 | 0.00000 | 0.50000 | U-235 | 0.23000 | PCI/G | 0.13394 | 8.00000 | 1900 | 0.094 |
| BY45-001 | 0.00000 | 0.50000 | U-238 | 4.06600 | PCI/G | 1.78995 | 351.00000 | 1600 | 2.000 |
| BY45-001 | 0.00000 | 0.50000 | VANADIUM | 158.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY45-001 | 0.00000 | 0.50000 | ZINC | 96.20000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BZ45-005 | 6.50000 | 8.50000 | BARIUM | 822.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BZ45-005 | 6.50000 | 8.50000 | BARIUM | 765.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 289.38 |
| BZ45-005 | 6.50000 | 8.50000 | U-235 | 0.31210 | PCI/G | 0.19261 | 8.00000 | 1900 | 0.12 |
| BZ45-005 | 6.50000 | 8.50000 | U-238 | 5.31500 | PCI/G | 1.67012 | 351.00000 | 1600 | 1.49 |
| BZ45-005 | 6.50000 | 8.50000 | U-238 | 4.53000 | PCI/G | 2.21041 | 351.00000 | 1600 | 1.49 |
| BZ45-005 | 6.50000 | 8.50000 | VANADIUM | 149.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 88.49 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-006 | 0.00000 | 0.50000 | ALUMINUM | 27000.00000 | MG/KG | 2.60000 | 228000.00000 | -- | 16902.000 |
| BY45-006 | 0.00000 | 0.50000 | AM241 | 0.05790 | PCI/G | 0.02480 | 76.00000 | 1900 | 0.023 |
| BY45-006 | 0.00000 | 0.50000 | BARIUM | 711.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-006 | 0.00000 | 0.50000 | BERYLLIUM | 1.10000 | MG/KG | 0.04200 | 921.00000 | 2.15 | 0.966 |
| BY45-006 | 0.00000 | 0.50000 | CHROMIUM | 74.60000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-006 | 0.00000 | 0.50000 | COPPER | 131.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-006 | 0.00000 | 0.50000 | IRON | 58900.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-006 | 0.00000 | 0.50000 | LITHIUM | 12.00000 | MG/KG | 0.14000 | 20400.00000 | -- | 11.550 |
| BY45-006 | 0.00000 | 0.50000 | MANGANESE | 1190.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY45-006 | 0.00000 | 0.50000 | NICKEL | 61.10000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-006 | 0.00000 | 0.50000 | STRONTIUM | 284.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-006 | 0.00000 | 0.50000 | U-235 | 0.22610 | PCI/G | 0.11898 | 8.00000 | 1900 | 0.094 |
| BY45-006 | 0.00000 | 0.50000 | U-238 | 3.29900 | PCI/G | 1.75230 | 351.00000 | 1600 | 2.000 |
| BY45-006 | 0.00000 | 0.50000 | VANADIUM | 191.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY45-006 | 0.00000 | 0.50000 | ZINC | 171.00000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-002 | 0.00000 | 0.50000 | AM241 | 0.08420 | PCI/G | 0.06310 | 76.00000 | 1900 | 0.023 |
| BY45-002 | 0.00000 | 0.50000 | BARIUM | 820.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-002 | 0.00000 | 0.50000 | CHROMIUM | 31.10000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-002 | 0.00000 | 0.50000 | COPPER | 112.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-002 | 0.00000 | 0.50000 | IRON | 28700.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-002 | 0.00000 | 0.50000 | NICKEL | 29.70000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-002 | 0.00000 | 0.50000 | PU239240 | 0.18300 | PCI/G | 0.13700 | 50.00000 | 3800 | 0.066 |
| BY45-002 | 0.00000 | 0.50000 | STRONTIUM | 338.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-002 | 0.00000 | 0.50000 | U-235 | 0.18040 | PCI/G | 0.13117 | 8.00000 | 1900 | 0.094 |
| BY45-002 | 0.00000 | 0.50000 | U-238 | 2.79800 | PCI/G | 1.45522 | 351.00000 | 1600 | 2.000 |
| BY45-002 | 0.00000 | 0.50000 | VANADIUM | 65.00000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |

| Location | Sbd_ft | Sed_ft | Analyte | Result | Unit | Dl | Wrw_al | Eco_al | Background |
|---|---|---|---|---|---|---|---|---|---|
| BY45-005 | 0.00000 | 0.50000 | ARSENIC | 12.00000 | MG/KG | 5.00000 | 22.20000 | 21.6 | 10.090 |
| BY45-005 | 0.00000 | 0.50000 | BARIUM | 819.00000 | MG/KG | 98.00000 | 26400.00000 | -- | 141.260 |
| BY45-005 | 0.00000 | 0.50000 | CHROMIUM | 35.80000 | MG/KG | 20.00000 | 268.00000 | -- | 16.990 |
| BY45-005 | 0.00000 | 0.50000 | COPPER | 120.00000 | MG/KG | 4.00000 | 40900.00000 | -- | 18.060 |
| BY45-005 | 0.00000 | 0.50000 | FLUORANTHENE | 75.00000 | UG/KG | 41.00000 | 27200000.00000 | -- | NA |
| BY45-005 | 0.00000 | 0.50000 | IRON | 33900.00000 | MG/KG | 2190.00000 | 307000.00000 | -- | 18037.000 |
| BY45-005 | 0.00000 | 0.50000 | MANGANESE | 867.00000 | MG/KG | 158.00000 | 3480.00000 | -- | 365.080 |
| BY45-005 | 0.00000 | 0.50000 | NAPHTHALENE | 22.00000 | UG/KG | 5.30000 | 3090000.00000 | -- | NA |
| BY45-005 | 0.00000 | 0.50000 | NICKEL | 35.90000 | MG/KG | 12.00000 | 20400.00000 | -- | 14.910 |
| BY45-005 | 0.00000 | 0.50000 | PYRENE | 63.00000 | UG/KG | 59.00000 | 22100000.00000 | -- | NA |
| BY45-005 | 0.00000 | 0.50000 | STRONTIUM | 294.00000 | MG/KG | 20.00000 | 613000.00000 | -- | 48.940 |
| BY45-005 | 0.00000 | 0.50000 | U-238 | 3.34600 | PCI/G | 1.96348 | 351.00000 | 1600 | 2.000 |
| BY45-005 | 0.00000 | 0.50000 | VANADIUM | 69.40000 | MG/KG | 31.00000 | 7150.00000 | 433 | 45.590 |
| BY45-005 | 0.00000 | 0.50000 | ZINC | 95.20000 | MG/KG | 9.00000 | 307000.00000 | -- | 73.760 |

## KEY

- Sampling location with concentration greater than WRW AL
- Sampling location with concentrations less than ALs
- New Process Waste Line
- UBC 371 and UBC 374
- Storm Drain
- Sewer
- Paved area
- Dirt road
- Stream or ditch
- Fence
- Demolished Building
- Standing Building

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N
W E
S

100 0 100 Feet

Scale = 1: 2,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

File: W:/projects/2003/300-3/characterization Date: 07/21/03

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## PIC REFERENCE NUMBER: 47

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Nickel Carbonyl Container Burial

Approximate Location: N750,500; E2,085,500

Date(s) of Operation or Occurrence

June 17 and 18, 1963[1]

Description of Operation or Occurrence

Four 55-gallon drums, one GI can with two cylinders, and six loose cylinders of nickel carbonyl were removed from the burial pit west of Building 771 (PAC 700-1110) to a pit east of the Solar Evaporation Ponds. Explosive charges were used to vent the containers (DOE 1992).

Physical/Chemical Description of Constituents Released

Nickel carbonyl was released to the environment (DOE 1992).

Responses to Operation or Occurrence

Air samples were collected during the venting of the containers. No documentation was found that further details response to this occurrence (DOE 1992).

Fate of Constituents Released to Environment

Nickel carbonyl was released to the air during venting of the cylinders. No documentation was found that further details the fate of the constituents (DOE 1992).

Action/No Action Recommendation

No action warranted-

- Nickel carbonyl is extremely volatile and, therefore, would not remain in the soil if indeed it was released to the soil. Burning of the nickel carbonyl creates an aerosol of nickel oxide that would have dispersed in the atmosphere. Therefore, there should not be a source of nickel contamination in the disposal area.

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- The approximate location of the burial pit (PIC 47) is shown on Figure 2.23. This location is within IHSS 900-176, the S&W Contractor Storage Yard. This IHSS was characterized along with other neighboring IHSSs within IHSS Group 000-1 in accordance with IASAP Addendum #IA-03-02 (DOE 2002). A Data Summary Report was prepared that indicates nickel concentrations in soil at IHSS 900-176 ranged from 20 to 50 mg/kg (DOE 2003). The WRW AL is 20,000 mg/kg. The Data Summary Report was approved by CDPHE on July 29, 2003. No action is warranted for this PIC.

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 47 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2002, Industrial Area Sampling and Analysis Plan Addendum #IA-03-02, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2003, Data Summary Report for IHHS Group 000-1, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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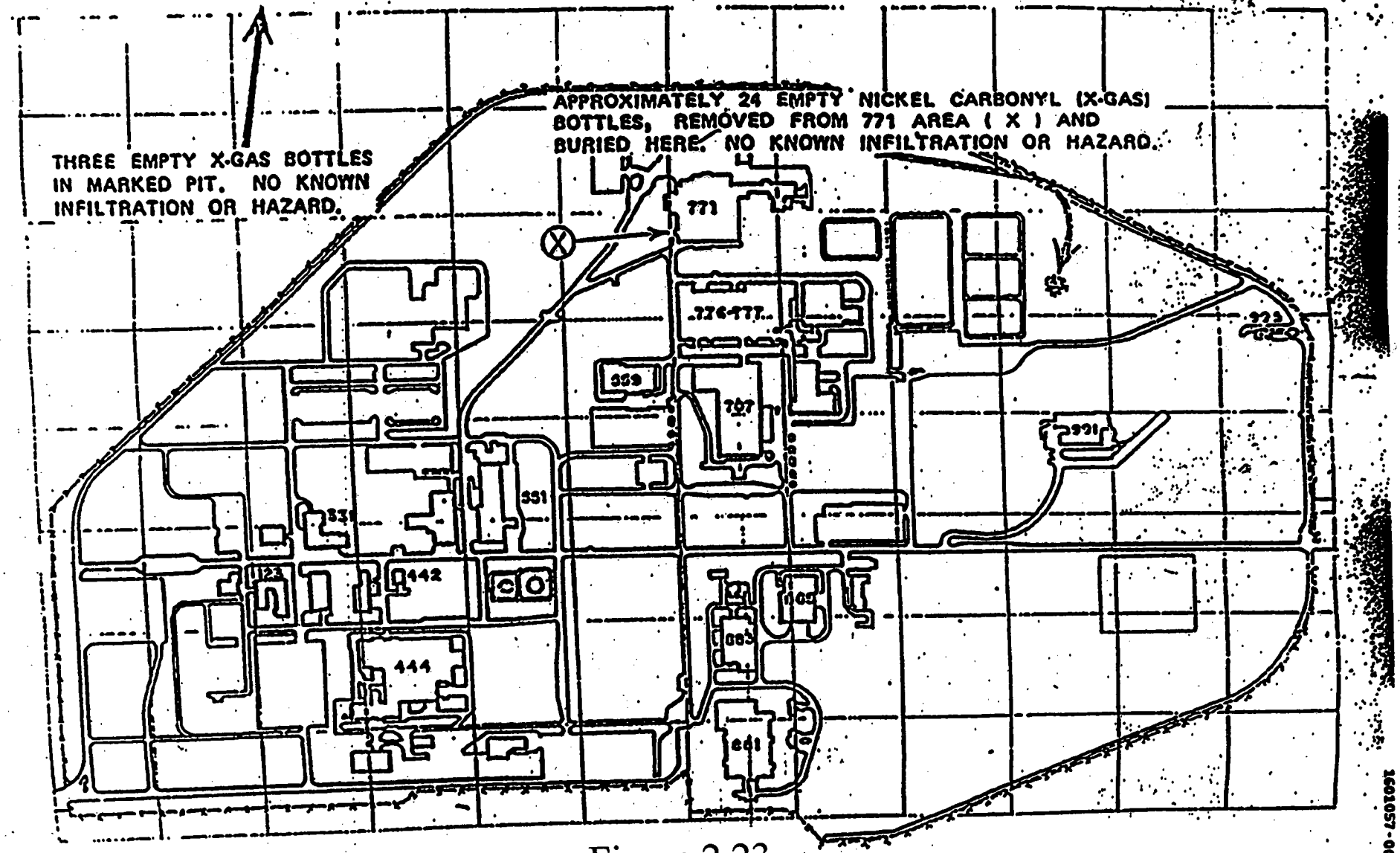


Figure 2.23

Nickel Carbonyl Burial Location

MAP 15A.

91HRR33 ITEM 2 6 00021756

1601057-00003084-217

## PIC REFERENCE NUMBER: 57

IHSS Number: Not Applicable

Operable Unit: Not Applicable

IHSS Group: Not Applicable

Unit Name: Oil from Spill in Co-60 Pit

Approximate Location: Unknown

Date(s) of Operation or Occurrence

September 7, 1979

Description of Operation or Occurrence

Oil was spilled in the Co-60 pit. Analytical results indicated 238 pCi/L gross beta. Oil was "OK to dispose through waste oil – 774" (DOE 1992).

Physical/Chemical Description of Constituents Released

Oil contaminated with radionuclides was released to the environment (DOE 1992).

Responses to Operation or Occurrence

The oil was characterized for gross beta and was determined to be acceptable for treatment in Building 774 (DOE 1992).

Fate of Constituents Released to Environment

No documentation was found that further details the fate of the constituent (DOE 1992).

Action/No Action Recommendation

No action warranted-

- The analytical results for the oil were sent to B. P. Schneider in Building 444, most likely to solicit approval for disposal of the oil that was spilled in the building. Building 444 manufacturing activities included welding and the use of radiography to detect flaws in depleted uranium and beryllium parts. Based on the Building 444 WSRIC Book, radiography took place in Rooms 139 and 143. Parts were X-rayed in the X-ray cell, which appears to be Room 139 (see Figure 2.24). Co-60 is the radioisotope source for the X-rays used in

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radiography. It is likely the floor of the X-ray cell was referred to as the Co-60 pit, a depression in the floor where the Co-60 source was stored until needed. Such a depression would catch oil or other liquids that might be spilled.

- The oil was only analyzed for gross beta contamination, which further indicates the radionuclide of interest was depleted uranium. Gross beta is typically the only analysis conducted for screening-level surveys to detect uranium-238 contamination, because the daughter products are strong beta emitters.

- The gross beta activity represents an upper bound on the activity of uranium-238 in the oil (that is, 268 pCi/L or 0.268 pCi/g). The activity is very low relative to the WRW AL for uranium-238 (350 pCi/g).

- Because the oil release was a spill in a room, it is not likely the oil was ever released to subsurface soil beneath the building. Also, the reference implies that the spill was cleaned up (that is, it was "OK to dispose of the oil at Building 774"). Lastly, the Data Summary Report for IHSS Group 400-3, which includes UBC 444, indicates the IHSS Group is an NFAA Site (DOE 2003). The Data Summary Report was approved by CDPHE on December 18, 2003 (CDPHE 2003).

After review of the PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations report (DOE 2004) by the regulatory agencies, DOE received concurrence from CDPHE (the lead regulatory agency) of the no action warranted status for PIC 57 on April 30, 2004 (CDPHE 2004).

References

CDPHE, 2003, Data Summary Report for IHSS Group 400-3 Approval Letter, December 18.

CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, August.

