Rocky Flats Environmental Technology Site

PRE-DEMOLITION SURVEY REPORT (PDSR)

Building 451 Closure Project

VERSION 0

September 25, 2004

CLASSIFICATION REVIEW NOT REQUIRED PER EXEMPTION NUMBER CEX-005-02

RECEIVED
OCT 18 2004

1/46

ADMIN RECORD
B444-A-000093

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Building 451 Closure Project

VERSION 0

September 25, 2004

Reviewed by: _____ Date: 9/27/04
Don Risoli, Quality Assurance

Reviewed by: _____ Date: 9/27/04
D.P. Snyder, RISS ESH&Q Manager

Approved by: _____ Date: 09/28/04
Cameron Freiboth,
K-H Area 3 D&D Project Manager

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ABBREVIATIONS/ACRONYMS

ACM	Asbestos containing material
Be	Beryllium
CDPHE	Colorado Department of Public Health and the Environment
$DCGL_{EMC}$	Derived Concentration Guideline Level – elevated measurement comparison
$DCGL_{W}$	Derived Concentration Guideline Level – Wilcoxon Rank Sum Test
D&D	Decontamination and Decommissioning
DDCP	Decontamination and Decommissioning Characterization Protocol
DOE	U.S. Department of Energy
DPP	Decommissioning Program Plan
DQA	Data quality assessment
DQOs	Data quality objectives
EPA	U.S. Environmental Protection Agency
FDPM	Facility Disposition Program Manual
HVAC	Heating, ventilation, air conditioning
HSAR	Historical Site Assessment Report
HEUN	Highly Enriched Uranyl Nitrate
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Package
K-H	Kaiser-Hill
LBP	Lead-based paint
LLW	Low-level waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum detectable activity
MDC	Minimum detectable concentration
NORM	Naturally occurring radioactive material
NRA	Non-Rad-Added Verification
OSHA	Occupational Safety and Health Administration
PARCC	Precision, accuracy, representativeness, comparability and completeness
PCBs	Polychlorinated Biphenyls
PDS	Pre-demolition survey
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RLC	Reconnaissance Level Characterization
RLCR	Reconnaissance Level Characterization Report
RSA	Removable Surface Activity
RSP	Radiological Safety Practices
SVOCs	Semi-volatile organic compounds
TCLP	Toxicity Characteristic Leaching Procedure
TSA	Total surface activity
VOCs	Volatile organic compounds

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EXECUTIVE SUMMARY

A Pre-Demolition Survey (PDS) was performed to enable compliant disposition and waste management of Building 451. Because this Type 2 facility will be decommissioned, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP) to supplement the Reconnaissance Level Characterization of this Type 2 facility. Building surfaces characterized as part of this PDS included the floors, walls, and ceiling. Environmental media beneath and surrounding the facility was not within the scope of this PDS and will be addressed using the Soil Disturbance Permit process and in compliance with RFCA.

This PDS encompassed both radiological and chemical characterization to enable the compliant disposition and waste management pursuant to the D&D Characterization Protocol (MAN-077-DDCP). The characterization built upon physical, chemical and radiological hazards identified in the facility-specific Historical Site Assessment Report and Reconnaissance Level Characterization Report.

Results indicate that no beryllium or chemical contamination exists in excess of the PDSP unrestricted release limits. However, fixatives were used to immobilize beryllium contamination. Radiological contamination exists in excess of the PDSP unrestricted release limits in the first stage plenum and part of the second stage plenum. All other areas are less than the PDSP unrestricted release limits. All PCB ballasts, and hazardous waste items (e.g., mercury thermostats, fluorescent light bulbs, mercury vapor light bulbs, mercury-containing gauges, circuit boards, leaded glass, and lead-acid batteries) have been removed and disposed of in compliance with Environmental Protection Agency (EPA) and Colorado Department of Public Health and Environment (CDPHE) regulations. Asbestos abatement was conducted in Building 451 prior to the PDS. Friable and non-friable asbestos containing building materials were removed per CDPHE, Regulation No. 8, Part B, *Emission Standards for Asbestos*. PCBs in paint meet the unrestricted release criteria of the RSOP for Facility Disposition (specific to 40CFR 761.62c).

Based upon this PDSR, Building 451 can be demolished. The contaminated portions of the first and second stage plenums will be managed as LLW during demolition. To ensure the facility remains free of further contamination and PDS data remain valid, Level 2 Isolation Controls have been established and the areas posted accordingly.

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1 INTRODUCTION

A Pre-Demolition Survey (PDS) was performed to enable compliant disposition and waste management of Building 451. Because this Type 2 facility will be decommissioned, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP) to supplement the Reconnaissance Level Characterization of this Type 2 facility. Building surfaces characterized as a part of this PDS included floors, walls and ceiling. The Building 451 exterior was characterized in accordance with Pre-Demolition Survey Plan (MAN-127-PDSP) requirements as part of the Building 444 Cluster RLCR, completed November 6, 2001. Environmental media beneath and surrounding the facility was not within the scope of this PDS and will be addressed using the Soil Disturbance Permit process and in compliance with RFCA.

As part of the Rocky Flats Environmental Technology Site (RFETS) Closure Project, numerous facilities will be removed, among these is Building 451. The location of this facility is shown in Attachment A, *Facility Location Map*. This facility no longer supports the RFETS mission and will be decommissioned to reduce Site infrastructure, risks and/or operating costs.

Before this Type 2 facility can be decommissioned, the Data Quality Objectives (DQOs) for a Pre-Demolition Survey (PDS) must be satisfied; this document presents the PDS results for Building 451. The PDS was conducted pursuant to the Decontamination and Decommissioning Characterization Protocol (MAN-077-DDCP) and the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). The PDS is built upon physical, chemical and radiological hazards identified in the facility-specific Historical Site Assessment Report and Reconnaissance Level Characterization Report.

1.1 Purpose

The purpose of this report is to communicate and document the results of the Building 451 PDS effort. A PDS is performed prior to building demolition to define the final radiological and chemical conditions of a facility. Final conditions are compared with the release limits for radiological and non-radiological contaminants. PDS results will enable project personnel to make final disposition decisions, develop related worker health and safety controls, and estimate waste volumes by waste types.

1.2 Scope

This report presents the final radiological and chemical conditions of Building 451. Environmental media beneath and surrounding the facility is not within the scope of this PDSR and will be addressed using the Soil Disturbance Permit process and in compliance with RFCA.

1.3 Data Quality Objectives

The Data Quality Objectives (DQOs) used in designing this PDS were the same DQOs identified in the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). Refer to section 2.0 of MAN-127-PDSP for these DQOs.

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2 HISTORICAL SITE ASSESSMENT

A Facility-specific Historical Site Assessment (HSA) and a Reconnaissance Level Characterization (RLC) was conducted to understand the facility history and related hazards. The HSA consisted of facility walk-downs, interviews, and document review, including review of the Historical Release Report, and were used to design the RLC. The RLC for Building 451 was performed in FY 2002 as part of the Building 444 Cluster RLCR (refer to *Reconnaissance Level Characterization Report for the Building 444 Cluster,* dated November 6, 2001, Revision 0). Based on the RLC results, Building 451 was classified as a Type 2 facility, therefore, PDS characterization was required before decommissioning of the facility. The HSA, RLC and in-process results were used to identify PDS data gaps and needs, and to develop radiological and chemical PDS characterization packages. HSA and RLC documentation are located in the RISS Characterization Project files.

3 RADIOLOGICAL CHARACTERIZATION AND HAZARDS

3.1 In-Process Strip-out and Decontamination

Radiological contamination was identified during the RLC, as well as, during the in-process stripout and decontamination phases in Building 451. Thus, extensive stripout and decontamination was required prior to the PDS. All contaminated equipment, filters and system piping were removed from the building prior to PDS. In some areas, radiological contamination could not be decontaminated below the PDS unrestricted release criteria without compromising the structural integrity of the building, or were too difficult to decontaminate. Therefore, these surfaces will be removed and managed as LLW during demolition. In some cases, areas were sprayed with fixative to immobilize loose contamination. The surfaces that will be removed and managed as LLW include the first stage plenum and portions of the second stage plenum. These contaminated areas have been highlighted in red on survey maps contained in Attachment B-1, *Radiological Survey Unit Data Summaries and Survey Maps,* in order for the reader to more easily determine the extent of all contaminated areas.

The following bullet summarizes the results of the in-process surveys of the LLW areas:

- 1st Stage Plenum Area

  Pre-fixative: <5,000-433,000 dpm/100cm^2 fixed, <1,000-4,488 dpm/100cm^2 loose

  Post-fixative: <5,000- 65,800 dpm/100cm^2 fixed, <1,000 dpm/100cm^2 loose

- 2nd Stage Plenum Area (north side, adjacent to 1st Stage)

  Pre-decon: <5,000 dpm/100cm^2 fixed, <1,000 dpm/100cm^2 loose

  Post-decon: <5,000-26,000 dpm/100cm^2 fixed, <1,000 dpm/100cm^2 loose

  Note: Post-decon results may be higher than Pre-decon results due to the decontamination process exposing more activity to the survey detectors.

3.2 PDS Planning and Preparation

Building 451 was characterized for radiological hazards per the PDSP. Radiological characterization was performed to define the nature and extent of radioactive materials that may be present on the facility surfaces. Measurements were performed to evaluate the contaminants of concern. Based on the RLC data and historical and process knowledge, only depleted uranium activity was a concern inside Building 451. Based upon a review of historical and process knowledge, building walk-downs, and MARSSIM guidance, a Radiological Characterization Plan was developed during the planning phase that describes the minimum survey requirements (refer to the RISS Characterization Project files for the Building 451 Radiological Characterization Plan). Individual radiological survey unit packages are maintained in the RISS Characterization Project files.

Three radiological survey unit packages were initially developed for Building 451: 451101, 451102 and 451103. Radiological survey unit 451101 included the first stage plenum, survey unit 451102 included the second stage plenum, and survey unit 451103 included the third stage plenum and fan room. The survey unit packages were developed in accordance with Radiological Safety Practices (RSP) 16.01, *Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure.*

Total surface activity (TSA), removable surface activity (RSA), and scan measurements were collected in accordance with RSP 16.02 *Radiological Surveys of Surfaces and Structures.* Media samples were not collected because the paint in Building 451 was either the original factory coating or was removed during decontamination efforts. Radiological survey data were verified, validated and evaluated in accordance with RSP 16.04, *Radiological Survey/Sample Data Analysis.* Quality control measures were implemented relative to the survey process in accordance with RSP 16.05, *Radiological Survey/Sample Quality Control.* Individual radiological survey unit packages are maintained in the RISS Characterization Project files.

3.3 Building 451 Confirmatory Surveys (Exterior)

Building 451 exterior was surveyed per PDS requirements as part of the *Reconnaissance Level Characterization Report for the Building 444 Cluster,* dated November 6, 2001, and met PDS unrestricted release levels. Additional random confirmatory swipe surveys of all wall and roof surfaces of the Building 451 exterior were performed during the PDS survey, and all results were less than the PDS unrestricted release levels. Refer to Attachment B-2, *451 Confirmatory Survey*, for the building exterior confirmatory radiological survey.

3.4 PDS Survey Results

The table below summarizes the PDS radiological survey data by Survey Unit:

Building 451 PDS Radiological Summary Survey Table

Survey Unit	Description	MARSSIM Class	TSAs Performed	RSAs Performed	% Scans Performed	Survey Unit Class Justification	Survey Results
451101	1st Stage Plenum	1	N/A	N/A	N/A	Area had, prior to remediation, a potential for radioactive contamination, or known contamination above the $DCGL_W$.	Area will be managed as LLW.
451102	2nd Stage Plenum	2	17 – systematically grid, 2– QC	17 – systematically grid	50% of all surfaces (143 m^2 minimum) at biased locations	Area had, prior to remediation, a potential for radioactive contamination, or known contamination, but was not expected to exceed the $DCGL_W$.	Portions will be managed as LLW. All other areas were less than the PDS unrestricted release levels.
451103	3rd Stage Plenum and Fan Room	3	15 – systematically grid, 2 – QC	15 – systematically grid	10% of all surfaces (28 m^2 minimum) at biased locations	Areas are not expected to contain, or have ever contained, any residual radioactivity greater than the $DCGL_W$	All areas were less than the PDS unrestricted release levels.

All final "as left" PDS radiological survey results were less than the applicable PDSP unrestricted release limits. Radiological survey unit data, statistical analysis results, survey locations and radiological scan maps are presented in Attachment B-1, *Radiological Survey Unit Data Summary and Survey Maps*. To ensure the facility remains free of further contamination and PDS data remain valid, Level 2 Isolation Controls have been established and the areas posted accordingly.

4 CHEMICAL CHARACTERIZATION AND HAZARDS

Building 451 was characterized for chemical hazards per the PDSP. Chemical characterization was performed to determine the nature and extent of chemical contamination that may be present on, or in the facility. Based upon a review of historical and process knowledge, visual inspections, and PDSP DQOs, additional sampling needs were determined. A Chemical Characterization Plan was developed during the planning phase that describes sampling requirements and the justification for the sample locations and estimated sample numbers. The contaminants of concern were asbestos, beryllium, and RCRA constituents. Refer to Attachment C-1, for details on sample results and sample locations. Isolation control postings are displayed on affected structures to ensure no hazardous materials are introduced.

4.1 Asbestos

A survey of building materials suspected of containing asbestos was conducted during in-process stripout of the facility. A CDPHE-certified asbestos inspector conducted the inspections and sampling in accordance with the *Asbestos Characterization Protocol, PRO-563-ACPR, Revision 1.* Building materials suspected of containing asbestos were identified for sampling at the discretion of the inspector. Prior to the PDS, friable and non-friable asbestos abatement and satisfactory clearance sampling was conducted per CDPHE, Regulation No. 8, Part B, *Emission Standards for Asbestos.* On this basis, no additional asbestos sampling was required or performed as part of this PDS.

4.2 Beryllium (Be)

During the in-process stripout and decontamination phase of the Building 451 project, all areas containing loose beryllium contamination were either decontaminated to below the unrestricted release limit of 0.2 $\mu g/100cm^2$ or fixatives were applied (after the radiological portion of the PDS was completed) to immobilize the beryllium in order to comply with unrestricted release limits. Levels of beryllium that were immobilized in place ranged from 0.1 to 0.474 $ug/100cm^2$. Since Building 451 was on the list of Known Beryllium Areas, both random and biased PDS sampling was required. Once the areas were isolated from adjacent work areas, random and biased beryllium PDS swipes were collected and analyzed.