DOE, 2003, Data Summary Report for IHSS Group 400-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004, Potential Incidents of Concern 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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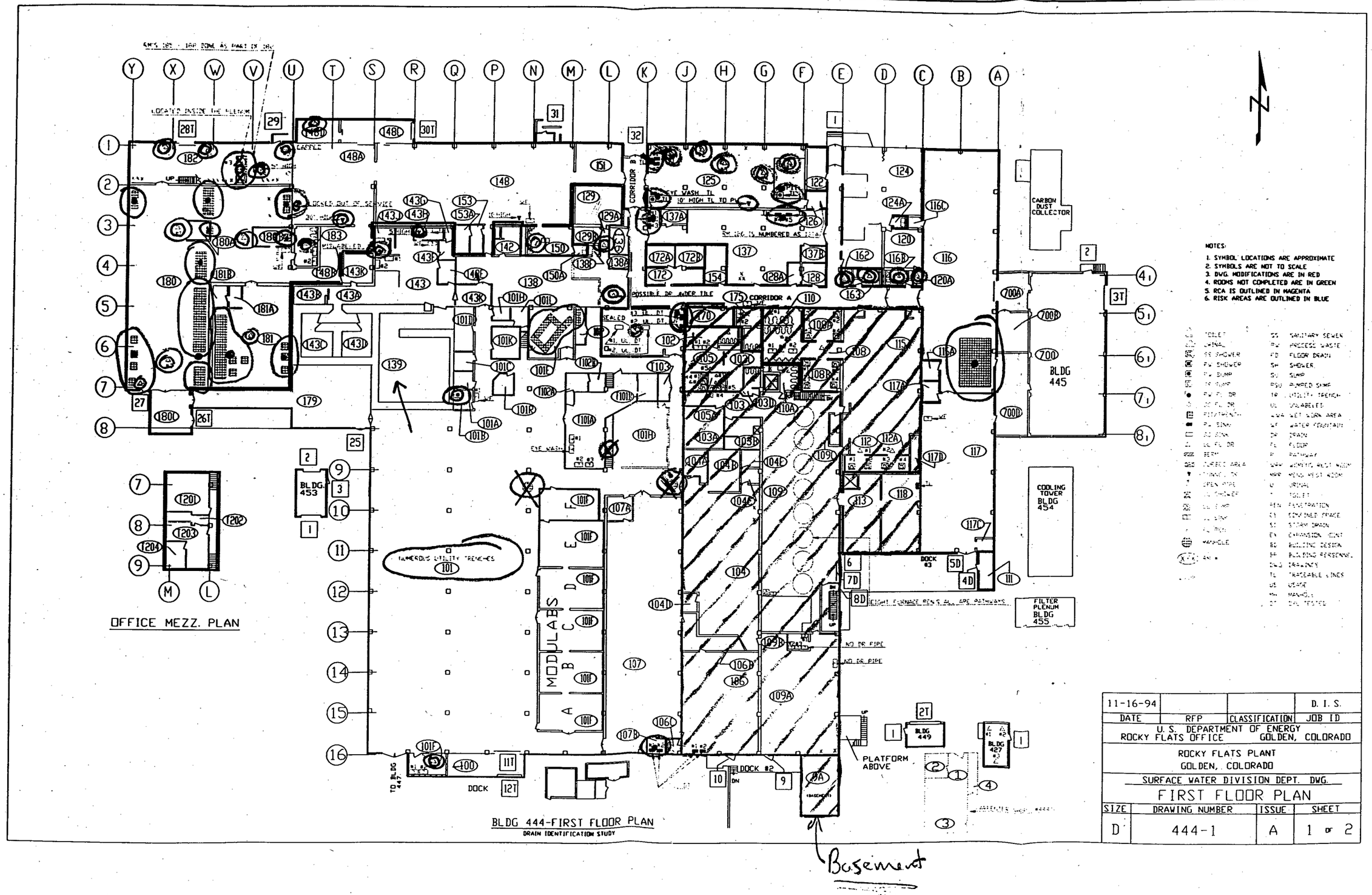
Figure 2.24

# Building 444 - Process Sinks, Sumps, and Ancillary Equipment Location

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# SECTION 3.0
# OTHER SIGNIFICANT EVENTS

# 3.0 OTHER SIGNIFICANT EVENTS

This section describes specific events, occurrences, and projects that have taken place during the reporting period for this Annual Update. The event descriptions are brief summaries and may be useful for future projects and in support of Site closure.

## 3.1 CDPHE Buffer Zone Contamination Report

### 3.1.1 Rocky Flats Response to Concerns

This section documents the actions taken and final disposition of 36 potential BZ contamination sites submitted to DOE by CDPHE in an August 1999[1] report and five additional sites submitted to DOE by CDPHE on April 23, 2003[2]. A complete background of the 1999 report and responses is located in Section 3.0 of the 2001 Annual Update to the HRR and will not be repeated in this section.

Table 3.1 identifies the potential contamination sites in numeric order as they have been addressed since 1999. The sites identified in 2003 are numbered 1(a) through 5(a) for purposes of separation and are at the end of Table 3.1. A description and the actions required (or not required) are provided, as well as the date that final disposition for the site was granted. All approval letters and other pertinent documents are footnoted and referenced below the table. All of the items referenced are located in the Administrative Record.

**Table 3.1**
**Buffer Zone Contamination Report Sites (CDPHE 1999 and 2003)**

| BZCR ID | Description | Action Taken | Resolution (Date) |
|---|---|---|---|
| BZCR Site 1 1999 | Disturbed ground SE of Industrial Area.[1] | Site Identified as the East Firing Ranges. Designated as new PAC SE-1602 | Agreed to create new PAC on January 10, 2001.[3,4,12] Will evaluate in FY05. |
| BZCR Site 2 1999 | Disturbed ground NW of Industrial Area (Lindsay Ranch).[1] | Perform "survey/sweep" for unexploded ordinance | Spent ammunition picked up in 2002[4] |
| BZCR Site 3 1999 | Disturbed areas SW of Building 881.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 4 1999 | Disturbed ground north of IHSS 119.1.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 5 1999 | Disturbed area identified as concrete spoils within the 903 Lip Area (IHSS 900-155)[1] | Agreed to investigate/remediate with IHSS 155 (903 Lip Area)[3,12] | Documented with CDPHE September 23, 2004. Site remediated and sampled[5] |
| BZCR Site 6 1999 | Disturbed area(s) identified east of IHSS 111.3.[1] | Samples collected under BZCR SAP (March 25, 2002[6]) *Note: the May 3, 2001 responses indicate characterization will be with IHSS 216.3* | Documented with CDPHE September 16, 2004[7]. All data well below RFCA ALs |
| BZCR Site 7 1999 | Disturbed Area identified NW of Industrial Area.[1] | Samples collected under BZCR SAP (March 25, 2002[6]) | Documented with CDPHE September 16, 2004[7]. All data well below RFCA ALs |

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| BZCR ID | Description | Action Taken | Resolution (Date) |
|---|---|---|---|
| BZCR Site 8 1999 | Disturbed area identified south of Present Landfill (IHSS 114).[1] | Samples collected under BZCR SAP (March 25, 2002[6]) | Documented with CDPHE September 16, 2004.[7] All data well below RFCA ALs |
| BZCR Site 9 1999 | Disturbed area identified SW of Present Landfill (IHSS 114) and east of IHSS 170 (PU&D Yard).[1] | Samples collected under BZCR SAP (March 25, 2002[6]) | Documented with CDPHE September 16, 2004.[7] All data well below RFCA ALs |
| BZCR Site 10 1999 | Disturbed area west of Industrial Area and IHSS 170 (PU&D Yard). The site is the location of the Concrete Batching Plant.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 11 1999 | Small Arms Range located north of the Industrial Area.[1] | Site designated as new PAC NW-1505 and requires D&D action | Agreed to Create New PAC January 10, 2001.[3,12] Will evaluate in FY05. |
| BZCR Site 12 1999 | Small pond identified on aerial photograph NE of Industrial Area.[1] | Samples collected under BZCR SAP (March 25, 2002[6]) | Documented with CDPHE September 16, 2004.[7] All data well below RFCA ALs |
| BZCR Site 13 1999 | Disturbed area(s) south-southeast of Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 14 1999 | Disturbed area(s) west of Industrial Area and North of IHSS 133.5.[1] | Agreed to no further investigation for north side (January 10, 2001)[3,12].<br><br>Samples collected under BZCR SAP for south side (March 25, 2002[6]) | South Side Documented with CDPHE September 16, 2004[7] All data well below RFCA ALs |
| BZCR Site 15 1999 | Disturbed area west of Industrial Area, north of Walnut Creek.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 16 1999 | Elongated disturbed area east of the Industrial Area.[1] | Samples collected under BZCR SAP for south side (March 25, 2002[6]) | Documented with CDPHE September 16, 2004.[7] All data well below RFCA ALs |
| BZCR Site 17 1999 | A structure identified SE of the Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 18 1999 | A structure identified SE of the Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 19 1999 | Possible ash disposal area or concrete spoil area west of IHSS 133.5 and 133.6.[1] | Samples collected under BZCR SAP for south side (March 25, 2002[6]) | Documented with CDPHE September 16, 2004.[7] All data well below RFCA ALs |
| BZCR Site 20 1999 | Numerous (hundreds) of disturbed areas in West Buffer Zone (on and off DOE Property. Possibly prairie dog colony.[1] | Perform research and submit ecological explanation | Explanation Provided in 2001 Historical Release Report[4,10] (page 99-103) |
| BZCR Site 21 1999 | Two areas of disturbed ground SW of Industrial Area. | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 22 1999 | Large excavation west of the Industrial Area.[1] | Site determined to be operational gravel pit not related to RFETS. | January 10, 2001[3,12] |

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| BZCR ID | Description | Action Taken | Resolution (Date) |
|---|---|---|---|
| | | Agreed to no further investigation | |
| BZCR Site 23 1999 | Possible waste disposal area west of the Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 24 1999 | Areas of possible fill material north-northwest of the Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 25 1999 | Disturbed area north of the Industrial Area and north of the Landfill Pond.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 26 1999 | Disturbed ground northeast of the Industrial Area and north of Walnut Creek.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 27 1999 | Disturbed ground northeast of the Industrial Area and north of Walnut Creek (IHSS 142.3).[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 28 1999 | Change in surface features/outfall locations to bypass South Walnut Creek Ponds.[1] | Samples collected under BZCR SAP for South Side (March 25, 2002[6]) | Documented with CDPHE September 16, 2004[7]. All data well below RFCA ALs |
| BZCR Site 29 1999 | Disturbed ground northwest of the Industrial Area (determined to be "Met Tower" (identified in Operable Unit 11 RI Report).[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 30 1999 | Disturbed ground north of parking lot on north side of the Industrial Area.[1] | Agreed to no further investigation | January 10, 2001[3,10] |
| BZCR Site 31 1999 | Disturbed ground northwest of the Industrial Area (near or within PAC 300-700).[1] | Samples collected under BZCR SAP for South Side (March 25, 2002[6]) | Documented with CDPHE September 16, 2004[7]. All data well below RFCA ALs |
| BZCR Site 32 1999 | Possible waste disposal area southwest of the Industrial Area (near the Ash Pits).[1] | Samples collected under BZCR SAP for South Side (March 25, 2002[6]) *Note: the May 3, 2001 responses indicate characterization will be with IHSS 133 (Ash Pits)* | Documented with CDPHE September 16, 2004[7] All data well below RFCA ALs |
| BZCR Site 33 1999 | Possible waste disposal area(s) southwest of the Industrial Area (near the Ash Pits).[1] | Samples collected under BZCR SAP for South Side (March 25, 2002[6]) *Note: the May 3, 2001 responses indicate characterization will be with IHSS 133 (Ash Pits)* | Documented with CDPHE September 16, 2004[7]. All data well below RFCA ALs |
| BZCR Site 34 1999 | Disturbed ground southeast of the Industrial Area and south of Woman Creek.[1] | Agreed to no further investigation | January 10, 2001[3,12] |
| BZCR Site 35 1999 | Disturbed ground and debris east of the Industrial Area.[1] *Note: the May 3, 2001 responses indicate characterization will be with IHSS 216.2* | Sampling was performed under an IWCP for Routine Buffer Zone Cleanup activities. Maps given to D. Kruchek (CDPHE) 9/22/04 | Documented with CDPHE September 22, 2004. Site Sampled and all data below RFCA Als[4,8,] |
| BZCR Site 36 1999 | Disturbed ground west of the Industrial Area. Appears to be fill material.[1] | The Site is within PAC 100-604 and was Discussed During the NFAA Approval of PAC 100-604 | Approval Letter from CDPHE and EPA dated February 14, 2002.[9] |
| BZCR Site 1(a) 2003 | Additional investigation required in the area west of the Industrial Area. | Three borehole locations where approved for sampling; | Approval Letter from CDPHE and EPA dated |



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| BZCR ID | Description | Action Taken | Resolution (Date) |
|---|---|---|---|
| | Disturbance identified on aerial photographs.[2] | samples collected on February 3, 2004 and results provided to the regulatory agencies on April 8, 2004[10] | May 11, 2004.[11] |
| BZCR Site 2(a) 2003 | Additional investigation required in the area north of the Industrial Area. Aerial photograph dated September 25, 1975 shows unknown cylindrical objects.[2] | Research was conducted and explanations provided in response titled "Additional Assessment to BZCR" April 8, 2004[10] | Approval Letter from CDPHE and EPA dated May 11, 2004.[11] |
| BZCR Site 3(a) 2003 | Additional investigation required in the area immediately west of the Present Landfill. Aerial photograph dated July 29, 1983 shows dam-like feature.[2] | Research was conducted and explanations provided in response titled "Additional Assessment to BZCR" April 8, 2004[10] | Approval Letter from CDPHE and EPA dated May 11, 2004.[11] |
| BZCR Site 4(a) 2003 | Additional investigation required in the area near IHSSs 166.1, 166.2 and 166.3 Immediately South of the Present Landfill.[2] | Research was conducted and explanations provided in response titled "Additional Assessment to BZCR" April 8, 2004[10] | Approval Letter from CDPHE and EPA dated May 11, 2004.[11] |
| BZCR Site 5(a) 2003 | Additional investigation required in the area north of the Present Landfill as shown in aerial photograph dated June 26, 1991.[2] | Research was conducted and explanations provided in response titled "Additional Assessment to BZCR" April 8, 2004[10] | Approval Letter from CDPHE and EPA dated May 11, 2004.[11] |

**References** (Footnoted above)

**1.** CDPHE, Buffer Zone Contamination Review, Technical Report, August 23, 1999.
**2.** CDPHE, Buffer Zone Contamination Review, Update, Additional Assessment, April 8, 2003.
**3.** Regulatory Contact Record for meeting held on January 10, 2001
**4.** Historical Release Report (Annual Update) for 2001 Reporting Period, September, 2002
**5.** Map prepared by the 903 Pad Project Manager verifying cleanup of concrete debris and sampling data, September 20, 2004
**6.** Sampling and Analysis Approach for Investigation of CDPHE Buffer Zone Contamination Sites (Sites #2, 6a, 6b, 7, 8, 9, 12, 14, 16, 19, 28, 31, 32, 33a, and 33b), Kaiser-Hill, L.L.C., March 25, 2002, Rev 0
**7.** Maps and data prepared of BZCR sites sampled, May 5, 2004 (Given to D. Kruchek 9/16/04
**8.** Map showing analytical results for BZCR Site #35, September 22, 2004
**9.** EPA and CDPHE, 2002, Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA, S. Gunderson, CDPHE, RE: Approval of NFA Designation for IHSSs & PACs, February 14, 2002
**10.** Buffer Zone Contamination Report-Additional Assessment, Response to Concerns, RFETS, April 15, 2004
**11.** EPA and CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from M. Aguilar, EPA, S. Gunderson, CDPHE, RE: Approval of Buffer Zone Contamination Report - Additional Assessment, Site Response to Concerns, May 11, 2004
**12.** CDPHE, Buffer Zone Contamination Review, Rocky Flats Response to Concerns, May 3, 2001