Random and biased beryllium smear samples were collected in Building 451 in accordance with the PDSP and the *Beryllium Characterization Procedure,* PRO-536-BCPR, Revision 0, September 9, 1999. The table in Attachment C-1 summarizes the "as left" PDS beryllium swipe data for Building 451. All final "as left" beryllium PDS swipe results were less than the action levels of 0.2 $\mu g/100cm^2$ and investigative levels of 0.1 $\mu g/100cm^2$. Detailed PDS beryllium laboratory swipe data and location maps are contained in Attachment C-1, *Beryllium Results Table and Sample Location Maps.*

4.3 RCRA/CERCLA Constituents [including metals and volatile organic compounds (VOCs)

Based on a review of the HSAR, RLCR, interviews, and facility walk-downs, Building 451 was a filter plenum providing ventilation to Buildings 447 and 448. Prior to PDS, activities in Buildings 447 and 448 did not indicate any RCRA/CERCLA contamination, and there is no additional evidence that RCRA/CERCLA constituents were introduced into Building 451. Therefore, sampling was not performed as part of this PDSR.

The facility contained some RCRA regulated items, such as mercury thermostats, fluorescent light bulbs, mercury vapor light bulbs, mercury containing gauges, circuit boards, and lead-acid batteries. However, these items have been removed and managed in accordance with the Colorado Hazardous Waste Act.

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4.4 Polychlorinated Biphenyls (PCBs)

Based on the HSAR, RLCR, interviews, and facility walk-downs of Building 451, no PCB-containing equipment was ever used or stored in the building, making the potential for PCB contamination resulting from spills highly unlikely. Therefore, PCB sampling was not performed as part of the PDS.

Based on the age of Building 451 (constructed after to 1980), paint used in the facility did not contain PCBs, therefore, painted surfaces will not be managed as PCB Bulk Product Waste. The facility may have contained PCB fluorescent light ballasts, however, all leaking PCB ballasts, and those greater than 9 pounds have been removed from the facility and managed appropriately.

5 PHYSICAL HAZARDS

Physical hazards associated with Building 451 are those common to standard industrial environments, and include hazards associated with energized systems, utilities, and trips and falls. Building 451 was attached to Building 447 via ventilation ducting, therefore, care shall be taken in order to not disturb Building 447 during demolition. There are no other unique hazards associated with the facility. The facility has been relatively well maintained and is in good physical condition, therefore, does not present hazards associated with building deterioration. Physical hazards are controlled by the Site Occupational Safety and Industrial Hygiene Program, which is based on OSHA regulations, DOE orders, and standard industry practices.

6 DATA QUALITY ASSESSMENT

Data used in making management decisions for the decommissioning of Building 451, and consequent waste management, are of adequate quality to support the decisions documented in this report. The data presented in this report (Attachments B and C) were verified and validated relative to DOE quality requirements, applicable EPA guidance, and original project DQOs.

In summary, the Verification and Validation (V&V) process corroborates that the following elements of the characterization process are adequate:

- the *number* of samples and surveys;
- the *types* of samples and surveys;
- the sampling/survey process as implemented "in the field"; and
- the laboratory analytical process, relative to accuracy and precision considerations.

Details of the DQA are provided in Attachment D.

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7 DECOMMISSIONING WASTE TYPES AND VOLUME ESTIMATES

The decommissioning of Building 451 will generate sanitary waste and LLW. These wastes will be removed and sent to appropriate offsite landfills. Estimated waste volumes are presented below. All ballasts and hazardous waste items have been removed and managed pursuant to Site PCB and waste management procedures.

WASTE TYPES AND VOLUME ESTIMATES							
Facility	**Concrete (cu ft)**	**Wood (cu ft)**	**Metal (cu ft)**	**Corrugated Sheet Metal (cu ft)**	**Wall Board (cu ft)**	**ACM (cu ft)**	**Other Waste (cu ft)**
451	2,800	0	2,800 – sanitary 1,000 – LLW	0	0	0	None

8 FACILITY CLASSIFICATION AND CONCLUSIONS

Based on the analysis of radiological, chemical and physical hazards, Building 451 is ready for demolition. Building 451 does not possess beryllium or chemical contamination in excess of the PDSP unrestricted release limits. However, fixatives were used to immobilize beryllium contamination. All PCB ballasts and hazardous waste items (e.g., mercury thermostats, fluorescent light bulbs, mercury vapor light bulbs, mercury-containing gauges, circuit boards, leaded glass, and lead-acid batteries) have been removed and disposed of in compliance with Environmental Protection Agency (EPA) and Colorado Department of Public Health and Environment (CDPHE) regulations. Asbestos abatement was conducted in Building 451 prior to the PDS. Friable and non-friable asbestos containing building materials were removed per CDPHE, Regulation No. 8, Part B, *Emission Standards for Asbestos*.

Radiological contamination exists in excess of the PDSP unrestricted release limits in the first stage plenum area and portions of the 2nd stage plenum. The first stage plenum and portions of the second stage plenum will be managed as LLW during demolition. These areas are discussed in detail in Section 3.1 above. All other areas of Building 451 are less than the PDSP unrestricted release limits.

The PDS for Building 451 was performed in accordance with the DDCP and PDSP, all PDSP DQOs were met, and all data satisfied the PDSP DQA criteria. Environmental media beneath and surrounding the facility will be addressed at a future date using the Soil Disturbance Permit process and in compliance with RFCA. To ensure Building 451 remains free of further contamination and PDS data remain valid, Level 2 Isolation Controls have been established and the facility posted accordingly.

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9 REFERENCES

DOE/RFFO, CDPHE, EPA, 1996. *Rocky Flats Cleanup Agreement (RFCA),* July 19, 1996.

DOE Order 5400.5, *"Radiation Protection of the Public and the Environment."*

DOE Order 414.1A, *"Quality Assurance."*

EPA, 1994. *"The Data Quality Objective Process,"* EPA QA/G-4.

K-H, 1999. *Decommissioning Program Plan,* June 21, 1999.

MAN-131-QAPM, *Kaiser-Hill Team Quality Assurance Program,* Rev. 1, November 1, 2001.

MAN-076-FDPM, *Facility Disposition Program Manual,* Rev. 3, January 1, 2002.

MAN-077-DDCP, *Decontamination and Decommissioning Characterization Protocol,* Rev. 4, July 15, 2002.

MAN-127-PDSP, *Pre-Demolition Survey Plan for D&D Facilities,* Rev. 1, July 15, 2002.

MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual* (NUREG-1575, EPA 402-R-97-016).

PRO-475-RSP-16.01, *Radiological Survey/Sampling Package Design, Preparation, Control, Implementation, and Closure,* Rev. 1, May 22, 2001.

PRO-476-RSP-16.02, *Pre-Demolition (Final Status) Radiological Surveys of Surfaces and Structures,* Rev. 1, May 22, 2001.

PRO-477-RSP-16.03, *Radiological Samples of Building Media,* Rev. 1, May 22, 2001.

PRO-478-RSP-16.04, *Radiological Survey/Sample Data Analysis for Final Status Survey,* Rev. 1, May 22, 2001.