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# Appendix 1

# HRR SITES

# IHSSs, PACs, & UBCs

**(Comprehensive Status List)**

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| **NORTHEAST BUFFER ZONE** | | | | | | | |
| 110 | BZ | NE-110 | Trench T-3 | HRR[1] | Annual 1996[2]<br>Annual 1997[3]<br>Annual 2000[26]<br>Annual 2002[35] | Annual 1997[3]<br>Annual 2000[26] | 2002[32], |
| 111.1 | BZ | NE-111.1 | Trench T-4 | HRR[1] | Annual 1996[2]<br>Annual 1997[3]<br>Annual 2003[42] | Annual 1997[3] | 1999[27]<br>2003[42] |
| 111.2 | BZ | NE-111.2 | Trench T-5 | HRR[1] | - | - | - |
| 111.3 | BZ | NE-111.3 | Trench T-6 | HRR[1] | - | - | - |
| 111.4 | BZ | NE-111.4 | Trench T-7 | HRR[1] | Annual 2003[42] | - | 2003[42] |
| 111.5 | BZ | NE-111.5 | Trench T-8 | HRR[1] | - | - | - |
| 111.6 | BZ | NE-111.6 | Trench T-9 | HRR[1] | - | - | - |
| 111.7 | BZ | NE-111.7 | Trench T-10 | HRR[1] | - | - | - |
| 111.8 | BZ | NE-111.8 | Trench T-11 | HRR[1] | - | - | - |
| 142.1 | 6 | NE-142.1 | Pond A-1 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.2 | 6 | NE-142.2 | Pond A-2 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.3 | 6 | NE-142.3 | Pond A-3 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.4 | 6 | NE-142.4 | Pond A-4 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.5 | 6 | NE-142.5 | Pond B-1 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.6 | 6 | NE-142.6 | Pond B-2 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.7 | 6 | NE-142.7 | Pond B-3 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.8 | 6 | NE-142.8 | Pond B-4 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 142.9 | 6 | NE-142.9 | Pond B-5 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 142.12 | 6 | NE-142.12 | Flume Pond (IAG Name: Newly Identified Pond A-5)<br>(off-scale of Plate #1) | HRR[1] | Annual 1996[2] | Annual 1996[2] | - |
| 156.2 | 6 | NE-156.2 | Soil Dump Area Between the A and B Series Drainages | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 166.1 | 6 | NE-166.1 | Trench A | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 166.2 | 6 | NE-166.2 | Trench B | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 166.3 | 6 | NE-166.3 | Trench C<br>(two areas designated on Plate #2) | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 167.1 | 6 | NE-167.1 | Landfill North Area Spray Field | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 167.2 | 7 | NE-167.2 | Pond Area Spray Field (Center Area) | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 167.3 | 7 | NE-167.3 | South Area Spray Field | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 216.1 | 6 | NE-216.1 | East Spray Fields - North Area | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 216.2 | BZ | NE-216.2 | East Spray Field | HRR[1] | Annual 1997[3]<br>Annual 2003 | Annual 1997[3]<br>Annual 2003[55] | 2003[57] |
| 216.3 | BZ | NE-216.3 | East Spray Field | HRR[1] | Annual 1997[3]<br>Annual 2003 | Annual 1997[3]<br>Annual 2003[55] | 2003[57] |
| NA | BZ | NE-1400 | Tear Gas Powder Release | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | BZ | NE-1401 | NE Buffer Zone Gas Line Break | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | BZ | NE-1402 | East Inner Gate PCB Spill | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | BZ | NE-1403 | Gasoline Spill - Building 920 Guard Post | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| 142.6 | BZ | NE-1404 | Diesel Spill at Pond B-2 Spillway | Quarterly 2[5] | Quarterly 3[6]<br>Annual 1998[7] | Annual 1998[7] | 2002[34] |
| NA | BZ | NE-1405 | Diesel Fuel Spill at Field Treatability Unit (identified as NE-1404; reassigned NE-1405 in Quarterly 7[9]) | Quarterly 3[6] | Quarterly 4[8]<br>Quarterly 7[9]<br>Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | BZ | NE-1406 | 771 Hillside Sludge Release | Quarterly 4[8] | Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | BZ | NE-1407 | OU 2 Treatment Facility | Quarterly 4[8] | Quarterly 7[9] (900-1312)<br>Quarterly 8[15] (900-1309)<br>Annual 2003 | Annual 2002<br>Annual 2003[55] | 2003[57] |
| NA | BZ | NE-1408 | OU 2 Test Well (formerly NE-1406) | Quarterly 4[8] | Quarterly 7[9] | Annual 1999[23] | 2000[29] |
| NA | BZ | NE-1409 | Modular Tanks and 910 Treatment System Spill (misidentified as 000-503 in Quarterly 5; correctly identified as NE-1409 in Quarterly 7) | Quarterly 5[10] | Quarterly 7[9]<br>Annual 2000[26] | Annual 1999[23]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| NA | BZ | NE-1410 | Diesel Fuel Spill at Field Treatability Unit | Quarterly 7[9] | - | Quarterly 7[9] | 2002[34] |
| NA | BZ | NE-1411 | Diesel Fuel Overflowed from Tanker at OU 2 Field Treatability Unit | Quarterly 7[9] | - | Quarterly 7[9] | 2002[34] |
| NA | BZ | NE-1412 | Trench T-12 Located in OU 2 East Trenches | Quarterly 10[11] | Annual 2003 | Annual 2003[55] | 2003[57] |
| NA | BZ | NE-1413 | Trench T-13 Located in OU 2 East Trenches | Quarterly 10[11] | Annual 2003 | Annual 2003[55] | 2003[57] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| **NORTHWEST BUFFER ZONE** | | | | | | | |
| 114 | 7 | NW-114 | Present Landfill | HRR[1] | - | - | - |
| 170 | BZ | NW-170 | PU&D Storage Yard - Waste Spills | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 2002[35] | Annual 1998[7]<br>Annual 1999[23] | 2002[34] |
| 174A | BZ | NW-174A | PU&D Yard Container Storage Area | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 2003 | Annual 2003[55] | 2003[57] |
| 174B | BZ | NW-174B | PU&D Container Storage Facilities | HRR[1] | Annual 1997[3]<br>Annual 1998[7] | Annual 1998[7]<br>Annual 1999[23] | 1999[28] |
| 195 | 16 | NW-195 | Nickel Carbonyl Disposal | HRR[1] | Annual 1996[2] | - | OU 16 CAD/ROD[12] |
| 203 | 7 | NW-203 | Inactive Hazardous Waste Storage Area | HRR[1] | Annual 1996[2]<br>Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | BZ | NW-1500 | Diesel Spill at PU&D Yard (formerly NW-175) | Quarterly 3[6] | Quarterly 7[9]<br>Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | BZ | NW-1501 | Asbestos Release at PU&D Yard (formerly NW-176) | Quarterly 3[6] | Quarterly 7[9] | Annual 1999[23] | 2000[29] |
| 114 | 7 | NW-1502 | Improper Disposal of Diesel-Contaminated Material at Landfill (formerly NW-177) | Quarterly 2[5] | Quarterly 3[6]<br>Quarterly 7[9] | Quarterly 7[9] | 2002[32] |
| 114 | 7 | NW-1503 | Improper Disposal of Fuel-Contaminated Material at Landfill | Quarterly 1[24] | Quarterly 7[9] | Quarterly 7[9] | 2002[32] |
| 114 | 7 | NW-1504 | Improper Disposal of Thorosilane-Contaminated Material at Landfill | Quarterly 7[9] | - | Quarterly 7[9] | 2002[34] |
| NA | BZ | NW-1505 | North Firing Range | Annual 2001[75] | Annual 2001[75] | | - |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| **SOUTHEAST BUFFER ZONE** | | | | | | | |
| 142.10 | 5 | SE-142.10 | Pond C-1 | HRR[1] | Annual 1997[3]<br>Annual 2004[56] | Annual 1997[3]<br>Annual 2004[56] | 2004[79] |
| 142.11 | 5 | SE-142.11 | Pond C-2 | HRR[1] | Annual 1997[3] | Annual 1997[3] | - |
| 209 | 5 | SE-209 | Surface Disturbance Southeast of Bldg. 881 | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| NA | BZ | SE-1600 | Pond 7-Steam Condensate Releases | HRR[1] | Annual 2002[35] | - | EPA, 1992[4],<br>2002[34] |
| NA | BZ | SE-1601 | Pond 8 - Cooling Tower Discharge Releases | HRR[1] | Annual 2002[35] | - | EPA, 1992[4],<br>2002[34] |
| 155 | BZ | SE-1602 | East Firing Range | Annual 1999[23] | - | - | - |
| **SOUTHWEST BUFFER ZONE** | | | | | | | |
| 115 | IA | SW-115 | Original Landfill | HRR[1] | - | - | - |
| 133.1 | 5 | SW-133.1 | Ash Pit 1 | HRR[1] | Annual 2001[75]<br>Annual 2003[42] | Annual 2001[75] | 2003[42] |
| 133.2 | 5 | SW-133.2 | Ash Pit 2 | HRR[1] | Annual 2001[75]<br>Annual 2002[3]<br>Annual 2003[42] | Annual 2001[75] | 2003[42] |
| 133.3 | 5 | SW-133.3 | Ash Pit 3 | HRR[1] | Annual 2001[75] | Annual 2001[75] | 2002[32] |
| 133.4 | 5 | SW-133.4 | Ash Pit 4 | HRR[1] | Annual 2001[75]<br>Annual 2002[35]<br>Annual 2003[42] | Annual 2001[75] | 2003[42] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 133.5 | 5 | SW-133.5 | Incinerator Facility | HRR[1] | Annual 1997[3]<br>Annual 2001[75]<br>Annual 2004[56] | Annual 1997[3]<br>Annual 2001[75]<br>Annual 2004[56] | 2003[60] |
| 133.6 | 5 | SW-133.6 | Concrete Wash Pad | HRR[1] | Annual 1997[3]<br>Annual 2001[75]<br>Annual 2004[56] | Annual 1997[3]<br>Annual 2001[75]<br>Annual 2004[56] | 2003[60] |
| 196 | IA | SW-196 | Water Treatment Plant Backwash Pond | HRR[1] | - | - | - |
| NA | BZ | SW-1700 | Fuel Spill into Woman Creek Drainage | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | 5 | SW-1701 | Recently Identified Ash Pit<br>(also referred to as TDEM-1) | Quarterly 9[13] | Annual 1997[3]<br>Annual 2001[75] | Annual 1997[3]<br>Annual 2001[75] | 2002[32] |
| NA | 5 | SW-1702 | Recently Identified Ash Pit<br>(also referred to as TDEM-2) | Quarterly 9[13] | Annual 2001[75]<br>Annual 2003[42] | Annual 2001[75] | 2003[42] |
| **000 AREA** | | | | | | | |
| 101 | IA | 000-101 | 207 Solar Evaporation Ponds | HRR[1] | Annual 1998[7]<br>Annual 2003 | | 2003[50] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 121 | IA | 000-121 | Original Process Waste Lines | HRR[1] | Annual 1996[2] Annual 1998[7] (OPWL in IHSS Group 100-4) Annual 2002 (Tank 40) Annual 2004[56] (Tanks 2, 3, 4, 5, 6, 8, 12, 13, 14, 15,16,17,36, 37; OPWL in IHSS Group 800-1 ) | Annual 2002 (Tank 40) Annual 2004[56] (Tanks 2, 3, 4, 5, 6, 8, 12, 13, 14, 15,16,17,36, 37; OPWL in IHSS Group 800-1) | 2003[38] (Tank 40) 2003[39] (OPWL in IHSS Group 100-4) 2003[61] (Tanks 4, 5, 6) 2004[62] (Tanks 8, 12, 13, 14, 15,16,17,36, 37) 2004[64] (OPWL in IHSS Group 800-1) 2004[65] (Tanks 2, 3) |
| 162 | IA | 000-162 | Radioactive Site - 700 Area Site # 2 | HRR[1] | - | - | - |
| 168 | 11 | 000-168 | West Spray Field | HRR[1] | Annual 1996[2] | - | OU 11 CAD/ROD[14] |
| 172 | IA | 000-172 | Central Avenue Waste Spill | HRR[1] | Annual 1998[7] | Annual 1998[7] | 1999[28] |
| 190 | IA | 000-190 | Caustic Leak (also referred to as Central Avenue Ditch) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[73] |
| 192 | 16 | 000-192 | Antifreeze Discharge | HRR[1] | Annual 1996[2] | - | OU 16 CAD/ROD[12] |
| NA | IA | 000-500 | Sanitary Sewer System (not shown on Plate 4) | HRR[1] | - | - | - |
| NA | BZ | 000-501 (see 100-613) | Roadway Spraying (identified as 000-501 in Quarterly 4[8]; reassigned as 100-613 in Quarterly 7[9]) | HRR[1] | - | - | EPA, 1992[4] 2002[32] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 000-502 (see 900-1310) | ITS Water Spill (identified in Quarterly 2 as 000-502; reassigned as 900-1310 in Quarterly 7; the number 000-502 is no longer in use.) | Quarterly 2[5] | NA | NA | NA |
| NA | IA | 000-503 | Solar Pond Water Spill Along Central Avenue | Quarterly 7[9] | - | Quarterly 7[9] | 2002[34] |
| NA | IA | 000-504 | New Process Waste Lines | Annual 1999[23] | Annual 2004[56] (NPWL in IHSS Group 800-1) | Annual 2004[56] (NPWL in IHSS Group 800-1)- | 2004[64] (NPWL in IHSS Group 800-1) - |
| NA | IA | 000-505 | Storm Drains | Annual 1999[23] | - | - | - |
| **100 AREA** | | | | | | | |
| 148 | IA | 100-148 | Waste Spills | HRR[1] | Annual 1998[7] (UBC 123) Annual 2003[39] | Annual 2002 | 2003[39] |
| NA | IA | 100-600 | Mercury Spill-Valve Vault 124-B, Building 124 | HRR[1] | - | - | EPA, 1992[4] 2002[32] |
| NA | IA | 100-601 | Building 123 Phosphoric Acid Spill | HRR[1] | - | - | EPA, 1992[4] 2002[32] |
| NA | IA | 100-602 | Building 123 Process Waste Line Break | HRR[1] | - | - | - |
| NA | IA | 100-603 | Building 123 Bioassay Waste Spill | HRR[1] | Annual 2001[75] Annual 2002[36] | Annual 2001[75] | 2002[32] |
| NA | IA | 100-604 | T130 Complex Sewer Line Leaks | HRR[1] | - | - | EPA, 1992[4] 2002[32] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 100-605 | Building 115 Hydraulic Oil Spill | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 100-606 | Building 125 TCE Spill | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 100-607 | Building 111 Transformer PCB Leak | HRR[1] | Annual 2000[26]<br>Annual 2001[75]<br>Annual 2002[36] | Annual 2001[75] | 2001[30] |
| NA | IA | 100-608 | Building 131 Transformer Leak | HRR[1] | Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | IA | 100-609 | Building 121 Security Incinerator | HRR[1] | Annual 2003[39] | Annual 2002 | Annual 2003[39] |
| NA | IA | 100-610 | Asbestos Release – Building 123 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 100-611 | Building 123 Scrubber Solution Spill | HRR[1] | Annual 2003[39] | Annual 2002 | 2003[39] |
| NA | IA | 100-612 | Battery Solution Spill - Building 119 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 100-613 | Asphalt Surface in Lay-down Yard North of Building 130<br>(identified as 000-501 in Quarterly 4[8]; reassigned as 100-613 in Quarterly 7[9]) | Quarterly 4[8] | Quarterly 7[9]<br>Annual 2002[35] | Quarterly 7[9] | 2002[34] |
| **300 AREA** | | | | | | | |
| 128 | IA | 300-128 | Oil Burn Pit No. 1 | HRR[1] | Annual 2003[44] | - | 2003[44] |
| 134N | IA | 300-134N | Lithium Metal Destruction Site | HRR[1] | Annual 2003[44] | - | 2003[44] |
| 134S | IA | 300-134S | Lithium Metal Destruction Site | HRR[1] | - | - | - |
| 135 | IA | 300-135 | Cooling Tower Blowdown | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 151 | IA | 300-151 | Tank 262 Fuel Oil Spills | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 156.1 | IA | 300-156.1 | Building 371 Parking Lot<br>(two locations designated on Plate #2) | HRR[1] | Annual 1997[3]<br>Annual 2000[26] | Annual 1997[3]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| 171 | IA | 300-171 | Solvent Burning Ground | HRR[1] | Annual 2003[44] | - | 2003[44] |
| 181 | IA | 300-181 | Building 334 Cargo Container Area | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 186 | IA | 300-186 | Valve Vault 12 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[85] |
| 188 | IA | 300-188 | Acid Leak | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 206 | IA | 300-206 | Inactive D-836 Hazardous Waste Tank | HRR[1] | Annual 2001[75] | Annual 2001[75] | 2002[34] |
| 212 | IA | 300-212 | Building 371 Drum Storage Area, Unit 63<br>(deferred to Part VIII of the RFETS RCRA Mixed Residues Modification; see Annual 1997) | HRR[1] | Annual 1997[3] | Annual 1997[3] | 2002[34] |
| NA | IA | 300-700 | Scrap Roofing Disposal<br>(see also BZCR Site 31, Section 3) | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-701 | Sulfuric Acid Spill – Building 371 | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-702 | Pesticide Shed | HRR[1] | Annual 2003[42] | - | 2003[48] |
| NA | IA | 300-703 | Building 331 North Area | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-704 | Roof Fire, Building 381 | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-705 | Potassium Hydroxide Spill North of Building 374 | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-706 | Evaporator Tanks North of Building 374 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 300-707 | Sanitizer Spill | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 300-708 | Transformers North of Building 371 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 300-709 | Transformer Leak 334-1 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 300-710 | Gasoline Spill North of Building 331 | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 300-711 | Nickel-Cadmium Battery Acid Spill Outside of Building 373 | Quarterly 1[24] | Quarterly 7[9] | Quarterly 7[9] | 2002[34] |
| NA | IA | 300-712 | 0.5-Gallon Antifreeze Spilled by Street Sweeper Outside of Building 373 | Quarterly 7[9] | - | Quarterly 7[9] | 2002[34] |
| NA | IA | 300-713 | Caustic Spill North of Building 331 | Quarterly 8[15] | - | Quarterly 8[15] | 2002[34] |
| NA | IA | 300-714 | Laundry Waste Water Spill from Tank T-803, North of Building 374 | Quarterly 10[11] | - | Quarterly 10[11] | 2002[34] |
| NA | IA | 300-715 | Battery Acid Spill | Annual 1997[3] | - | Annual 1997[3] | 1999[27] |
| **400 AREA** | | | | | | | |
| 116.1 | IA | 400-116.1 | West Loading Dock, Building 447 (IAG Name: West Loading Dock Area) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 116.2 | IA | 400-116.2 | South Loading Dock, Building 444 (IAG Name: South Loading Dock Area) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 122 | IA | 400-122 | Underground Concrete Tank | HRR[1] | Annual 1996[2] (000-121) | Annual 2004[56] | 2004[65] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 129 | IA | 400-129 | Building 443 Oil Leak (deferred to IA OU; see Annual 1997) | HRR[1] | Annual 1996[2] Annual 1997[3] | - | - |
| 136.1 | IA | 400-136.1 | Cooling Tower Pond West of Building 444 (IAG Name: Cooling Tower Pond Northeast Corner of Building 460) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 136.2 | IA | 400-136.2 | Cooling Tower Pond East of Building 444 (IAG Name: Cooling Tower Pond West of Building 460) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 157.1 | IA | 400-157.1 | Radioactive Site North Area | HRR[1] | - | - | - |
| 157.2 | IA | 400-157.2 | Radioactive Site South Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[84] |
| 182 | IA | 400-182 | Building 444/453 Drum Storage Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 187 | IA | 400-187 | Sulfuric Acid Spill (IAG Name: Acid Leaks [2] | HRR[1] | - | - | - |
| 191 | IA | 400-191 | Hydrogen Peroxide Spill | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 193 | 16 | 400-193 | Steam Condensate Leak | HRR[1] | Annual 1996[2] | - | OU 16 CAD/ROD[12] |
| 204 | 15 | 400-204 | Original Uranium Chip Roaster (deferred to D&D and UBC 447; see OU 15 CAD/ROD) | HRR[1] | Annual 1996[2] | Annual 1996[2] | 2002[32] |
| 205 | IA | 400-205 | Building 460 Sump #3 Acid Side | HRR[1] | - | - | - |
| 207 | IA | 400-207 | Inactive 444 Acid Dumpster | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| 208 | IA | 400-208 | Inactive 444/447 Waste Storage Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| NA | IA | 400-800 | Transformer 443-1 | HRR[1] | Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | IA | 400-801 | Transformer, Roof of Building 447 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| NA | IA | 400-802 | Storage Area, South of Building 334 | HRR[1] | Annual 2003[43] | - | 2003[43] |
| NA | IA | 400-803 | Miscellaneous Dumping, Building 460 Storm Drain | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[77] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 400-804 | Road North of Building 460 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[77] |
| NA | IA | 400-805 | Building 443 Tank #9 Leak | HRR[1] | Annual 2002[35] | - | EPA, 1992[4], 2002[32] |
| NA | IA | 400-806 | Catalyst Spill, Building 440 | HRR[1] | - | - | EPA, 1992[4], 2002[32] |
| NA | IA | 400-807 | Sandblasting Area | HRR[1] | Annual 2003[46] | - | 2003[46] |
| NA | IA | 400-808 | Vacuum Pump Leak - Building 442 | HRR[1] | - | - | EPA, 1992[4], 2002[32] |
| NA | IA | 400-809 | Oil Leak - 446 Guard Post | HRR[1] | - | - | EPA, 1992[4], 2002[32] |
| NA | IA | 400-810 | Beryllium Fire - Building 444 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| NA | IA | 400-811 | Transformer 443-2, Building 443 | Quarterly 2[5] | Quarterly 3[6] Annual 1998[7] | Annual 1998[7] | 1999[28] |
| NA | IA | 400-812 | Tank T-2 Spill in Building 460 | Quarterly 6[16] | Quarterly 7[9] Quarterly 8[15] Annual 2001[75] | Quarterly 8[15] Annual 2001[75] | 2002[32] |
| NA | IA | 400-813 | RCRA Tank Leak in Building 460 | Quarterly 7[9] | - | - | - |
| NA | IA | 400-814 | Air Conditioner Compressor Release, Bldg. 444 Roof | Quarterly 8[15] | - | Quarterly 8[15] | 2002[34] |
| NA | IA | 400-815 | RCRA Tank Leak in Building 460 | Quarterly 8[15] | - | - | - |
| NA | IA | 400-820 (see 600-1004) | Central Avenue Ditch Soil Spreading (identified in Quarterly 6 as 400-820, reassigned as 600-1004 in Quarterly 7; the number 400-820 is no longer in use). | Quarterly 6[16] | Quarterly 7[9] | NA | NA |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| **500 AREA** | | | | | | | |
| 117.1 | IA | 500-117.1 | North Site Chemical Storage | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[85] |
| 117.2 | IA | 500-117.2 | Middle Site Chemical Storage | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[70] |
| 158 | IA | 500-158 | Radioactive Site – Building 551 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[69] |
| 159 | IA | 500-159 | Radioactive Site – Building 559 | HRR[1] | - | - | - |
| 169 | IA | 500-169 | Waste Drum Peroxide Burial | HRR[1] | Annual 1998[7]<br>Annual 2000[26]<br>Annual 2004[56] | Annual 1998[7]<br>Annual 2004[56] | 2004[63] |
| 197 | IA | 500-197 | Scrap Metal Sites | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[85] |
| NA | IA | 500-900 | Transformer Leak – 515/516 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 500-901 | Transformer Leak – 555 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 500-902 | Transformer Leak – 559 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 500-903 | RCRA Storage Unit #1 | HRR[1] | - | - | EPA, 1992[4],<br>2002[32] |
| NA | IA | 500-904 | Transformer Leak – 223-1/223-2 | HRR[1] | Annual 2004[56] | Annual 2004[56] | Annual 2004[68] |
| NA | IA | 500-905 | Transformer Leak – 558-1 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 500-906 | Asphalt Surface Near Building 559 | Quarterly 4[8] | Annual 2003[47] | Annual 2002 | 2003[47] |
| 172 | IA | 500-907 | Tanker Truck Release of Hazardous Waste from Tank 231B | Quarterly 9[13] | Annual 2003[41] | | 2003[41] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 156.1, 186 | IA | 500-908 | Oil Released from Air Compressor | Quarterly 12[17] | - | Quarterly 12[17] | 2002[34] |
| 158 | IA | 500-909 | Release of Spent Photographic Fixer Solution | Annual 1996[2] | - | Annual 1996[2] | 2002[32] |
| **600 AREA** | | | | | | | |
| 117.3 | IA | 600-117.3 | Chemical Storage – South Site | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 120.1 | IA | 600-120.1 | Fiberglassing Area North of Building 664 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[67] |
| 120.2 | IA | 600-120.2 | Fiberglassing Area West of Building 664 | HRR[1] | Annual 2003[46] | - | 2003[46] |
| 152 | IA | 600-152 | Fuel Oil Tank 221 Spills | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 160 | IA | 600-160 | Radioactive Site Building 444 Parking Lot | HRR[1] | - | - | - |
| 161 | IA | 600-161 | Radioactive Site - Building 664 | HRR[1] | Annual 2003[46] | - | 2003[46] |
| 164.1 | IA | 600-164.1 | Radioactive Slab from Bldg. 771 | HRR[1] | Annual 1997[3]<br>Annual 2000[26]<br>Annual 2002[36] | Annual 1997[3]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| 189 | IA | 600-189 | Nitric Acid Tank | HRR[1] | Annual 1997[3]<br>Annual 2000[26]<br>Annual 2001[75] | Annual 1997[3]<br>Annual 2001[75] | 2002[34] |
| NA | IA | 600-1000 | Transformer Storage Outside Building 662 | HRR[1] | Annual 1996[2] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] |
| NA | IA | 600-1001 | Temporary Waste Storage Building 663 | HRR[1] | Annual 1997[3]<br>Annual 2003[45] | - | 2003[45] |
| NA | IA | 600-1001(a) | Waste Oil Identified in PAC-1001 | Annual 1997[3] | Annual 1997[3]<br>Annual 2000[26]<br>Annual 2002[36] | Annual 1997[3] | 1999[27]<br>2002[32] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 600-1002 | Transformer Storage - West of Building 666 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 600-1003 | Transformers North and South of 661/675 Substation | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| 152, 157.1, 172 | IA | 600-1004 | Central Avenue Ditch Cleaning Incident (formerly identified as 400-820) | Quarterly 6[16] | Quarterly 7[9]<br>Annual 2004[56] | Annual 2004[56] | 2004[71] |
| NA | IA | 600-1005 | Former Pesticide Storage Area | Quarterly 7[9] | Annual 2003[40] | Annual 2002 | 2003[40] |
| **700 AREA** | | | | | | | |
| 118.1 | IA | 700-118.1 | Multiple Solvent Spills West of Building 730 | HRR[1] | Annual 1998[7] | - | - |
| 118.2 | IA | 700-118.2 | Multiple Solvent Spills South End of Building 776 | HRR[1] | - | - | - |
| 123.1 | IA | 700-123.1 | Valve Vault 7 | HRR[1] | Annual 1997[3]<br>Annual 2000[26] | Annual 1997[3]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| 123.2 | IA | 700-123.2 | Valve Vault West of Building 707 | HRR[1] | - | - | - |
| 124.1 | IA | 700-124.1 | 30,000 Gallon Tank (Tank #68) | HRR[1] | Annual 1996[2] (000-121)<br>Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 124.2 | IA | 700-124.2 | 14,000 Gallon Tank (Tank #66) | HRR[1] | Annual 1996[2] (000-121)<br>Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 124.3 | IA | 700-124.3 | 14,000 Gallon Tank (Tank #67) | HRR[1] | Annual 1996[2] (000-121)<br>Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 125 | IA | 700-125 | Holding Tank (Tank #66) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 126.1 | IA | 700-126.1 | Westernmost Out-of-Service Waste Tank | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 126.2 | IA | 700-126.2 | Easternmost Out-of-Service Waste Tank | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 127 | IA | 700-127 | Low-Level Radioactive Waste Leak | HRR[1] | - | - | - |
| 131 | IA | 700-131 | Radioactive Site - 700 Area Site #1 | HRR[1] | - | - | - |
| 132 | IA | 700-132 | Radioactive Site - 700 Area Site #4 | HRR[1] | Annual 1996[2] (000-121) Annual 1997[3] | - | - |
| 137 | IA | 700-137 | Cooling Tower Blowdown Buildings 712 and 713 (IAG Name: Cooling Tower Blowdown Building 774) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[82] |
| 138 | IA | 700-138 | Cooling Tower Blowdown Building 779 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[87] |
| 139.1N(a) | IA | 700-139.1N(a) | Caustic/Acid Spills Hydroxide Tank Area | HRR[1] | Annual 1999[23] | - | - |
| 139.1N(b) | IA | 700-139.1N(b) | Caustic/Acid Spills Hydroxide Tank Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 139.1S | IA | 700-139.1S | Caustic/Acid Spills Hydroxide Tank Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[82] |
| 139.2 | IA | 700-139.2 | Caustic/Acid Spills Hydrofluoric Acid Tanks | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 143 | IA | 700-143 | Bldg. 771 Outfall | HRR[1] | Annual 1997[3] Annual 2004[56] | Annual 2004[56] | 2004[80] |
| 144 | IA | 700-144(N) | Sewer Line Overflow (IAG Name: Sewer Line Break) | HRR[1] | - | - | - |
| 144 | IA | 700-144(S) | Sewer Line Overflow (IAG Name: Sewer Line Break) | HRR[1] | - | - | - |
| 146.1 | IA | 700-146.1 | Concrete Process Waste Tanks 7,500 Gallon Tank (31) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 146.2 | IA | 700-146.2 | Concrete Process Waste Tanks 7,500 Gallon Tank (32) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 146.3 | IA | 700-146.3 | Concrete Process Waste Tanks 7,500 Gallon Tank (34W) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 146.4 | IA | 700-146.4 | Concrete Process Waste Tanks 7,500 Gallon Tank (34E) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 146.5 | IA | 700-146.5 | Concrete Process Waste Tanks 3,750 Gallon Tank (30) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 146.6 | IA | 700-146.6 | Concrete Process Waste Tanks 3,750 Gallon Tank (33) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 147.1 | IA | 700-147.1 | Process Waste Line Leaks (IAG Name: Maas Area) | HRR[1] | - | - | - |
| 149.1 | IA | 700-149.1 | Effluent Pipe | HRR[1] | | | 2003[50] |
| 149.2 | IA | 700-149.2 | Effluent Pipe | HRR[1] | | - | 2003[50] |
| 150.1 | IA | 700-150.1 | Radioactive Site North of Building 771 (IAG Name: Radioactive Leak North of Building 771) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 150.2 | IA | 700-150.2(N)<br>700-150.2(S) | Radioactive Site West of Buildings 771 and 776 (IAG Name: Radioactive Leak West of Building 771) | HRR[1] | Annual 2004[56] (700-150.2[N]) | Annual 2004[56] (700-150.2[N]) | 2004[62] (700-150.2[N]) |
| 150.3 | IA | 700-150.3 | Radioactive Site Between Buildings 771 & 774 (IAG Name: Radioactive Leak Between Buildings 771 & 774) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 150.4 | IA | 700-150.4 | Radioactive Site Northwest of Building 750 (IAG Name: Radioactive Leak East of Building 750) | HRR[1] | - | - | - |
| 150.5 | IA | 700-150.5 | Radioactive Site West of Building 707 (IAG Name: Radioactive Leak West of Building 707) | HRR[1] | Annual 1998[7] | Annual 1998[7] | 1999[28] |
| 150.6 | IA | 700-150.6 | Radioactive Site South of Building 779 (IAG Name: Radioactive Leak South of Building 779) | HRR[1] | Annual 2003 | Annual 2003[55] | 2003[58] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 150.7 | IA | 700-150.7 | Radioactive Site South of Building 776 (IAG Name: Radioactive Leak South of Building 776) | HRR[1] | - | - | - |
| 150.8 | IA | 700-150.8 | Radioactive Site Northeast of Building 779 (IAG Name: Radioactive Leak Northeast of Building 779) | HRR[1] | Annual 2003 | Annual 2003[55] | 2003[58] |
| 163.1 | IA | 700-163.1 | Radioactive Site 700 Area Site No.3 Wash Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 163.2 | IA | 700-163.2 | Radioactive Site 700 Area Site No.3 Buried Slab | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| 185 | 16 | 700-185 | Solvent Spill | HRR[1] | Annual 1996[2] | - | OU 16 CAD/ROD[12] |
| 194 | 16 | 700-194 | Steam Condensate Leak | HRR[1] | Annual 1996[2] | - | OU 16 CAD/ROD[12] |
| 214 | IA | 700-214 | 750 Pad Pondcrete & Saltcrete Storage, Unit 25 | HRR[1] | - | - | - |
| 215 | IA | 700-215 | Process Waste Tank Unit 55.13 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| NA | IA | 700-1100 | French Drain North of Building 776/777 | HRR[1] | - | - | - |
| NA | IA | 700-1101 | Laundry Tank Overflow - Building 732 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[86] |
| NA | IA | 700-1102 | Transformer Leak – 776-4 | HRR[1] | Annual 1996[2]<br>Annual 1997[3]<br>Annual 2000[26]<br>Annual 2001[75]<br>Annual 2004[56] | Annual 1997[3]<br>Annual 2001[75]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 700-1103 | Leaking Transformers - Building 707 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 700-1104 | Leaking Transformers - Building 708 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 700-1105 | Transformer Leak - 779-1/779-2 | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[87] |
| NA | IA | 700-1106 | Process Waste Spill - Portal 1 | HRR[1] | Annual 2003[37] | Annual 2002 | 2003[37] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 700-1107 | Compressor Waste Oil Spill - Building 776 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 700-1108 | 771/774 Footing Drain Pond | HRR[1] | Annual 1999[23] | - | - |
| NA | IA | 700-1109 | Uranium Incident - Building 778 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 700-1110 | Nickel Carbonyl Burial West of Building 771 | HRR[1] | - | - | EPA, 1992[4]<br>2002[34] |
| NA | IA | 700-1111 | Leaking Transformer - Building 750 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 700-1112 | Leaking Transformer - 776-5 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| 101 | IA | 700-1113 | Water Released from 207C Solar Evaporation Pond | Quarterly 11[18] | - | Quarterly 11[18] | 2002[34] |
| NA | IA | 700-1114a | Release During Liquid Transfer Operations from Bldg. 774 | Annual 1997[3] | - | Annual 1997[3] | 2002[34] |
| NA | IA | 700-1114b | Release During Liquid Transfer Operations from Bldg. 774 | Annual 1997[3] | Annual 2002[35] | Annual 1997[3] | 2002[34] |
| NA | IA | 700-1115 | Identification of Diesel Fuel in Subsurface Soils | Annual 1997[3] | Annual 2004[56] | Annual 2004[56] | 2004[81] |
| 150.7 | IA | 700-1116 | Leaking Transformer South of Building 776 | Annual 1998[7] | - | - | - |
| NA | IA | 700-1117 | Building 701 Water Line, Soil Put-back | Annual 1998[7] | - | Annual 1998[7] | CDPHE 1998[19] |
| **800 AREA** | | | | | | | |
| 102 | 1 | 800-102 | Oil Sludge Pit | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 103 | 1 | 800-103 | Chemical Burial | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 104 | 1 | 800-104 | Liquid Dumping | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 105.1 | 1 | 800-105.1 | Bldg. 881 Westernmost Out of Service Fuel Tanks | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 105.2 | 1 | 800-105.2 | Bldg. 881 Easternmost Out of Service Fuel Tanks | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 106 | 1 | 800-106 | Bldg. 881, Outfall | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 107 | 1 | 800-107 | Bldg. 881, Hillside Oil Leak | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 145 | 1 | 800-145 | Sanitary Waste Line Leak | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 147.2 | IA | 800-147.2 | Bldg. Conversion Activity Contamination Area | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 164.2 | IA | 800-164.2 | Radioactive Site 800 Area Site #2, Building 886 Spills | HRR[1] | Annual 2003[52] | - | 2003[52] |
| 164.3 | IA | 800-164.3 | Radioactive Site 800 Area Site #2, Building 889 Storage Pad | HRR[1] | Annual 2003[38] | - | 2003[38] |
| 177 | IA | 800-177 | Building 885 Drum Storage and Paint Storage (IAG Name: Building 885 Drum Storage Area) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[72] |
| 178 | 15 | 800-178 | Building 881 Drum Storage Area | HRR[1] | Annual 1996[2] | - | OU 15 CAD/ROD[21] |
| 179 | 15 | 800-179 | Building 865 Drum Storage; refer to OU 15 CAD/ROD) | HRR[1] | Annual 1996[2] Annual 2001[75] | Annual 1996[2] Annual 2001[75] | 2002[32] |
| 180 | 15 | 800-180 | Building 883 Drum Storage; refer to OU 15 CAD/ROD) | HRR[1] | Annual 1996[2] Annual 2001[75] | Annual 1996[2] Annual 2001[75] | 2002[32] |
| 211 | 15 | 800-211 | Building 881 Drum Storage, Unit 26 | HRR[1] | Annual 1996[2] | - | OU 15 CAD/ROD[22] |
| 217 | 15 | 800-217 | Building 881, CN Bench Scale Treatment, Unit 32 | HRR[1] | Annual 1996[2] | - | OU 15 CAD/ROD[22] |
| NA | IA | 800-1200 | Valve Vault 2 | HRR[1] | - | - | - |
| NA | IA | 800-1201 | Radioactive Site South of Building 883 | HRR[1] | - | - | - |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 800-1202 | Sulfuric Acid Spill, Building 883 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 800-1203 | Sanitary Sewer Line Break Between Buildings 865 and 886 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 800-1204 | Building 866 Spills | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[64] |
| NA | IA | 800-1205 | Building 881, East Dock | HRR[1] | Annual 2003[53] | - | 2003[53] |
| NA | IA | 800-1206 | Fire, Building 883 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 800-1207 | Transformer 883-4 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 800-1208 | Transformer 881-4 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 800-1209 | Leaking Transformers, 800 Area | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 800-1210 | Transformers 865-1 and 865-2 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[64] |
| NA | IA | 800-1211 | Capacitor Leak, Building 883 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 800-1212 | Building 866 Sump Spill | Quarterly 5[10] | Annual 2004[56] | Annual 2004[56] | 2004[64] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| **900 AREA** | | | | | | | |
| 108 | BZ | 900-108 | Trench T-1 | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 2000[26] | Annual 1999[23]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| 109 | BZ | 900-109 | Trench T-2 - Ryan's Pit | HRR[1] | Annual 1996[2]<br>Annual 1997[3]<br>Annual 2002[35] | Annual 1997[3] | 2002[34] |
| 112 | BZ | 900-112 | 903 Pad (IAG Name: 903 Drum Storage Area) | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 1999[23]<br>Annual 2000[26] | - | - |
| 113 | BZ | 900-113 | Mound Area | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 119.1 | 1 | 900-119.1 | West Scrap Metal Storage Area and Solvent Spill (OU 1 CAD/ROD Specifies Continuance of Groundwater Collection from well (see ref. # 20). | HRR[1] | Annual 1996[2]<br>Annual 1997[3]<br>Annual 1998[7] | - | 1999[27] |
| 119.2 | 1 | 900-119.2 | East Scrap Metal Storage Area and Solvent Spill | HRR[1] | Annual 1996[2]<br>Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 130 | 1 | 900-130 | Contaminated Soil Disposal Area East of Bldg. 881 | HRR[1] | Annual 1997[3] | - | OU 1 CAD/ROD[20] |
| 140 | BZ | 900-140 | Hazardous Disposal Area (IAG Name: Reactive Metal Destruction Site) | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 2000[26]<br>Annual 2003[42] | Annual 1998[7]<br>Annual 2003[55] | - |
| 141 | 6 | 900-141 | Sludge Disposal | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 153 | IA | 900-153 | Oil Burn Pit No. 2 | HRR[1] | Annual 1999[23]<br>Annual 2003[42] | Annual 2003[55] | - |
| 154 | IA | 900-154 | Pallet Burn Site | HRR[1] | Annual 1999[23]<br>Annual 2003[42] | Annual 2003[55] | - |
| 155 | BZ | 900-155 | 903 Lip Area | HRR[1] | Annual 1997[3]<br>Annual 1998[7]<br>Annual 1999[23]<br>Annual 2000[26] | - | - |
| 165 | IA | 900-165 | Triangle Area | HRR[1] | Annual 2003[50 & 54] | - | 2003[50 & 54] |
| 173 | IA | 900-173 | South Dock - Building 991 (IAG Name: Radioactive Site - 900 Area) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[66] |
| 175 | IA | 900-175 | S&W Building 980 Container Storage Facility | HRR[1] | Annual 2003[49] | - | 2003[49] |
| 176 | IA | 900-176 | S&W Contractor Storage Yard | HRR[1] | Annual 2003[55] | - | 2003[50 & 54] |
| 183 | BZ | 900-183 | Gas Detoxification Area | HRR[1] | Annual 1997[3]<br>Annual 2000[26]<br>Annual 2002[35] | Annual 1997[3]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| 184 | IA | 900-184 | Building 991 Steam Cleaning Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[66] |
| 210 | IA | 900-210 | Building 980 Cargo Container, Unit 16 | HRR[1] | Annual 1997[3] | Annual 1997[3] | 1999[27] |
| 213 | IA | 900-213 | Unit 15, 904 Pad Pondcrete Storage | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[59] |
| NA | IA | 900-1300 | RO Plant Sludge Drying Beds | HRR[1] | - | - | EPA, 1992[4]<br>2002[34] |
| NA | IA | 900-1301 | Building 991 Enclosed Area | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[66] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | 900-1302 | Gasoline Spill | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 900-1303 | Natural Gas Leak | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 900-1304 | Chromic Acid Spill - Building 991 | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 900-1305 | Building 991 Roof | HRR[1] | - | - | EPA, 1992[4]<br>2002[32] |
| NA | IA | 900-1306 | Transformers 991-1 and 991-2 | HRR[1] | Annual 1996[2]<br>Annual 2004[56] | Annual 1996[2]<br>Annual 2004[56] | 2004[74] |
| NA | IA | 900-1307 | Explosive Bonding Pit | HRR[1] | Annual 1999[23]<br>Annual 2004[56] | Annual 2004[56] | 2004[66] |
| NA | IA | 900-1308 | Gasoline Spill Outside of Building 980 | Quarterly 6[16] | Quarterly 8[15]<br>Annual 2001[75] | Annual 2001[75] | 2002[32] |
| NA | BZ | 900-1309 | OU 2 Field Treatability Unit Spill | Quarterly 6[16] | Quarterly 7[9] (900-1312)<br>Quarterly 8[15]<br>Annual 1999[23] | Annual 1999[23] | 2000[29] |
| NA | IA | 900-1310 | ITS Water Spill (identified as 000-502 in Quarterly 2; reassigned 900-1310 in Quarterly 7[9]) | Quarterly 2[5] | Quarterly 3[6]<br>Quarterly 7[9]<br>Annual 2000[50] | - | Annual 2000[50] |
| NA | IA | 900-1311 | Septic Tank East of Building 991 | Quarterly 7[9] | Annual 1999[23]<br>Annual 2000[26] | Annual 1999[23]<br>Annual 2000[26] | 2001[31]<br>2002[32] |
| NA | IA | 900-1312 | OU-2 Water Spill | Quarterly 7[9] | Annual 1999[23] | Annual 1999[23] | 1999[29] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| 192 | IA | 900-1313 | Seep Area Near OU-2 Influent | Quarterly 9[13] | Annual 1999[23] | Annual 1999[23] | 1999[29] |
| 101 | IA | 900-1314 | Solar Evaporation Pond 207B Sludge Release | Quarterly 9[13] | - | Quarterly 9[13] | 2002[34] |
| NA | IA | 900-1315 | Tanker Truck Release on East Patrol Road, North of Spruce Ave. | Quarterly 10[11] | Quarterly 11[18] | Quarterly 11[18] | 2002[34] |
| NA | BZ | 900-1316 | Elevated Chromium (total) Identified During Geotechnical Drilling | Quarterly 10[11] | - | Quarterly 10[11] | 2002[34] |
| 176 | IA | 900-1317 | Soil Released from Wooden Crate in 964 Laydown Yard | Quarterly 11[18] | - | Quarterly 11[18] | 2002[34] |
| NA | IA | 900-1318 | Release of F001 Listed Waste Water to Soil (misidentified as 900-1307 in Annual 1997; correctly identified as 900-1318 in Annual 1998) | Annual 1997[3] | Annual 1998[7] Annual 2000[26] | Annual 1997[3] Annual 2000[26] | 2001[31] 2002[32] |
| **OFF-SITE AREA** | | | | | | | |
| 199 | 3 | OFF-SITE AREA 1 | Off-Site Area 1 | HRR[1] | Annual 1997[3] | - | OU 3 CAD/ROD[22] |
| 200 | 3 | OFF-SITE AREA 2 | Great Western Reservoir | HRR[1] | Annual 1997[3] | - | OU 3 CAD/ROD[22] |
| 201 | 3 | OFF-SITE AREA 3 | Standley Lake | HRR[1] | Annual 1997[3] | - | OU 3 CAD/ROD[22] |
| 202 | 3 | OFF-SITE AREA 4 | Mower Reservoir | HRR[1] | Annual 1997[3] | - | OU 3 CAD/ROD[22] |
| **UNDER BUILDING CONTAMINATION** | | | | | | | |
| NA | IA | UBC-122 | Building 122 (UBC-122) | HRR[1] | - | - | - |
| NA | IA | UBC-123 | Building 123 (UBC-123) | HRR[1] | Annual 1998[7] Annual 2001[75] Annual 2003[39] | Annual 2002 | 2003[39] |
| NA | IA | UBC-125 | Building 125 (UBC-125) | HRR[1] | Annual 2002[35] | - | 2002[33] |
| NA | IA | UBC-331 | Building 331 (UBC-331) | HRR[1] | - | - | - |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | UBC-371 | Building 371 (UBC-371) | HRR[1] | Annual 2003[51] | - | 2003[51] |
| NA | IA | UBC-374 | Building 374 (UBC-374) | HRR[1] | Annual 2003[51] | - | 2003[51] |
| NA | IA | UBC-439 | Building 439 (UBC-439) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[76] |
| NA | IA | UBC-440 | Building 440 (UBC-440) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[83] |
| NA | IA | UBC-441 | Building 441 UBC-441) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[65] |
| NA | IA | UBC-442 | Building 442 (UBC-442) | HRR[1] | - | - | - |
| NA | IA | UBC-444 | Building 444 (UBC-444) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| NA | IA | UBC-447 | Building 447 (UBC-447) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2003[61] |
| NA | IA | UBC-528 | Building 528 (UBC-528) | HRR[1] | - | - | - |
| NA | IA | UBC-559 | Building 559 (UBC-559) | HRR[1] | - | - | - |
| NA | IA | UBC-701 | Building 701 (UBC-701) | HRR[1] | - | - | - |
| NA | IA | UBC-707 | Building 707 (UBC-707) | HRR[1] | - | - | - |
| NA | IA | UBC-731 | Building 731 (UBC-731) | HRR[1] | - | - | - |
| NA | IA | UBC-770 | Building 770 UBC-770) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[78] |
| NA | IA | UBC-771 | Building 771(UBC-771) | HRR[1] | Annual 2001[75]<br>Annual 2004[56] | Annual 2004[56] | 2004[62] |
| NA | IA | UBC-774 | Building 774 (UBC-774) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[62] |
| NA | IA | UBC-776 | Building 776 (UBC-776) | HRR[1] | Annual 2003 | - | - |
| NA | IA | UBC-777 | Building 777 (UBC-777) | HRR[1] | Annual 2003 | - | - |
| NA | IA | UBC-778 | Building 778 (UBC-778) | HRR[1] | - | - | - |
| NA | IA | UBC-779 | Building 779 (UBC-779) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[87] |
| NA | IA | UBC-865 | Building 865 (UBC-865) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[64] |
| NA | IA | UBC-881 | Building 881 (UBC-881) | HRR[1] | Annual 2003[53] | - | 2003[53] |