PRO-479-RSP-16.05, *Radiological Survey/Sample Quality Control for Final Status Survey,* Rev. 1, May 22, 2001.

PRO-563-ACPR, *Asbestos Characterization Procedure,* Revision 0, August 24, 1999.

PRO-536-BCPR, *Beryllium Characterization Procedure,* Revision 0, August 24, 1999.

RFETS, *Environmental Waste Compliance Guidance #25, Management of Polychlorinated Biphenyls (PCBs) in Paint and Other Bulk Product Waste During Facility Disposition.*

RFETS, *Environmental Waste Compliance* Guidance #27, Lead-Based Paint (LBP) and Lead-Based Paint Debris Disposal.

RFETS, *RFCA RSOP for Recycling Concrete,* September 28, 1999

Reconnaissance Level Characterization Report for the Building 444 Cluster, dated November 6, 2001, Revision 0

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ATTACHMENT A

Facility Location Map

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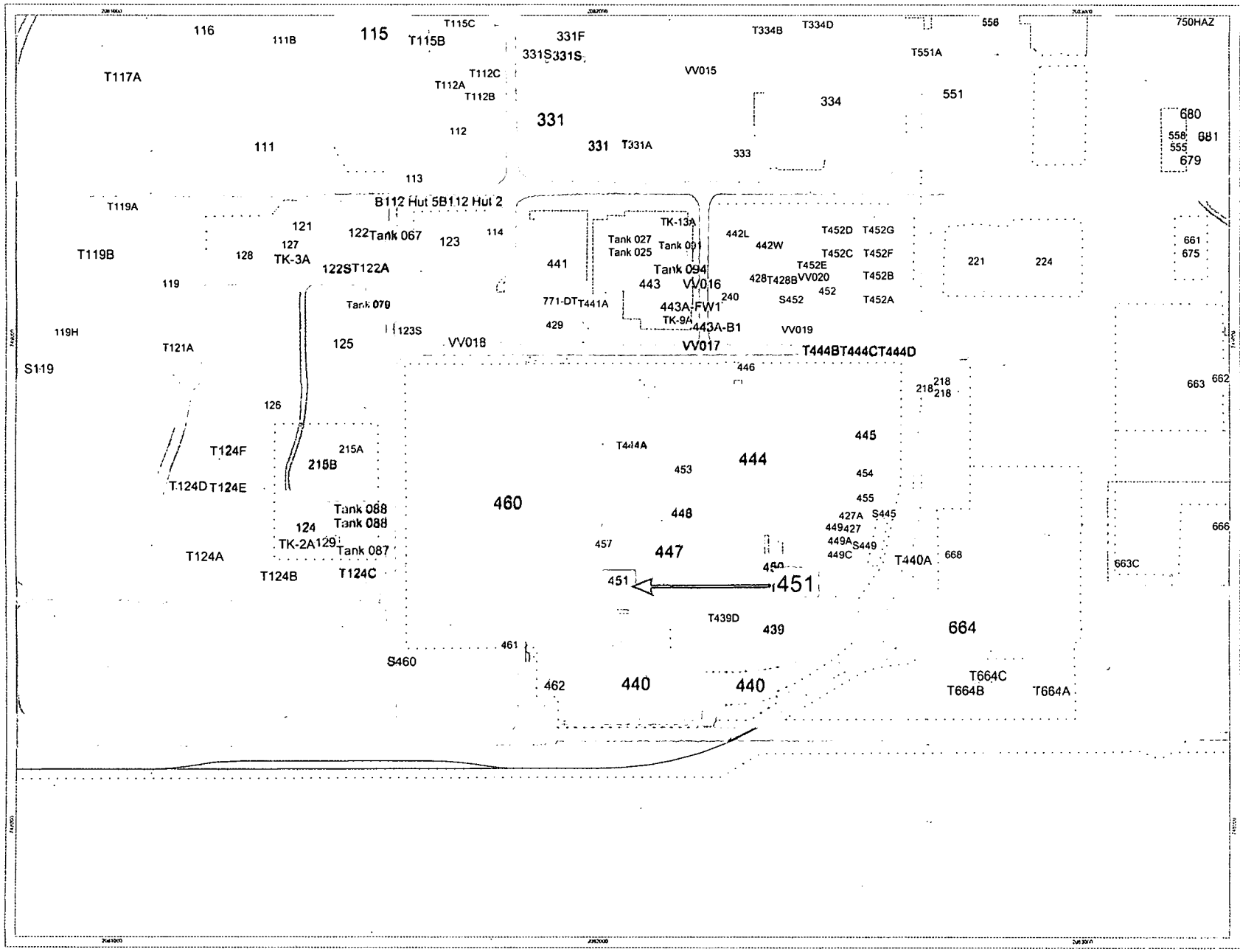


Rocky Flats Environmental Technology Site

451 Location Map

Map Features

- Building Remaining
- 451
- D&D Facility
- Paved Roads
- Dirt Roads
- Lakes
- Railroad Removed
- Railroad Remaining
- Fence Removed
- Fence Remaining
- Streams

N

1:1,034
1 inch equals 86 feet

State Plane Coordinate Projection
Colorado Central Zone (3476)
Datum: NAD27

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

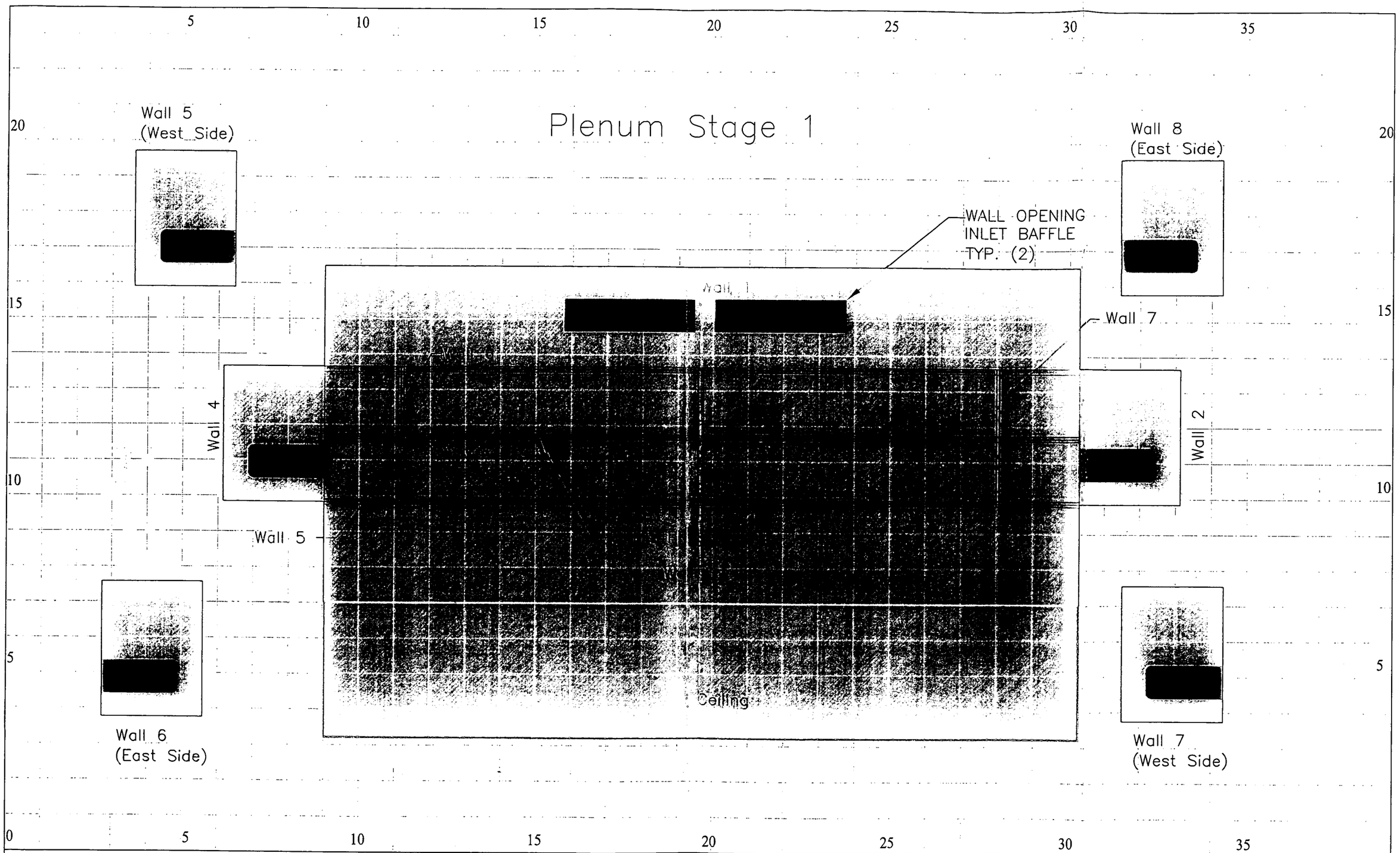
GIS Dept. (303) 966-7707

CH2MHILL

W:\Projects\700404-0839\451 location map.mxd

ATTACHMENT B-1

Radiological Survey Unit Data Summary and Survey Maps



PRE-DEMOLITION SURVEY MAP

BLDG: 451 Survey Area: 3 Survey Unit: 451101 Classification: 1

Survey Area/Unit Description: Building 451, All surfaces, Plenum Stage 1

Floor or Ceiling Area: 80 sq.m Total Area: 348 sq.m Grid Spacing for Survey Area: N/A

SURVEY POINT LEGEND

- Radiological RSA & TSA Location
- Radiological RSA , TSA & Sample Location
- Beryllium Sample Location
- RCRA/CERCLA Sample Location
- PCB Sample Location
- Radiological Scan Area
- Open/Inaccessible Area
- Area in Another Survey Unit
- Low Level Waste Area to be Removed

N

0 INCH 1

0 METERS 0.03

1 inch = 8 feet
1 grid sq. = 1 sq. m.

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

Prepared by: RF CSS Rocky Flats Closure Site Services, LLC.

Prepared for: KAISER HILL

File Name: PDS 451103C-1.DWG | Sheet 1 of 1 | Rev: 0

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Survey Area: 3	Survey Unit: 451102	Building: 451

Description: Building 451, All surfaces, Plenum Stage 2

Rocky Flats Environmental Technology Site
Final Radiological Survey Summary Results

Total Surface Activity Measurements

Nbr Random Measurements Required: 15
Nbr Random Measurements Performed: 17

Nbr Biased Measurements Required: 0
Nbr Biased Measurements Performed: 0

Nbr QC Required: 2
Nbr QC Performed: 2

Beta

Maximum:	1,421.7 dpm/100cm²
Minimum:	-114.7 dpm/100cm²
Mean:	589.3 dpm/100cm²
Standard Deviation:	506.4
QC Maximum:	200.0 dpm/100cm²
QC Minimum:	-31.8 dpm/100cm²
QC Mean:	84.1 dpm/100cm²
Uranium DCGLw:	5,000.0 dpm/100cm²
Uranium DCGLEMC:	15,000.0 dpm/100cm²

Removable Surface Activity Measurements

Nbr Random Measurements Required: 15
Nbr Random Measurements Performed: 17

Nbr Biased Measurements Required: 0
Nbr Biased Measurements Performed: 0

Beta

Maximum:	96.4 dpm/100cm²
Minimum:	-43.6 dpm/100cm²
Mean:	-0.1 dpm/100cm²
Standard Deviation:	38.9
Uranium DCGLw:	1,000.0

Media Sample Results

Nbr Random Required: 0
Nbr Random Collected: 0

Nbr Biased Required: 0
Nbr Biased Collected: 0

Conclusion - A comparison of the random, biased and QC measurement results against the PDSP Table 7-1 Surface Contamination Guideline limits was conducted; the comparison demonstrates that this survey unit passes the criterion specified in the PDSP.

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Survey Area: 3	Survey Unit: 451102	Building: 451

Description: Building 451, All surfaces, Plenum Stage 2

Instrument Data Sheet

Inst/RCT Number	RCT ID	Analysis Date	Instr Model	Instru S/N	Probe Type	Calibration Due Dt	Instru Efficiency Alpha	Instru Efficiency Beta	A-Priori MDA (dpm/100cm²) Alpha	A-Priori MDA (dpm/100cm²) Beta	Survey Type
1	712467	09/17/04	Electra	659	DP-8	03/07/05	NA	0.160	NA	745.0	S
2	700831	09/17/04	Electra	290	DP-6	02/18/05	NA	0.220	NA	745.0	T/S
3	712467	09/17/04	Electra	2352	DP-6	11/13/04	NA	0.220	NA	745.0	Q
4	700831	09/17/04	Ludlum 292	99042	NA	10/26/04	NA	0.250	NA	205.0	R

Survey Types: T = Total Surface Activity, Q = TSA QC, S = Scan, R = Removable Surface Activity, I = Investigation

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Survey Area: 3	Survey Unit: 451102	Building: 451

Description: Building 451, All surfaces, Plenum Stage 2

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
451102PRP-N001	4	N/A	-23.6	
451102PRP-N002	4	N/A	40.4	
451102PRP-N003	4	N/A	32.4	
451102PRP-N004	4	N/A	-23.6	
451102PRP-N005	4	N/A	-3.6	
451102PRP-N006	4	N/A	-15.6	
451102PRP-N007	4	N/A	-39.6	
451102PRP-N008	4	N/A	16.4	
451102PRP-N009	4	N/A	64.4	
451102PRP-N010	4	N/A	4.4	
451102PRP-N011	4	N/A	-7.6	
451102PRP-N012	4	N/A	-39.6	
451102PRP-N013	4	N/A	-15.6	
451102PRP-N014	4	N/A	-43.6	
451102PRP-N015	4	N/A	96.4	
451102PRP-N016	4	N/A	-11.6	
451102PRP-N017	4	N/A	-31.6	

Comments:

Survey Area: 3	Survey Unit: 451102	Building: 451

Description: Building 451, All surfaces, Plenum Stage 2

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
451102PRP-N001	2	N/A	-10.1	
451102PRP-N002	2	N/A	-114.7	
451102PRP-N003	2	N/A	189.9	
451102PRP-N004	2	N/A	162.6	
451102PRP-N005	2	N/A	285.3	
451102PRP-N006	2	N/A	108.1	
451102PRP-N007	2	N/A	-101.0	
451102PRP-N008	2	N/A	1,153.5	
451102QRP-N008	3	N/A	-31.8	
451102PRP-N009	2	N/A	1,185.3	
451102QRP-N009	3	N/A	200.0	
451102PRP-N010	2	N/A	1,421.7	
451102PRP-N011	2	N/A	1,103.5	
451102PRP-N012	2	N/A	1,235.3	
451102PRP-N013	2	N/A	617.2	
451102PRP-N014	2	N/A	744.4	
451102PRP-N015	2	N/A	758.1	
451102PRP-N016	2	N/A	635.3	
451102PRP-N017	2	N/A	644.4	

Comments:

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Plenum Stage 2

Starting Point For Square Sampling Grid (X12, Y19)

Wall 5 (West Side)

Wall 8 (East Side)

Wall 1

Wall 7

Wall 6

Floor

Wall 4

Wall 2

Filter Frame Typ.