**Appendix 1.** HRR Sites at RFETS.

| IHSS | OU | PAC | Description | Identified | Updated | Proposed NFA in HRR | NFA Recommendation Approved |
|---|---|---|---|---|---|---|---|
| NA | IA | UBC-883 | Building 883 (UBC-883) | HRR[1] | - | - | - |
| NA | IA | UBC-886 | Building 886 (UBC-886) | HRR[1] | Annual 2001[75] Annual 2003[52] | - | 2003[52] |
| NA | IA | UBC-887 | Building 887 (UBC-887) | HRR[1] | Annual 2004[56] | Annual 2004[56] | 2004[72] |
| NA | IA | UBC-889 | Building 889 (UBC-889) | HRR[1] | Annual 2003[38] | Annual 2002 | 2003[38] |
| NA | IA | UBC-991 | Building 991 (UBC-991) | HRR[1] | Annual 2003[51] Annual 2004[56] | Annual 2004[56] | 2004[66] |
| NA | NA | NA | PICs 1, 2, 3, 5, 7, 8, 10, 12, 13, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 43, 45, 46, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 59, 60, 61 | HRR[1] | 2002 | - | 2002[34] |
| NA | NA | NA | PICs 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, 57 | HRR[1] | 2002 Annual 2004[56] | Annual 2004[56] | 2004[88] |

1. Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, CO, June, 1992.
2. Annual Update for the Historical Release Report, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, CO, September, 1996.
3. Annual Update for the Historical Release Report, RF/RMRS-97-073.UN, Rocky Flats Environmental Technology Site, Golden, CO, September, 1997.
4. EPA, 1992. Correspondence to R. Schassburger, DOE RFO, from M. Hestmark, EPA Region VIII, RE: Potential Area of Concern Needing Further Investigation, December 23.
5. Historical Release Report Second Quarterly Update, October 1, 1992 to January 1, 1993.
6. Historical Release Report, Third Quarterly Update, January 1, 1993 to April 1, 1993.
7. Annual Update for the Historical Release Report, RF/RMRS-98-269.UN, Rocky Flats Environmental Technology Site, Golden, CO, September.
8. Historical Release Report, Fourth Quarterly Update, April 1, 1993 to July 1, 1993.
9. Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994.
10. Historical Release Report, Fifth Quarterly Update, July 1, 1993 to October 1, 1993.

11. Historical Release Report, Tenth Quarterly Update, October 1, 1994 to December 31, 1994.
12. Corrective Action Decision/Record of Decision for OU 16: Low Priority Sites, Rocky Flats Environmental Technology Site, Golden, CO August, 1994
13. Historical Release Report, Ninth Quarterly Update, July 1, 1994 to September 30, 1994.
14. Operable Unit 11 Final Combined Phases RFI/RI Report, Rocky Flats Environmental Technology Site, Golden, CO, June, 1995.
15. Historical Release Report, Eighth Quarterly Update, April 1, 1994 to June 30, 1994.
16. Historical Release Report, Sixth Quarterly Update, October 1, 1993 to January 1, 1994.
17. Historical Release Report, Twelfth Quarterly Update, April 1, 1995 to June 30, 1995.
18. Historical Release Report, Eleventh Quarterly Update, January 1, 1995 to March 31, 1995.
19. CDPHE, 1998, Excavated Soil Adjacent to Building 701 (cc mail from C. Spreng to L. Brooks), Rocky Flats Environmental Technology Site, Golden, CO, July.
20. Corrective Action Decision/Record of Decision, Operable Unit 1: 881 Hillside Area, IHSS 119.1, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, February, 1997.
21. Corrective Action Decision/Record of Decision for OU 15: Inside Building Closures, Rocky Flats Environmental Technology Site, Golden, CO, August, 1995.
22. Final Corrective Action Decision/Record of Decision Declaration, Operable Unit 3, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July, 1997.
23. Annual Update for the Historical Release Report, RF/RMRS-99-428.UN, Rocky Flats Environmental Technology Site, Golden, CO, September, 1999.
24. Historical Release Report, First Quarterly Report submitted September 30, 1992.
25. KH, 2000, Historical Release Report (Interim Update) and Response to Comments for HRR Annual Updates (1997, 1998 & 1999), Rocky Flats Environmental Technology Site, Golden, CO, September.
26. Annual Update for the Historical Release Report, KH-00-900.UN, Rocky Flats Environmental Technology Site, Golden, CO, September, 2000.
27. EPA, CDPHE, 1999. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: 1997 Annual HRR Review, July 9, 1999.
28. EPA, CDPHE, 1999. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: 1998 Annual HRR Review, July 9, 1999.
29. EPA, CDPHE, 2000. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: 1999 Annual HRR Review, June 23, 2000.
30. EPA, CDPHE, 2001. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: NFA PAC 100-607, April 12, 2001.
31. CDPHE, 2001, Preliminary Electronic Correspondence to M.C. Broussard, from C. Spreng CDPHE, RE: 2000 Annual HRR Review, September 2001.
32. EPA, CDPHE, 2002. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: Approval of NFA Designation for IHSSs & PACs, February 14, 2002.
33. EPA, CDPHE, 2002. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: No Further Action Justification for Bldg. 125 UBC, April 2, 2002.

34. EPA, CDPHE, 2002. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: Approval of NFA designation for IHSSs, PACs, and PICs, September 26, 2002.
35. Additional clarification supporting NFA status is provided in the 2002 HRR narratives, based on discussions of FY02 HRR Working Group.
36. Further clarification of NFA status is provided by NFA Approval Letter, based on FY02 HRR Working Group discussion.
37. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 700-12, May 15.
38. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 800-6, March 25.
39. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Groups 100-4 and 100-5, April 22.
40. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 600-6, May 15.
41. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 500-7, June9.
42. EPA, 2003. Correspondence to R. DiSalvo, DOE RFO, from T. Rehder, EPA Region VIII, RE: No Further Action Justification for Ash Pits PAC Reference Numbers SW-133.1, SW-133.2, SW-133.4 and 1702 (dated June 11, 2003), NFAA Justification for Trench T-7 PAC Reference Number: NE 111.4 (dated May 21, 2003, NFAA Justification Trenches T-3 and T-4 PAC Reference Number: 111.1 (dated May 21, 2003), June 12.
43. CDPHE, 2003. Correspondence to R. DiSalvo, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 600-2, June 19.
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47. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 500-6, July 16.
48. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 300-6, July 21.
49. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 900-4&5, July 23.
50. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, T. Rehder, EPA Region VIII RE: Final Closeout Report for IHSS Group 000-1, July 29.
51. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Groups 300-3 and 300-4, August 21.
52. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 800-4, May 15.
53. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Closeout Report for IHSS Group 800-2, July 16.
54. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Data Summary Report for IHSS Group 000-1, July 29.
55. Annual Update for the Historical Release Report, Rocky Flats Environmental Technology Site, Golden, CO. September, 2003.
56. Annual Update for the Historical Release Report, Rocky Flats Environmental Technology Site, Golden, CO, September, 2004.
57. EPA, 2003. Correspondence to J. Legare, DOE RFO; from G. Kleeman; EPA, RE: Characterization Data Summary Report IHSS Group NE/NW, October 7.

58. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: No Further Accelerated Action (NFAA) for IHSS Groups 150.6 and 150.8 (B779), October 20.

59. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Final Approval, Data Summary Report, IHSS Group 900-3 (904 Pad), dated November 2003, December 17.

60. EPA, 2003. Correspondence to J. Legare, DOE RFO; from M. Aguilar; EPA, RE: Closeout Report for IHSS Group SW-1, December 18.

61. CDPHE, 2003. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Data Summary Report, IHSS Group 400-3 (Buildings 444, 447 et. Al.), dated November 2003, December 18.

62. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: ER RSOP Notification and Closeout Report for IHSS Group 700-4 (B771 & 774) - Approval, February 6.

63. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval: No Further Accelerated Action (NFAA), PAC 500-169 Waste Drum Peroxide Burial, February 20.

64. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Closeout Report for IHSS Group 800-1 (B865) - Approval, March 19.

65. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Closeout Report for IHSS Group 400-8 (B441) - Approval, March 19.

66. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Closeout Report for IHSS Group 900-1 (B991 & 993) - Approval, March 31.

67. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Data Summary Report for IHSS Group 600-3 (B668) - Approval, May 12.

68. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Data Summary Report for IHSS Group 500-5, PAC 500-904, April 2004, May 17.

69. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Closeout Report for IHSS Group 500-2, IHSS 500-158 Radioactive Site – Building 551, June 2004, June 18.

70. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-4, IHSS 500-117.2, Middle Site Chemical Storage, June 2004, June 18.

71. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 600-5, PAC 600-1004, June 2004, June 18.

72. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Data Summary Report IHSS Group 800-5 (B887 and B885), NFAA - Approval, June 21.

73. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval: No Further Accelerated Action (NFAA), PAC 000-190, Caustic Leak, July 9.

74. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004), May 6.

75. Annual Update for the Historical Release Report, Rocky Flats Environmental Technology Site, Golden, CO, September, 2001.

76. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Data Summary Report for IHSS Group 400-1 (UBC-439) – Radiological Survey - August 23.

77. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE:Approval, Data Summary Report for IHSS Group 400-4, PAC 400-803 – Miscellaneous Dumping, Building 446 Storm Drain, and PAC -804 – Road North of Building 460, August 23.

78. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Data Summary Report IHSS Group 700-5 (B770), NFAA - Approval, September 7.

79. EPA, 2004, Correspondence to J. Legare, DOE RFO; from M. Aguilar; EPA, RE: No Further Accelerated Action Justification for Retention Pond C-1 (PAC Reference Number: SE-142.10. June 17, 2004.

80. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: No Further Accelerated Action (NFAA) Request for IHSS 143 (B771) - Approval, September 29, 2004.

81. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 700-1 PAC 700-1115 – Identification of Diesel Fuel in Subsurface Soil, dated August 2004, September 14, 2004.

82. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Closeout Report for IHSS Group 700-6, Buildings 712/713 Cooling Tower Blowdown, IHSS 700-139.1(S) Caustic/Acid Spills Hydroxide Tank Area, dated September 2004, September 29, 2004.

83. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 400-2, UBC 440 – Modification Center, dated September 2004, September 27, 2004.

84. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 400-6, IHSS 157.2 Radioactive Site South Area, dated September 2004, September 29, 2004.

85. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 500-1, IHSS 300-186, IHSS 500-117.1 and IHSS 500-197, dated September 2004, September 29, 2004.

86. CDPHE, 2004, Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Approval, Draft Data Summary Report for IHSS Group 700-10, PAC 700-1101 Laundry Tank Overflow – Building 732, dated September 2004, September 21, 2004.

87. CDPHE, 2004. Correspondence to J. Legare, DOE RFO; from S. Gunderson; CDPHE, RE: Closeout Report for IHSS Group 700-7 (B779) - Approval, October 1, 2004.

88. CDPHE, 2004, Correspondence to J. Legare, DOE RFO, from S. Gunderson, CDPHE, RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47, and 57 Action/No Action Recommendations, April 15, 2004.

# Appendix 2

# Correspondence

400-75
D-5

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

December 17, 2003

Mr. Joseph Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Final Approval, Data Summary Report, IHSS Group 900-3 (904 Pad), dated November 2003**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants final approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for the 904 Pad. The Division previously granted conditional approval for NFAA subject to sampling of native soils believed to have been contaminated by wind blown releases of radionuclides from the 903 Pad. The additional sampling has been satisfactorily completed.

A comment resolution meeting, stemming from the inclusion of the new data, occurred on December 12, 2003. Based on the meeting, the document may now be finalized. For completeness, the additional set of comments is attached.

The new data should also be included in the closeout report for the 903 Pad and/or Inner Lip. Agreement on this objective was made at a meeting, including the project coordinators, on September 24, 2003 and reiterated in the conditional approval letter of September 30, 2003.

We look forward to verifying the content of the revised final report. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

Attachment

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

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SW-1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466

DEC 18 2003

Mr. Joseph A. Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

Dear Mr. Legare:

RE: Closeout Report for IHSS Group SW-1

The above referenced document has been reviewed by EPA. This document summarizes the accelerated action activities conducted at IHSS 133.5, the Incinerator Facility and IHSS 133.6 the Concrete Wash Pad. Approval of this document is granted at this time, however EPA notes the existence of lead, beryllium, and total uranium at levels exceeding RFCA ecological action levels. It is understood that these exceedances will be carefully evaluated through the sitewide Accelerated Action Ecological Screening Process and the Comprehensive Risk Assessment to determine whether a soil removal action will be necessary in the future.

If you have any questions in regards to these comments, please call Gary Kleeman at 303 312-6246.

Sincerely,

Mark Aguilar
Acting Rocky Flats Team Leader

Cc Norma Castenada, DOE
Lane Butler, KH
Marla Broussard, KH
Steve Gunderson, CDPHE

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# STATE OF COLORADO

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Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

December 18, 2003

Mr. Joseph Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Data Summary Report, IHSS Group 400-3 (Building 444, 447 et. al.), dated November 2003**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) approves the Data Summary Report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 400-3.

The Division notes the existence of arsenic, lead, beryllium, and uranium (total) at levels exceeding RFCA ecological action levels. It is understood that these exceedances will be carefully evaluated through the sitewide Accelerated Action Ecological Screening Process and the Comprehensive Risk Assessment (CRA) to determine whether an eco-specific action becomes necessary within IHSS Group 400-3.

Additionally, the Division agrees that the forthcoming sitewide ground water IM/IRA is an acceptable means to address concerns regarding any potential of a ground water pathway for beryllium or chlorinated solvents that might be generated from the vicinity of IHSS 182. Surface and subsurface soils show that organic constituents are present at low levels. However, the investigation of IHSS 182 was not extended to a depth sufficient to detect the potential presence of dense non-aqueous phase liquids (DNAPL) that may constitute the source of a Tier I plume originating in the area, and that may impact surface water in the future.

Due to the elevated levels of lead and beryllium found during the UBC investigation, special attention needs to be paid when removing the slab for any indication of contaminant migration pathways through the slab, such as staining along cracks in the slab. If indications of possible contamination are identified, additional soil samples may need to be collected for metals and radiological analysis.

The Division's comments, discussed at a resolution meeting on December 12, 2003, are attached to support the Administrative Record. Verbal comments on a subsequent electronic version were resolved in a series of telephone conversations between staff on December 17, 2003. Therefore, please submit a finial, hard copy, of the document for final verification and filing.

If you have any questions regarding this correspondence, please contact me at (303) 692-3367, Harlen Ainscough at 303-692-3337, Elizabeth Pottorff at 303-692-3429 or David Kruchek at 303-692-3328.

395

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Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

Attachment

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Dyan Foss, K-H

700-4
Not: Closeout

# STATE OF COLORADO

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Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

February 6, 2004

Mr. Joe Legare
Acting Assistant Manager for Environment and Stewardship
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: ER RSOP Notification and Closeout Report for IHSS GROUP 700-4 (B771 & 774) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the ER RSOP Notification and Closeout Report for IHSS GROUP 700-4, dated December 2003. The IHSS Group 700-4 includes investigation for possible contamination under and around Buildings 771 and 774. Based on the information provided, the Division is hereby approving this Notification, Closeout Report, and No Further Accelerated Action (NFAA) determination for IHSS Group 700-4 with the following comments/clarifications:

1) It is stated that the benzo(a)pyrene and dibenz(a,h)anthracene contamination (SVOCs) at locations CE47-012 and CE48-012 will be transferred to IHSS Group 000-2 and "soil removal will be conducted in accordance with the ER RSOP Notification 03-14". Although it is stated that these SVOCs are from asphalt, the levels found are higher than elsewhere on site. It is our understanding, based on conversations with Marla Broussard with KH, this soil contamination, which is as much as 6.6 times the WRW AL will be removed, and this remedial action will be added to IHSS Group 000-2, performed as appropriate with confirmation sampling, and included in the Closeout Report for IHSS Group 000-2. It is also our understanding the removal of this contaminated soil will occur prior to soil disturbances that may occur during the demolition of B771.
2) It should be recognized that although we are approving this Closeout Report and NFAA, additional soil investigation and removal may need to occur during D&D removal of contaminated building slabs or other contaminated structures.
3) As indicated in this document it is expected that the final land configuration will provide appropriate soil cover, which is described as 6 feet, above remaining radiological contamination, especially in those areas exceeding 1nCi/g. As also indicated, since there is erosion potential in areas with remaining contamination, which could effect future surface water contaminant levels, this concern will need to be properly addressed in future stewardship discussions and decisions.

If you have any questions regarding this correspondence please contact me at (303) 692-3367 or David Kruchek at (303) 692-3328.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Administrative Records Building T130G
Karen Wiemelt, KH
Gary Kleeman, EPA
Mark Sattelberg, USFWS

| Post-it® Fax Note 7671 | Date 2/6 | # of pages ▶ 2 |
|---|---|---|
| To Marla Broussard | From Kruchek | |
| Co./Dept. KH | Co. CDPHE | |
| Phone # | Phone # | |
| Fax # | Fax # | |

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# STATE OF COLORADO

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Colorado Department
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February 20, 2004

Mr. Joseph Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval: No Further Accelerated Action (NFAA), PAC 500-169 Waste Drum Peroxide Burial**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants NFAA approval for the subject unit.

We have reviewed the revised Historical Release Report (HRR) description of the unit (February 2004), which includes a discussion of efforts to substantiate the incident. We have also considered the potential for residual environmental damage stemming from releases of hydrogen peroxide following burial or, as included in the description, through the rupture of a drum in transport.

The Division agrees with the assessment that the decomposition of hydrogen peroxide whether buried and subsequently released, or released directly into the environment, does not require a remedial effort. This determination is especially appropriate given the passage of time.

We have discussed with your contractors the need to consider an anomaly, detected with Ground Penetrating Radar (GPR), in the course of other remediation efforts or closeouts. The anomaly remains of interest to the Division, but is outside the scope of PAC 500-169.

If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Dave Shelton, KH

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C.O.

# STATE OF COLORADO

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Colorado Department
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March 19, 2004

Mr. Joe Legare
Acting Assistant Manager for Environment and Stewardship
U.S. Department of Energy, Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: Closeout Report for IHSS Group 800-1 (B865) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Draft Closeout Report for IHSS Group 800-1, dated February 2004. Comments were provided and modifications to the report have been made. The revised Closeout Report for Group 800-1, dated March 2004 has been submitted and reviewed. The IHSS Group 800-1 includes the UBC for B865, PAC 800-1204 & 1212 (B866), PAC 800-1210, and portions of IHSS 000-121 (OPWL) & PAC 000-504 (NPWL). Based on the information contained in the March 2004 Closeout Report, and minor revisions as requested, the Division is hereby approving the IHSS Group 800-1 Closeout Report for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Steve Nesta, KH
Mark Aguilar, EPA
Gary Kleeman, EPA
Karen Wiemelt, KH
Administrative Records Building T130G

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400-8

# STATE OF COLORADO

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March 19, 2004

Mr. Joe Legare
Acting Assistant Manager for Environment and Stewardship
U.S. Department of Energy, Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: Closeout Report for IHSS Group 400-8 (B441) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Draft Closeout Report for IHSS Group 400-8, dated March 2004. Comments were provided and modifications to the report have been made. The IHSS Group 400-8 includes the UBC for B441, IHSS 400-122, and portions of IHSS 000-121 (OPWLs) including Tanks T-2 and T-3. Based on the information contained in the March 2004 Closeout Report, and revisions as discussed and provided, the Division is hereby approving the IHSS Group 400-8 Closeout Report for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Steve Nesta, KH
Mark Aguilar, EPA
Gary Kleeman, EPA
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Administrative Records Building T130G

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CORRESPONDENCE CONTROL

# STATE OF COLORADO


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Colorado Department
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March 31, 2004

Mr. Joe Legare
Acting Assistant Manager for Environment and Stewardship
U.S. Department of Energy, Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

RE: **Closeout Report for IHSS Group 900-1 (B991 & 993) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Draft Closeout Report for IHSS Group 900-1, dated March 2004. Comments were provided and modifications to the report have been made. The revised Closeout Report for Group 900-1, also dated March 2004 has been submitted and reviewed. The IHSS Group 900-1 includes the UBC for B991 (which also includes vaults 996, 997, 998, 999, and the associated tunnels), IHSS 900-173, IHSS 900-184, PAC 900-1301, & PAC 900-1307 (B993). Based on the information contained in the revised March 2004 Closeout Report the Division is hereby approving the IHSS Group 900-1 Closeout Report for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
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 PICs

# STATE OF COLORADO

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Colorado Department
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April 30, 2004

Mr. Joseph Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Potential Incidents of Concern (PIC), 4, 6, 9, 11, 14, 15, 17, 18, 41, 42, 44, 47 and 57 Action/No Action Recommendations, April 15, 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) concurs with the recommendations set forth in the subject document. A comment resolution meeting on April 29, 2004 was successful in addressing the Division's minor issues. Written comments were not submitted.

As stated in the meeting, the facility must ensure that PICs 9, 15, 17, and 18 are properly acknowledged and dispositioned through the IHSSs or IHSS Groups with which they co-exist within the Industrial Area. This means that either SAP addenda, Data Summary Reports and/or Closeout Reports must specifically address these PICs to ensure proper investigation and action, if warranted. If not specifically address in a SAP addenda, the subsequent report(s) must indicate the basis for data sufficiency.

If possible, please provide legible copies of photographs as replacement pages. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

403

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2004 MAY 12 P 2:48

CONTROL

CORRES. CONTROL
INCOMING LTR NO.
02.14 RF 04
DUE DATE
ACTION

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director
Dedicated to protecting and improving the health and environment of the people of Colorado

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http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department of Public Health and Environment

| DIST. | LTR | ENC |
|---|---|---|
| BERARDINI, J.H. | X | |
| BOGNAR, E.S. | X | |
| BROOKS, L. | X | |
| BUTLER, L. | X | |
| CARPENTER, M. | X | |
| CROCKETT, G.A. | | |
| DECK, L.A. | X | |
| DEGENHART, K.R. | | |
| DIETER, T.J. | | |
| DIETERLE, S.L. | | |
| FERRERA, D.W. | | |
| GIACOMINI, J.J. | X | |
| LINDSAY, D.C. | X | |
| LONG, J.W. | | |
| LYLE, J.L. | | |
| MARTINEZ, L.A. | X | |
| NAGEL, R.E. | X | |
| NESTA, S. | | |
| NORTH, K. | X | |
| PARKER, A.M. | X | |
| RODGERS, A.D. | | |
| SHELTON, D.C. | X | |
| SPARS, M.S. | X | |
| TOZUTO, V.M. | | |
| TUBIN, M. | X | |
| TUCH, N.R. | X | |
| WILMETT, K. | | |
| WILLIAMS, J.I. | | |
| ZAHM, C. | X | |
| [illegible] | X | |

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|---|---|---|
| COR. CONTROL | X | |
| ADMIN. RECORD | X | |
| PATS/130 | | |

Reviewed for Addressee
Corres. Control RFP
05/12/04 [illegible]
Date By

Ref. Ltr. #

DOE ORDER #
52100.1

May 6, 2004

Mr. Joe Legare
Assistant Administrator for Environment and Stewardship
U.S. Department of Energy-RFFO
10808 Highway 93, Unit A
Golden CO 80403-8200

RE: No Further Accelerated Action Justification PCB Potential Areas of Concern (April 15, 2004)

Dear Mr. Legare:

The Colorado Department of Public Health & Environment is satisfied that the effort to characterize, remediate, and confirm residual contamination levels at these PCB contamination sites is adequate. The proposal for No Further Accelerated Action at these 18 PACs is approved.

Subsequent to the removal actions at these sites, the Department requested additional information in order to justify a No Further Accelerated Action decision. Groundwater samples were collected downgradient of PAC 700-1102 to verify that PCB contamination is not a threat to surface water via ground water. A recent white paper on dioxin-like compounds in transformer oil evaluated whether PCB action levels are adequately protective of potential levels of PCB congeners with dioxin-like properties. Both of these efforts have satisfied the Department's remaining concerns.