Wall 8

Wall 5

Wall 3

Fan Opening Typ. (3)

Ceiling

Wall 6 (East Side)

Wall 7 (West Side)

PRE-DEMOLITION SURVEY MAP

BLDG: 451 Survey Area: 3 Survey Unit: 451102 Classification: 2

Survey Area/Unit Description: Building 451, All surfaces, Plenum Stage 2

Floor or Ceiling Area: 81 sq.m Total Area: 285 sq.m Grid Spacing for Survey Area: 4 m x 4 m

SURVEY POINT LEGEND

- Radiological RSA & TSA Location
- Radiological RSA , TSA & Sample Location
- Beryllium Sample Location
- RCRA/CERCLA Sample Location
- PCB Sample Location
- Radiological Scan Area
- Open/Inaccessible Area
- Area in Another Survey Unit
- Low Level Waste Area to be Removed

N

0 INCH 1

0 METERS 0.03

1 inch = 8 feet
1 grid sq. = 1 sq. m.

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Prepared for: KAISER HILL

File Name: PDS 451103C-2.DWG | Sheet 1 of 1 | Rev: 0

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Survey Area: 3	Survey Unit: 451103	Building: 451

Description: Building 451, All surfaces Plenum Stage 3

Rocky Flats Environmental Technology Site
Final Radiological Survey Summary Results

Total Surface Activity Measurements

Nbr Random Measurements Required: 15
Nbr Random Measurements Performed: 15

Nbr Biased Measurements Required: 0
Nbr Biased Measurements Performed: 0

Nbr QC Required: 2
Nbr QC Performed: 2

Beta

Maximum:	2,538.8 dpm/100cm²
Minimum:	-970.3 dpm/100cm²
Mean:	465.5 dpm/100cm²
Standard Deviation:	1,124.2
QC Maximum:	1,475.0 dpm/100cm²
QC Minimum:	1,015.9 dpm/100cm²
QC Mean:	1,245.4 dpm/100cm²
Uranium DCGL$_W$:	5,000.0 dpm/100cm²
Uranium DCGL$_{EMC}$:	15,000.0 dpm/100cm²

Removable Surface Activity Measurements

Nbr Random Measurements Required: 15
Nbr Random Measurements Performed: 15

Nbr Biased Measurements Required: 0
Nbr Biased Measurements Performed: 0

Beta

Maximum:	73.5 dpm/100cm²
Minimum:	-47.9 dpm/100cm²
Mean:	5.0 dpm/100cm²
Standard Deviation:	38.1
Uranium DCGL$_W$:	1,000.0

Media Sample Results

Nbr Random Required: 0
Nbr Random Collected: 0

Nbr Biased Required: 0
Nbr Biased Collected: 0

Conclusion - A comparison of the random, biased and QC measurement results against the PDSP Table 7-1 Surface Contamination Guideline limits was conducted; the comparison demonstrates that this survey unit passes the criterion specified in the PDSP.

Survey Area: 3	Survey Unit: 451103	Building: 451

Description: Building 451, All surfaces Plenum Stage 3

Instrument Data Sheet

Inst/RCT Number	RCT ID	Analysis Date	Instr Model	Instru S/N	Probe Type	Calibration Due Dt	Instru Efficiency Alpha	Instru Efficiency Beta	A-Priori MDA (dpm/100cm²) Alpha	A-Priori MDA (dpm/100cm²) Beta	Survey Type
1	712467	09/17/04	Electra	659	DP-8	03/07/05	NA	0.160	NA	745.0	S
2	700831	09/17/04	Electra	290	DP-6	02/18/05	NA	0.220	NA	745.0	T/S
3	712467	09/17/04	Electra	2352	DP-6	11/13/04	NA	0.220	NA	745.0	Q
4	700831	09/17/04	BC-4	911	NA	10/29/04	NA	0.140	NA	258.0	R

Survey Types: T = Total Surface Activity, Q = TSA QC, S = Scan, R = Removable Surface Activity, I = Investigation

Survey Area: 3	Survey Unit: 451103	Building: 451

Description: Building 451, All surfaces Plenum Stage 3

Random Removable Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
451103PRP-N001	4	N/A	-26.5	
451103PRP-N002	4	N/A	2.1	
451103PRP-N003	4	N/A	9.3	
451103PRP-N004	4	N/A	-12.2	
451103PRP-N005	4	N/A	-33.6	
451103PRP-N006	4	N/A	30.7	
451103PRP-N007	4	N/A	73.5	
451103PRP-N008	4	N/A	16.4	
451103PRP-N009	4	N/A	23.5	
451103PRP-N010	4	N/A	73.5	
451103PRP-N011	4	N/A	-33.6	
451103PRP-N012	4	N/A	-5.0	
451103PRP-N013	4	N/A	-33.6	
451103PRP-N014	4	N/A	37.8	
451103PRP-N015	4	N/A	-47.9	

Comments:

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Survey Area: 3	Survey Unit: 451103	Building: 451

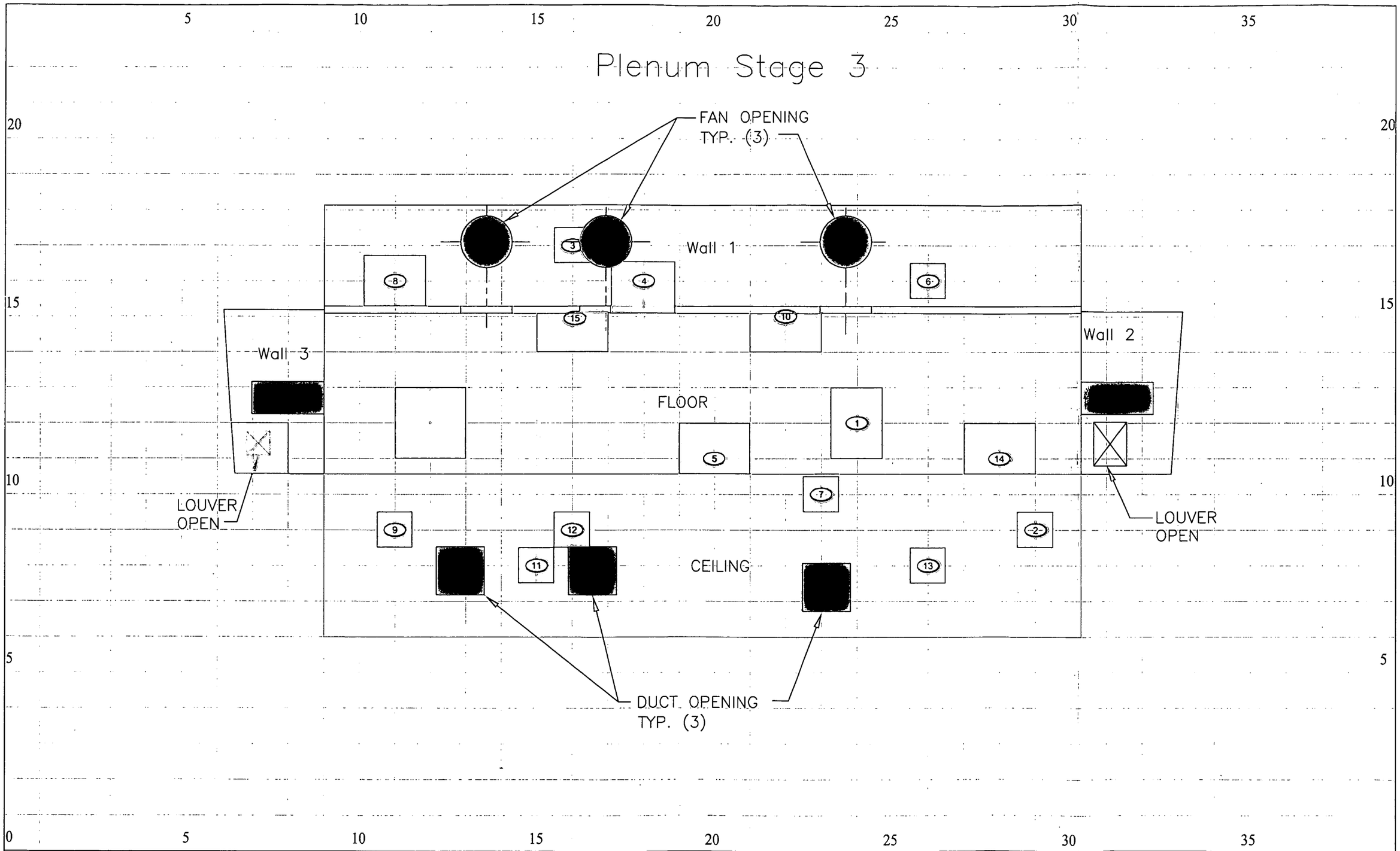
Description: Building 451, All surfaces Plenum Stage 3

Random/QC Total Surface Activity Data Sheet

Random Measurement Location	Inst / RCT Nbr	Net Alpha (dpm/100cm²)	Net Beta (dpm/100cm²)	
451103PRP-N001	2	N/A	1,684.3	
451103QRP-N001	3	N/A	1,475.0	
451103PRP-N002	2	N/A	29.7	
451103PRP-N003	2	N/A	-970.3	
451103PRP-N004	2	N/A	-597.5	
451103PRP-N005	2	N/A	1,838.8	
451103PRP-N006	2	N/A	-524.8	
451103PRP-N007	2	N/A	525.2	
451103PRP-N008	2	N/A	-515.7	
451103PRP-N009	2	N/A	-102.1	
451103PRP-N010	2	N/A	2,538.8	
451103QRP-N010	3	N/A	1,015.9	
451103PRP-N011	2	N/A	-261.2	
451103PRP-N012	2	N/A	-124.8	
451103PRP-N013	2	N/A	7.0	
451103PRP-N014	2	N/A	1,502.5	
451103PRP-N015	2	N/A	1,952.5	

Comments:

Plenum Stage 3



PRE-DEMOLITION SURVEY MAP

BLDG: 451 Survey Area: 3 Survey Unit: 451103 Classification: 3

Survey Area/Unit Description: Building 451, All surfaces, Plenum Stage 3

Floor or Ceiling Area: 98 sq.m Total Area: 272 sq.m Grid Spacing for Survey Area:

SURVEY POINT LEGEND

- Radiological RSA & TSA Location
- Radiological RSA , TSA & Sample Location
- Beryllium Sample Location
- RCRA/CERCLA Sample Location
- PCB Sample Location
- Radiological Scan Area
- Open/Inaccessible Area
- Area in Another Survey Unit

N

0 INCH 1

0 METERS 0.03

1 inch = 8 feet
1 grid sq. = 1 sq. m.

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Prepared by: RFCSS Rocky Flats Closure Site Services, LLC.

Prepared for: KAISER HILL

File Name: PDS_451103C-3.DWG | Sheet 1 of 1 | Rev: 0

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ATTACHMENT B-2

Building 451 Confirmatory Survey

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

INSTRUMENT DATA

Mfg.	Ludlum	Mfg.	Eberline	Mfg.	NE Electra
Model	2929	Model	SAC-4	Model	DP-6
Serial #	99042	Serial #	N/A	Serial #	1379
Cal Due	10/26/04	Cal Due	N/A	Cal Due	2/18/05
Bkg	0.1 cpmα	Bkg	N/A cpmα	Bkg	2.0 cpmα
Efficiency	34.90 %	Efficiency	33.00 %	Efficiency	21.80 %
MDA	18 dpmα	MDA	20 dpmα	MDA	44 dpmα
Mfg.	Ludlum	Mfg.	Eberline	Mfg.	NE Electra
Model	2929	Model	BC-4	Model	DP-6
Serial #	99042	Serial #	N/A	Serial #	1379
Cal Due	10/26/04	Cal Due	N/A	Cal Due	2/18/05
Bkg	90.0 cpmβ	Bkg	N/A cpmβ	Bkg	551 cpmβ
Efficiency	25.00 %	Efficiency	14.00 %	Efficiency	22.00 %
MDA	205 dpmβ	MDA	258 dpmβ	MDA	745 dpmβ

Survey Tracking # N/A

Survey Type: Contamination

Building: 451 plenum

Location: Interior and exterior surfaces

Purpose: Pre-Demolition Verification Survey

RWP #: N/A

Date: 9/23/04 Time: 1045

RC [redacted]

Print name Signature Emp. #

RCT: N/A / N/A / N/A

Print name Signature Emp. #

PRN/REN # : N/A

Comments: Nuclides of concern are Uranium and Plutonium. Survey performed to verify contamination levels prior to demolition of B451. Performed swipe of floors, walls, and remaining equipment in B451. Beta efficiencies listed reflect correction for Depleted Uranium (DU), calibrated efficiencies were: for Ludlum 2929 # 99042 - 39.0% and for Electra # 1379 - 31.6%.