If you have any questions, please contact me at 303-692-3367 or Carl Spreng at 303-692-3358.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator
Colorado Department of Public Health and Environment

RECEIVED
MAY 13 2004

cc: Dave Shelton, K-H
Lane Butler, K-H
Mark Aguilar, EPA
Dan Miller, AGO
Susan Chaki, CDPHE
Administrative Record, T130G

ADMIN RECORD

IA-A-002114

404

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

May 12, 2004

Mr. Joe Legare
Acting Assistant Manager for Environment and Stewardship
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

RE: Data Summary Report IHSS Group 600-3 (B668) – Approval

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Data Summary Report for IHSS Group 600-3, dated April 2004. The IHSS Group 600-3 includes IHSS 600-120.1 (Fiberglass Area North of Building 664). The Division is hereby approving this Data Summary Report for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Karen Wiemelt, KH
Administrative Records Building T130G
Mark Aguilar, EPA
Gary Morgan, DOE
Mark Sattelberg, USFWS
Steve Nesta, KH

405

# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

May 17, 2004

Mr. Joseph Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Data Summary Report for IHSS Group 500-5, PAC 500-904, April 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject document and No Further Accelerated Action (NFAA). A comment resolution meeting on May 14, 2004 was successful in resolving the Division's verbal comments on the initial document. The comments and agreements included:

Section 2.1: A request to determine whether "fluid", analyzed during the circa 1985 time frame at relatively high PCB levels, was actually "oil". It was noted that samples of the oil, during the same time frame, exhibited lower PCB levels. In addition, the units relative to a smear sample, i.e. 50 ug/L, will be verified or corrected.

Section 2.2: A change of location for dioxan and furan analyses, as previously discussed with the Division, will be documented in Appendix A.

Section 4.0: Previously existing data, from surface scrape samples, showed two locations with PCB results above the subsequently established WRW threshold. More recent sampling at the same locations, at a depth of 0.0 to 0.5 feet, showed no such exceedances. The removal of soil at these locations, as a best management practice, is acceptable in lieu of an accelerated action.

Section 6.2: Real data, for which units and abbreviations have been adjusted for consistency, will be referred to as "standardized" rather than "normalized" to avoid inference that data were transformed.

We look forward to verifying the final, revised document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

H:\RFETS\500-5 IHSS Group DSR (PAC 500-904), Approval.doc

406

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2004 JUN 21 A 11:41

ADMIN RECORD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466

JUN 17 2004

Mr. Joseph A. Legare
Assistant Manager for Environment and Stewardship
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

Dear Mr. Legare:

RE: *No Further Accelerated Action Justification for Retention Pond C-1* (PAC Reference Number: **SE-142.10)**

EPA has reviewed the above referenced document and is satisfied with the revisions that have been made to it. Therefore, EPA approves this document.

If you have any questions in regards to these comments, please call Gary Kleeman at 303 312-6246.

Sincerely,

Mark Aguilar
Acting Rocky Flats Team Leader

Cc Norma Castenada, DOE
Lane Butler, KH
Steve Gunderson, CDPHE

407

5400

500-4

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director
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Colorado Department
of Public Health
and Environment

June 18, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 500-4, IHSS 500-117.2, Middle Site Chemical Storage, June 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject document and No Further Accelerated Action (NFAA). A comment resolution meeting on June 17, 2004 was successful in resolving the Division's verbal comments on the initial document. Most of our comments were routine and easily dispositioned.

Inconsistencies in establishing sampling depths beneath a layer of asphalt, although inconsequential to project decisions, will be clarified in the document. Additionally, the rationale for omitting one specific VOC sample will be further clarified.

The response to Screen 4 of the Subsurface Soil Risk Screen (SSRS) will be changed to "No" to reflect that a sufficient quantity of contaminant, in addition to a pathway(s), must be present to warrant a "Yes" and further concern for surface water quality.

Clarifications will be made in Section 6.2.1, of the data quality assessment to address low, or borderline, laboratory control and matrix spike affects and to clarify that project decisions were fully supported.

The issues and resolutions, summarized above, will be fully reflected in meeting minutes as part of the Administrative Record.

We look forward to verifying the final, revised document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

H:\RFETS\500-4 IHSS DSR (IHSS 500-117.2), Approval.doc

408

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

500-2

# STATE OF COLORADO

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Colorado Department
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June 18, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Closeout Report for IHSS Group 500-2, IHSS 500-158 Radioactive Site – Building 551, June 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject document and No Further Accelerated Action (NFAA). A comment resolution meeting on June 17, 2004 was successful in resolving the Division's verbal comments on the initial document. Most of our comments were routine and easily dispositioned.

The Division questioned the adequacy of the sampling effort negotiated and reported via Contact Record (meeting minutes) dated February 19, 2004. It had been agreed that two borings would be placed within the northern half and two within the southern half of the Building 551 expansion area to evaluate the overlying fill and the native soils. The report appeared to indicate that only one had been placed in the northern portion (with three in the southern portion). The report will be modified to reflect that fill material was not present at the northernmost location. Specific details on five pertinent locations, i.e. sample depth, media encountered, locations codes, and specific reference to analytical results, will be added.

The location of a chemical disposal area will be shown on the appropriate figure. Rationale will be provided to support the adequacy of the sampling effort and to acknowledge that WRWs were met, even in the sub-surface. With VOCs being detected within the chemical disposal area footprint, a statement will be added to reflect that the disposal area will be considered in the forthcoming groundwater IM/IRA.

The issues and resolutions, summarized above, will be fully reflected in meeting minutes as part of the Administrative Record.

We look forward to verifying the final, revised document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

H:\RFETS\500-2 IHSS Group Closeout Rpt (IHSS 500-158, B551), Approval.doc

410

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

600-5

# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

June 18, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 600-5, PAC 600-1004, June 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject document and No Further Accelerated Action (NFAA). A comment resolution meeting on June 10, 2004 was successful in resolving the Division's verbal comments on the initial document. Our comments were limited and did not impact the document significantly.

The Division was initially concerned that arsenic in a surface sample, while not actionable in respect to WRW thresholds, but given the proximity to Central Ditch and the very low surface water standard for arsenic, might warrant consideration for soil removal. The concern, however, was resolved in recognition that Central Ave Ditch will be reconfigured, arsenic exceedances have been noted further down gradient but not at the most immediate down gradient location, that the location is far distant from actual surface water points of compliance, and that arsenic occurrence will be considered further under the CRA.

The degree and adequacy of the quality control and assurance effort was considered. Validation requirements were not specifically met for this small IHSS data set. However, validation was met, programmatically, when sample sets analyzed in sequence with the IHSS data set met quality assurance requirements. Additionally, the Rocky Flats verification process evaluates many of the same parameters as performed under the laboratory validation process.

The issues and resolutions, summarized above, will be fully reflected in meeting minutes as part of the Administrative Record.

We look forward to verifying the final, revised document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

4/2

H:\RFETS\600-5 IHSS Group DSR (PAC 600-1004), Approval.doc

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

800-5 7/14

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

June 21, 2004

Mr. Joe Legare
Director, Project Management Division
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: Data Summary Report IHSS Group 800-5 (B887 & B885), NFAA – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Data Summary Report for IHSS Group 800-5, dated June 2004. The IHSS Group 800-5 includes UBC 887 and PAC 800-177 (B885). Based on the information contained in this Report and the modifications to be made, as discussed in the June 17, 2004 ER Document Resolution Meeting, the Division is hereby approving this Data Summary Report, as modified, for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Karen Wiemelt, KH
Administrative Records Building T130G
Mark Aguilar, EPA
Gary Morgan, DOE
Mark Sattelberg, USFWS
Steve Nesta, KH

9/14

# STATE OF COLORADO

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Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

July 9, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval: No Further Accelerated Action (NFAA), PAC 000-190, Caustic Leak**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants NFAA approval for the subject unit.

Our comments, attached, on the draft Historical Release Report (HRR) description of the unit have been satisfactorily addressed in the July 6, 2004 revision.

In resolving the comments, an advanced verbal contact with the Division would likely have made comment resolution easier. The site has agreed to make initial informal contacts in the future.

If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

Attachment

cc: Mark Aguilar, EPA
Norma Castaneda, DOE
Lane Butler, KH
Mark Sattelberg, U.S.F&W
Dave Shelton, KH
Administrative Records Building T130G

415

**Colorado Department of Public Health and Environment**

**Hazardous Materials & Waste Management Division**

**Comments**

**No Further Accelerated Action Justification for Caustic Leak**

**PAC Reference Number: 000-190**

**June 1, 2004**

---

General Comments:

1. Most of the text and supporting data is not pertinent to this IHSS. Data related to overlapping IHSSs should be dealt with in separate decisions. If all the exceedences at SW22 cannot be accounted for by the sources in those IHSSs, then those exceedences at that POE should drive additional evaluation.

2. The NFAA justification should be straightforward and simple.
   - The main incident which lead to this IHSS occured over 25 years ago. The acid release was adequately controlled and neutralized. Any remaining acid has long since been naturally neutralized.
   - Within the IHSS, concentrations of NaOH in surface soil are well below WRW ALs.
   - Concentrations of NaOH in the subsurface pass the Subsurface Soil Risk Screen.

3. Subsurface Soil Risk Screen #5 is not addressed. The standard statement deferring an ecological evaluation to the CRA should be included.

Specific Comments:

4. Fate of Constituents Released to Environment: The "constituent" released to the environment was caustic NaOH not other constituents. Please focus on the NaOH, the steps to neutralize it and the passage of time relative to residual NaOH.

5. Proposed Revision of the IHSS Boundary: The status of the bullet items are dated. For example, IHSS Group 600-5 has been investigated and has received an NFAA. Please update.

6. The Division will not approve the partitioning of this IHSS. The Division can grant NFAA status to the entire IHSS without such approval affecting the status of the overlapping sites. The caustic releases were connected from the point of origin to B-1 and a disjointed boundary is inconsistent with the nature of the release. Please remove the proposed change from the document.

7. Characterization Summary: In the first bullet, COCs in overlapping IHSSs, although unrelated to the release of caustic, have been used to show the expected levels in adjoining portions of the IHSS. This is misleading and unnecessary. Please see Comment No. 3.

8. Screen 1: The "several organics and radionuclide concentrations" are cited as the basis for a "Yes" response despite the fact that these COCs are not pertinent to the release. The only COC, as noted in "Physical/Chemical Description of Constituent Released" was "concentrated sodium hydroxide". Please make the response "No" then clarify that while the other constituents were found, the true COC is NaOH.

9. Screen 4: Please factor in the proposed reconfiguration of Central Ditch relative to the concentrated point source of the NaOH.

10. In the first paragraph, page 5, the organic, metals and radionuclides should be considered in the context of the CRA. Please add language to that effect.

11. NFAA Summary: The proximity or congruency of other IHSSs does not provide justification for partioning the IHSS. Please revise.

12. Subsurface Soil Risk Screen #5 is not addressed. The standardstatement deferring an ecological valuation to the CRA should be included.

416

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

August 23, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: APPROVAL, DATA SUMMARY REPORT FOR IHSS GROUP 400-4, PAC 400-803 – Miscellaneous Dumping, Building 446 Storm Drain and PAC 400-804 – Road North of Building 460**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 400-4. A comment resolution meeting on August 17, 2004, and subsequent revisions submitted electronically, was successful in resolving the Division's verbal comments.

Of specific concern was the manner in which a drainage ditch, covered with asphalt some time after the reported dumping incident, was relocated to ensure proper placement of borings. The document has been revised to indicate, more specifically, how the position of the ditch was determined. More importantly, the discussion with facility personnel provided adequate assurance that the relocation effort was successful and the resulting data support NFAA.

We look forward to confirming that the proposed changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

4/7 H:\RFETS\400-4 IHSS Group DSR Approval.doc

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

August 23, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: APPROVAL, DATA SUMMARY REPORT FOR IHSS GROUP 400-1, UBC 439 – RADIOLOGICAL SURVEY**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 400-1. A comment resolution meeting on August 17, 2004, and subsequent revisions submitted electronically, was successful in resolving the Division's comments. Our comments are attached for reference.

Data from beneath the building support the NFAA determination. However, from our comments, we reiterate that any UBC contamination that may have resulted from IHSS 400-157.2 may necessitate a removal action.

We look forward to confirming that changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367, Harlen Ainscough at 303-692-3337, or David Kruchek at 303-692-3328.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

Attachment

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

4/8

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Colorado Department
of Public Health
and Environment

September 7, 2004

Mr. Joe Legare
Director, Project Management Division
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: No Further Accelerated Action (NFAA) Request for IHSS 143 (B771) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the NFAA request for IHSS 143 (771 Outfall, PAC 700-143), dated July 6, 2004. This request was initially submitted to us on June 4, 2004 and has been revised based on discussions at several ER Comment Resolution Meetings. Based on the information contained in this document and previously agreed upon modifications to be made, the Division is hereby approving this request for NFAA, as modified.

Although we are approving NFAA for IHSS 143, there may still be the potential for radiological contamination to exist at depth in this area. As such, appropriate precautions, including Radiological Control Technicians (RCT) involvement, need to be implemented during the proposed culvert and storm drain removal, and drainage reconfiguration that is planned to occur in this area. Considering that this area may be excavated and exposed to direct surface water exposure and erosion, contamination that may be identified may need to be removed if necessary to prevent surface water degradation above appropriate levels, even if the levels in the soil do not exceed the WRW Levels. The consultative process needs to be utilized to properly discuss future activities and address contamination that may be found during future activities in this area.

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Harlen Ainscough at (303) 692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Karen Wiemelt, KH
Administrative Records Building T130G
Mark Aguilar, EPA
Gary Morgan, DOE
Mark Sattelberg, USFWS
Steve Nesta, KH

419

# STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

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Colorado Department
of Public Health
and Environment

| Post-it® Fax Note 7671 | Date 9/7/04 | # of pages ▶ 2 |
|---|---|---|
| To Susan Serrano | From D Kruchek | |
| Co./Dept. KH | Co. CDPHE | |
| Phone # | Phone # | |
| Fax # 966-5780 | Fax # | |

September 7, 2004

Mr. Joe Legare
Director, Project Management Division
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

RE: **Data Summary Report IHSS Group 700-5 (B770), NFAA – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Data Summary Report for IHSS Group 700-5, dated August 2004. The IHSS Group 700-5 consists solely of UBC 770. Based on the information contained in this Report and the previously agreed upon modifications to be made, as discussed in the ER Document Resolution Meetings, the Division is hereby approving this Data Summary Report, as modified, for No Further Accelerated Action (NFAA).

If you have any questions regarding this correspondence please contact me at (303) 692-3367, ~~David Kruchek at (303) 692-3328~~, or Harlen Ainscough at (303) 692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Karen Wiemelt, KH
Administrative Records Building T130G
Mark Aguilar, EPA
Gary Morgan, DOE
Mark Sattelberg, USFWS
Steve Nesta, KH

420

100-1
D.S

# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

September 14, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 700-1 PAC 700-1115 – Identification of Diesel Fuel in Subsurface Soil, dated August 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 700-1. Comment resolution meetings, and subsequent revisions submitted electronically, were successful in resolving the Division's verbal comments.

Of specific concern was the need to acknowledge the original release of diesel fuel at the northeast corner of Building 708 and to further show that data on Total Recoverable Petroleum Hydrocarbons (TRPH) was relevant to soil action levels defined in RFCA Attachment 13. The earlier TRPH data, and the absence of volatile organic compounds from recent samples, show that soil removal from the original release site or down gradient is unwarranted.

We look forward to confirming that the proposed changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH



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700-10
D.S.

# STATE OF COLORADO

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Colorado Department
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and Environment

September 21, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 700-10, PAC 700-1101 Laundry Tank Overflow – Building 732, dated September 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 700-10. A comment resolution meeting, revisions submitted electronically and subsequent e-mails were successful in resolving the Division's verbal comments.

At issue was the Division's preference that data on an incidental water sample from a flooded sump, collected under a Regulatory Contact Record to the approved SAP addendum, be reported in the narrative. Additionally, the Division requested that the availability of soils data on volatile organic compounds, collected as the opportunity presented relative to the IA Plume, be made known to the Groundwater IM/IRA team.

We look forward to confirming that minor additional changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367, Harlen Ainscough at 303-692-3337 or Elizabeth Pottorff at 303-692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

422

400-2
D.S.

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Colorado Department
of Public Health
and Environment

September 27, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 400-2, UBC 440 – Modification Center, dated September 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 400-2. The Division's few, general comments were resolved through telephone contact.

A statement in the Surrogate Evaluation section that implies WRW values exist for surrogates, and were used to evaluate the effects of low surrogate recoveries, will be revised. The text was intended to convey that WRWs for COCs, related to the surrogates, were used to evaluate data quality. The evaluations were performed correctly, however, the text was imprecise.

Although a global change to documents being written is appropriate, the approval of previous documents was not compromised and the issue will be disclosed in ER meeting minutes. Meeting minutes become part of the Administrative Record.

We look forward to confirming that the changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367, Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

423

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500-1
D.S

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Colorado Department
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and Environment

September 29, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 500-1, IHSS 300-186, IHSS 500-117.1 and IHSS 500-197, dated September 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 500-1. Comment resolution meetings, and subsequent revisions submitted electronically, were successful in resolving the Division's comments.

We specifically agree with the rationale, and necessity, of moving sample location BZ43-003 due to the occurrence of a thick valve vault concrete footer. The depth of the target interval, 12.5-14.5 feet, and the lack of erosion potential within the center of the Industrial Area, supports our determination.

Additionally, we agree that the rejected americium-241 data, associated with a statistical sample of the A interval at location CB44-013, was not significant and does not impact the NFAA decision. Adjacent plutonium and americium data do not indicate exceedances of the WRW ALs for either constituent near CB44-013.

We look forward to confirming that these and other minor changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

424

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400-6
D.S.

# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

September 29, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Data Summary Report for IHSS Group 400-6, IHSS 157.2 Radioactive Site South Area, dated September 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 400-6. A comment resolution meeting was successful in resolving the Division's comments.

A benzo(a)pyrene occurrence at BY35-008 exists at a concentration greater than four times its associated WRW AL. As agreed, the pertinent interval from 0.5-2.5 feet, will be evaluated in respect to the proposed final land configuration map to ensure that any grading will not expose the contamination. The final document will include a discussion of the concern.

In the *Sample Matrix Spike Evaluation* section, the discussion of low minimum recoveries for both matrix (MS) and laboratory control spikes (LCS) will include 2,4-Dichlorophenol and further demonstrate that project decisions were not affected.

We look forward to confirming that these and other minor changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
Lane Butler, KH

425

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700-6
C.O

# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

September 29, 2004

Mr. Joseph Legare
Director, Project Management Division
U.S. Department of Energy
Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, Colorado 80403-8200

**RE: Approval, Draft Closeout Report for IHSS Group 700-6, Buildings 712/713 Cooling Tower Blowdown, IHSS 700-139.1(S) Caustic/Acid Spills Hydroxide Tank Area, dated September 2004**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division) hereby grants approval for the subject closeout report and, as a consequence, No Further Accelerated Action (NFAA) for IHSS Group 700-6. Comment resolution meetings, and subsequent revisions submitted electronically, were successful in resolving the Division's comments. The comments are recorded in the minutes of a September 23, 2004 comment resolution meeting. The most significant resolutions included:

- Uncertainty regarding the status of OPWL below Buildings 712/713 was resolved with the disclosure that the lines had been grouted in place.
- An exceedance of the WRW AL for benzo(a)pyrene at eight feet, while inconsequential, was added to Table 8 and subsequently discussed it several sections including the SSRS, as required. Additionally, arsenic and PAHs were added to the SSRS Screen 4 discussion.
- The Sum of Ratios (SOR) for historical data was discussed qualitatively. This addition was based on a hot spot soil removal, for arsenic, that also contained chromium in excess of its WRW.
- The results of confirmation samples were included in the document as evidence that the hot spot soil removals were sufficient.

We look forward to confirming that these and other minor changes are reflected in the final document. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or Harlen Ainscough at 303-692-3337.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Mark Aguilar, EPA
Larry Kimmel, EPA
Dave Shelton, KH
Administrative Records Building T130G
Mark Sattelberg, U.S.F&W
Norma Castaneda, DOE
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# STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

October 1, 2004

Mr. Joe Legare
Director, Project Management Division
U.S. Department of Energy, Rocky Flats Project Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

**RE: Closeout Report for IHSS Group 700-7 (B779) – Approval**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the Draft Closeout Report for IHSS Group 700-7, dated September 2004. Comments were provided and modifications to the report have been made. The IHSS Group 700-7 includes the UBC for B779, IHSS 700-138, IHSS 700-150.6, IHSS 700-150.8, PAC 700-1105, and IHSS 700-149.2, as well as portions of IHSS 000-101 and IHSS 000-121. Based on the information contained in the Closeout Report as revised, the Division is hereby approving the IHSS Group 700-7 Closeout Report for No Further Accelerated Action (NFAA).

Although we are approving this Closeout Report and NFAA for IHSS Group 700-7, it is recognized, as stated in this Report, that additional actions will need to be performed to actually complete the closure of this area. This includes the placement of additional fill to bring this area to final grade and ensure that all remaining structural features (as well as the remaining subsurface contamination) are at least three feet below final grade, and surface re-contouring to change the current drainage and establish the appropriate final drainage (while retaining the 3 foot minimum cover) for this area, which is indicated to be to the South Walnut Creek drainage. In addition, as also discussed, although all of the identified surface soil radiological WRW exceedences have been removed, there remains concerns with possible radiological soil contamination in this area, which may be contributing to the degradation of surface water quality as seen at GS32 and SW093, and may require possible additional remedial actions beyond the currently implemented erosion controls.

If you have any questions regarding this correspondence please contact me at (303) 692-3367, David Kruchek at (303) 692-3328, or Elizabeth Pottorff at (303) 692-3429.

Sincerely,

Steven H. Gunderson
RFCA Project Coordinator

cc: Norma Castaneda, DOE
Lane Butler, KH
Dave Shelton, KH
Steve Nesta, KH
Administrative Records Building T130G
Mark Aguilar, EPA
Larry Kimmel, EPA
Karen Wiemelt, KH
Mark Sattelberg, U.S.F&W

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# Appendix 3

# Areas of (Non RFCA) Soil Put-back

There were no areas of (non RFCA) soil put-back for this year.

# Appendix 4

# Plates

0HIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: 04-DOE-00839; 00534-RF-04)

# Annual Update Historical Release Report

## August 1, 2003 through October 1, 2004

## Plate 1:

# Individual Hazardous Substance Sites by Consolidated Operable Unit

**As of September 2004**

**October 27, 2004**

**CERCLA Administrative Record Document, SW-A-005018**

U.S. DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

431

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: 04-DOE-00839; 00534-RF-04)

# Annual Update Historical Release Report

## August 1, 2003 through October 1, 2004

## Plate 2:

# No Further Accelerated Action Individual Hazardous Substance Sites and Potential Areas of Concern

**As of September 2004**

**October 28, 2004**

**CERCLA Administrative Record Document, SW-A-005018**

U.S. DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

432

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: 04-DOE-00839; 00534-RF-04)

# Annual Update Historical Release Report

## August 1, 2003 through October 1, 2004

## Plate 3:

# Historical Release Report

# Original Process Waste Lines and New Process Waste Lines

**As of September 2004**

**October 27, 2004**

**CERCLA Administrative Record Document, SW-A-005018**

U.S. DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

433

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: 04-DOE-00839; 00534-RF-04)

# Annual Update Historical Release Report

## August 1, 2003 through October 1, 2004

## Plate 4:

# Potential Areas of Concern And Under Building Contamination Sites

**As of September 2004**

**October 27, 2004**

**CERCLA Administrative Record Document, SW-A-005018**

U.S. DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

434

NORTHWEST

NORTHEAST

SOUTHWEST

SOUTHEAST

BUFFER ZONE OPERABLE UNIT (EPA LEAD)

INDUSTRIAL AREA OPERABLE UNIT (CDPHE LEAD)

100

300

400

500

600

700

800

900

114

Cell 1

280

283

303

306B-A

306B-B

306B-C

139.1N(a)

144(N)

144(S)

700-7 Addition

150.2(S)

150.7

118.1

118.2

214

134(S)

157.1

187

160

162

205

196

115

154

153

142.1

142.2

142.3

142.4

142.5

142.6

142.7

142.8

142.9

142.11

111.8

111.7

111.2

111.3

111.6b

111.6a

111.5

112
903 Pad

155

140

IHSS 155
903 Pad Inner/Outer Lip Area
Revised 2004 Boundary
(includes small anomalies
around main area)

# Plate 1

## Individual Hazardous Substance Sites by Consolidated Operable Unit

(As of Sept. 2004)

**Industrial Area Operable Units**

- Industrial Area OU

**Buffer Zone Operable Units**

- Buffer Zone OU

**NOTES:**

Former Operable Unit 9 (OU9), that is now part of the Industrial Area Operable Unit, is shown on a separate map for clarity. (See Plate 3.)

Proposed IHSS NE-142.12 (Indiana Flume Pond) not shown due to map scale.

**Other Map Features**

- Buildings and other structures
- Demolished buildings and Other Structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- Industrial Area Operable Unit Boundary

***DATA SOURCE BASE FEATURES:***

*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs, 1/95*
*Individual Hazardous Substance Sites (IHSSs) DOE, 1992, HRR Report and Subsequent Updates.*

All IHSS and PAC's Boundaries are Approximate. For more detail, please contact Environmental Restoration (X4605) for the following document:

Historical Release Report (HRR) September 2004 Annual Update

Scale = 1 : 3600
1 inch represents 300 feet

200 0 400 800ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER-HILL COMPANY

October 27, 2004

SW-A-005018 pg. 431

# Plate 2

## No Further Accelerated Action Individual Hazardous Substance Sites and Potential Areas of Concern

(As of Sept. 2004)

NOTE:
IHSS 199, 200, 201 and 202 (Operable Unit 3) East of Indiana Street are NOT SHOWN on map due to map scale.

PAC NE-1403 at East Guard Post, Building 920, is NOT SHOWN on map due to map scale.

NORTHWEST

NORTHEAST

SOUTHWEST

SOUTHEAST

BUFFER ZONE OPERABLE UNIT (EPA LEAD)

INDUSTRIAL AREA OPERABLE UNIT (CDPHE LEAD)

100

300

400

500

600

700

800

900

### EXPLANATION

- Operable Unit 1 (Closed through CAD/ROD Process)
- Former Operable Unit 2
- Former Operable Unit 4
- Former Operable Unit 5
- Former Operable Unit 6
- Former Operable Unit 7
- Former Operable Unit 8
- Process Waste IHSS Locations (Former OU 9 IHSSs)
- Former Operable Unit 10
- Operable Unit 11 (Closed through CAD/ROD Process)
- Former Operable Unit 12
- Former Operable Unit 13
- Former Operable Unit 14
- Operable Unit 15 (Closed through CAD/ROD Process)
- Operable Unit 16 (Closed through CAD/ROD Process)
- Potential Area of Concern (Proposed as No Further Action)
- No Further Action PACs approved by Colorado Department of Health and EPA in 1992.
- Under Building Contamination Site
- Foamed & Stabilized Tanks (Source Removed - RCRA Interim Status)
- Removed Tanks
- Industrial Area Operable Unit Boundary
- HRR Designation Area Boundary

### Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

***DATA SOURCE BASE FEATURES:***

*Locations of the Operable Unit(s) and their associated Individual Hazardous Substance Sites (IHSS) were derived from the DOE 1992 - HRR Report and subsequent updates.*
*Operable Unit(s) 1, 3, 11, 15, 16 are designated to be NFA by the Corrective Action Decision/Record of Decision (CAD/ROD).*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.*
*Digitized from the orthophotographs. 1/95*

**NOTES:**

All IHSS and PAC's Boundaries are Approximate. For more detail, please contact Environmental Restoration(X4605) for the following document:

Historical Release Report (HRR) September 2004 Annual Update

Scale = 1 : 4800
1 inch represents 400 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: CH2MHILL

Prepared for: KAISER•HILL COMPANY

October 28, 2004

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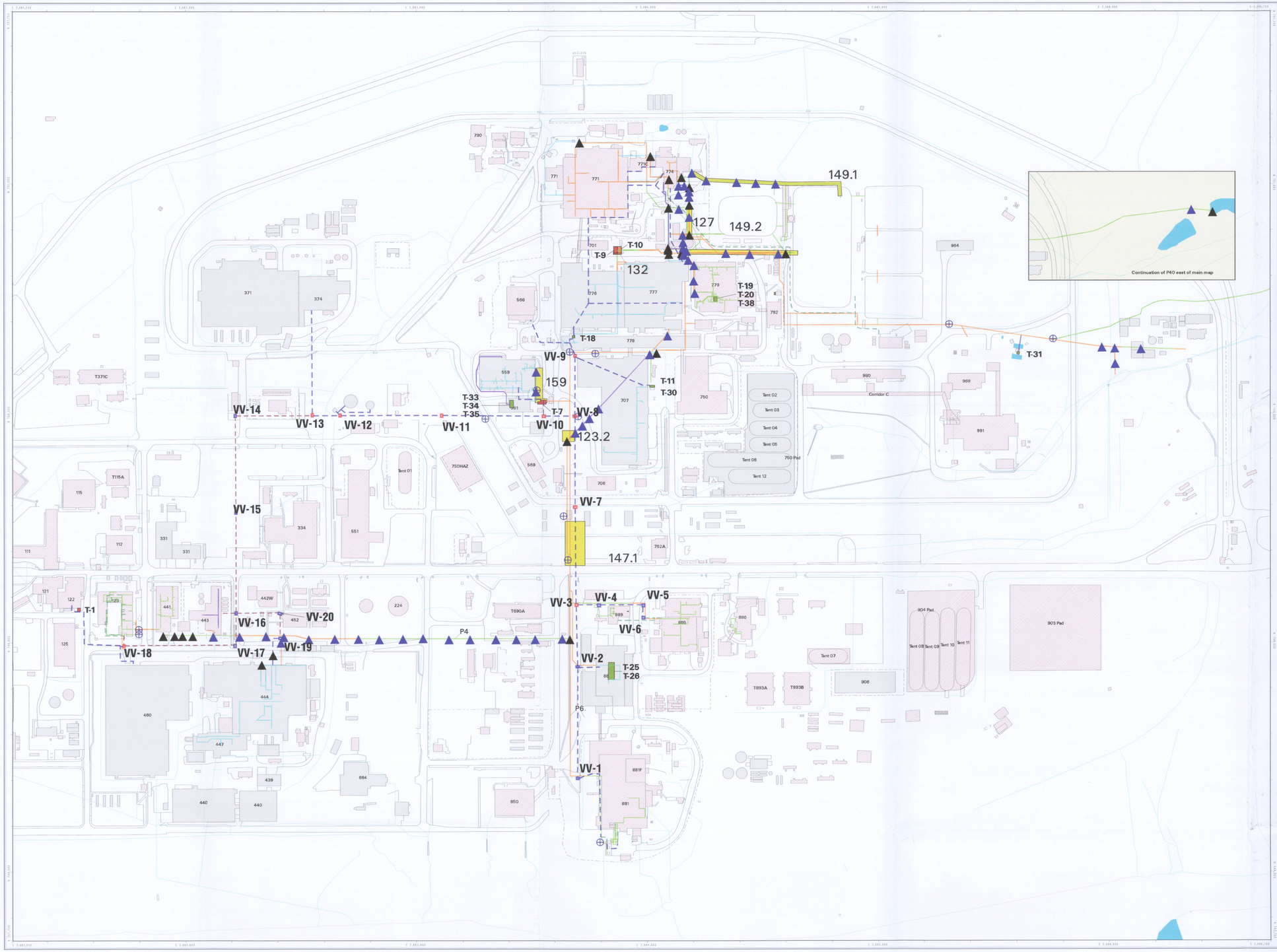
# Plate 3

## Historical Release Report

## Original Process Waste Lines and New Process Waste Lines




### EXPLANATION

- Tanks of Concern
- Foamed and Stabilized Tanks (Source Removed - Interim Status)
- Remaining Tanks
- Sumps
- Process Waste IHSS Locations (Former OU 9 IHSSs)
- Original Process Waste Lines (IHSS 000-121)
- OPWL Removed
- OPWL Between 3 and 4 Feet
- OPWL Does Not Exist
- Approximate Location of New Process Waste Lines (PAC 000-504)
- NPWL Removed
- NPWL Cleaned - Closed
- Known Leaks
- Suspected Leaks
- Manholes
- Valve Vault Locations
- Demolished Valve Vault

### Standard Map Features

- Buildings and other structures
- Demolished buildings and Other Structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads

*DATA SOURCE BASE FEATURES:*
*Individual Hazardous Substance Sites (IHSSs)*
*DOE, 1992, HRR Report and Subsequent Updates.*

**NOTES:**

The Original and New Process Waste Line locations shown on map are approximate and should not be used for determining the line location when performing excavation work.

PAC 000-500 (Sanitary Sewer System) and PAC 000-505 (Storm Drains) not shown.

All IHSS and PAC's Boundaries are Approximate. For more detail, please contact Environmental Restoration (X4605) for the following document:

Historical Release Report (HRR) September 2004 Annual Update

Scale = 1 : 2450
1 inch represents approximately 204 feet

100 0 200 400ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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NORTHWEST

NORTHEAST

SOUTHWEST

SOUTHEAST

700

300

500

100

400

600

800

900

NW-1505

700-1108

UBC-701

700-1100

UBC-776

UBC-777

700-1116

UBC-559

UBC-707

UBC-778

UBC-731

UBC-528

UBC-331

UBC-442

UBC-122

800-1200

UBC-883

800-1201

100-602

400-813

400-815

EAST FIRING RANGE

SE-1602

TARGET AREA

# Plate 4

## Potential Areas of Concern And Under Building Contamination Sites (As of Sept. 2004)

### EXPLANATION

UBC-559 — Under Building Contamination Site (Further Action Warranted)

700-1108 — Potential Area of Concern (Further Action Warranted)

400-815 — Potential Area of Concern Point Spill (not to scale) (Further Action Warranted)

### Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- HRR Designation Area Boundary

***DATA SOURCE BASE FEATURES:***
*Individual Hazardous Substance Sites (IHSSs) DOE, 1992, HRR Report and Subsequent Updates.*
*Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95*

**NOTES:**
All IHSS and PAC's Boundaries are Approximate. For more detail, please contact Environmental Restoration(X4605) for the following document:

Historical Release Report (HRR) September 2004 Annual Update

N

Scale = 1 : 3600
1 inch represents 300 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
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