	LOCATION	ALPHA			BETA		
		Swipe	Direct	Wipe	Swipe	Direct	Wipe
#		dpm/100cm2	dpm/100cm2	dpm/wipe	dpm/100cm2	dpm/100cm2	dpm/wipe
1-15	B451 floors	<18	N/A	<44	<205	N/A	<745
16-32	B451 interior walls	<18	N/A	<44	<205	N/A	<745
33-45	B451 external walls	<18	N/A	<44	<205	N/A	<745
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Date Reviewed: 9/23/04 **RS Supervision:** [redacted]

Print Name Signature Emp. #

ATTACHMENT C-1

Beryllium Results Table and Sample Location Maps

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
1	CONTROL ROOM	04Z2451	444-08192004-213-001	B.451 PDS CHRCTRZTN PT 1, CONTROL ROOM FLOOR	<0.1
2	3RD STAGE	04Z2536	451-09032004-602-002	B451 PDS CHARACTERIZATION POINT # 2, FLOOR	<0.1
3	3RD STAGE	04Z2536	451-09032004-602-003	B451 PDS CHARACTERIZATION POINT # 3, FLOOR	<0.1
4	1ST STAGE	04Z2565	451-09112004-01-004	B451 PDS CHARACTERIZATION POINT #4, FLOOR	<0.1
4	1ST STAGE	04D1180	451-09152004-602-004	B451 POST FIXATIVE PDS CHARACTERIZATION POINT #4, FLOOR	<0.1
5	CONTROL ROOM	04Z2451	444-08192004-213-005	B.451 PDS CHRCTRZTN PT 5, CONTROL ROOM FLOOR	<0.1
6	1ST STAGE	04Z2565	451-09112004-01-006	B451 PDS CHARACTERIZATION POINT #6, FLOOR	0.103
6	1ST STAGE	04D1180	451-09152004-602-006	B451 POST FIXATIVE PDS CHARACTERIZATION POINT #6, FLOOR	<0.1
7	CONTROL ROOM	04Z2451	444-08192004-213-007	B.451 PDS CHRCTRZTN PT 7, CONTROL ROOM FLOOR	<0.1
8	CONTROL ROOM	04Z2451	444-08192004-213-008	B.451 PDS CHRCTRZTN PT 8, CONTROL ROOM FLOOR	<0.1
9	1ST STAGE	04Z2565	451-09112004-01-009	B451 PDS CHARACTERIZATION POINT #9, FLOOR	0.13
9	1ST STAGE	04D1180	451-09152004-602-009	B451 POST FIXATIVE PDS CHARACTERIZATION POINT #9, FLOOR	<0.1
10	1ST STAGE	04Z2565	451-09112004-01-010	B451 PDS CHARACTERIZATION POINT #10, FLOOR	0.474
10	1ST STAGE	04D1180	451-09152004-602-010	B451 POST FIXATIVE PDS CHARACTERIZATION POINT #10, FLOOR	<0.1
11	CONTROL ROOM	04Z2451	444-08192004-213-011	B.451 PDS CHRCTRZTN PT 11, CONTROL ROOM FLOOR	<0.1
12	CONTROL ROOM	04Z2451	444-08192004-213-012	B.451 PDS CHRCTRZTN PT 12, CONTROL ROOM FLOOR	<0.1

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
13	CONTROL ROOM	04Z2451	444-08192004-213-013	B.451 PDS CHRCTRZTN PT 13, CONTROL ROOM FLOOR	<0.1
14	CONTROL ROOM	04Z2451	444-08192004-213-014	B.451 PDS CHRCTRZTN PT 14, CONTROL ROOM FLOOR	<0.1
15	CONTROL ROOM	04Z2451	444-08192004-213-015	B.451 PDS CHRCTRZTN PT 15, CONTROL ROOM FLOOR	<0.1
16	3RD STAGE	04Z2536	451-09032004-602-016	B451 PDS CHARACTERIZATION POINT # 16, FLOOR, WEST AIRLOCK	<0.1
17	DEMISTER STAGE	04Z2565	451-09112004-01-017	B451 PDS CHARACTERIZATION POINT #17, FLOOR	<0.1
17	DEMISTER STAGE	04D1180	451-09152004-602-017	B451 POST FIXATIVE PDS CHARACTERIZATION POINT #17, FLOOR	<0.1
18	CONTROL ROOM	04Z2451	444-08192004-213-018	B.451 PDS CHRCTRZTN PT 18, CONTROL ROOM FLOOR	<0.1
19	CONTROL ROOM	04Z2451	444-08192004-213-019	B.451 PDS CHRCTRZTN PT 19, CONTROL ROOM FLOOR	<0.1
20	CONTROL ROOM	04Z2451	444-08192004-213-020	B.451 PDS CHRCTRZTN PT 20, CONTROL ROOM FLOOR	<0.1
21	CONTROL ROOM	04Z2451	444-08192004-213-021	B.451 BIAS SAMPLE-ABOVE E DOOR, OVERHEAD PIPE/BEAM	<0.1
22	CONTROL ROOM	04Z2451	444-08192004-213-022	B.451 BIAS SAMPLE-ABOVE PT 8, OVERHEAD PIPE/BEAM	<0.1
23	CONTROL ROOM	04Z2451	444-08192004-213-023	B.451 BIAS SAMPLE-ABOVE PT 7, OVERHEAD PIPE/BEAM	<0.1
24	CONTROL ROOM	04Z2451	444-08192004-213-024	B.451 BIAS SAMPLE-ABOVE PT 15, OVERHEAD PIPE/BEAM	<0.1
25	CONTROL ROOM	04Z2451	444-08192004-213-025	B.451 BIAS SAMPLE-ABOVE PT 14, OVERHEAD PIPE/BEAM	<0.1
26	CONTROL ROOM	04Z2451	444-08192004-213-026	B.451 BIAS SAMPLE-ABOVE PT 1, OVERHEAD PIPE/BEAM	<0.1
27	CONTROL ROOM	04Z2451	444-08192004-213-027	B.451 BIAS SAMPLE-CENTER/W END, OVERHEAD PIPE/BEAM	<0.1

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
28	CONTROL ROOM	04Z2451	444-08192004-213-028	B.451 BIAS SAMPLE-CENTER/W END, OVERHEAD PIPE/BEAM	<0.1
29	CONTROL ROOM	04Z2451	444-08192004-213-029	B.451 BIAS SAMPLE-W END, OVERHEAD PIPE/BEAM	<0.1
30	CONTROL ROOM	04Z2451	444-08192004-213-030	B.451 BIAS SAMPLE-ABOVE PT 5, OVERHEAD PIPE/BEAM	<0.1
31	CONTROL ROOM	04Z2451	444-08192004-213-031	B.451 BIAS SAMPLE-W FAN ACCESS HATCH	<0.1
32	CONTROL ROOM	04Z2451	444-08192004-213-032	B.451 BIAS SAMPLE-MID FAN ACCESS HATCH ABOVE PT 12	<0.1
33	CONTROL ROOM	04Z2451	444-08192004-213-033	B.451 BIAS SAMPLE-E FAN ACCESS HATCH ABOVE PT 18	<0.1
34	CONTROL ROOM	04Z2451	444-08192004-213-034	B.451 BIAS SAMPLE-UNDER W FAN ACCESS HATCH, FLOOR	<0.1
35	CONTROL ROOM	04Z2451	444-08192004-213-035	B.451 BIAS SAMPLE-UNDER MID FAN ACCESS HATCH, FLOOR	<0.1
36	CONTROL ROOM	04Z2451	444-08192004-213-036	B.451 BIAS SAMPLE-UNDER E FAN ACCESS HATCH, FLOOR	<0.1
40	3RD STAGE	04Z2536	451-09032004-602-040	B451 PDS BIAS SAMPLE, WEST AIRLOCK, FLOOR IN FRONT OF DOOR TO PLENUM	<0.1
41	3RD STAGE	04Z2536	451-09032004-602-041	B451 PDS BIAS SAMPLE, FLOOR IN FRONT OF DOOR TO WEST AIRLOCK	<0.1
42	3RD STAGE	04Z2536	451-09032004-602-042	B451 PDS BIAS SAMPLE, INSIDE DUCT TO MIDDLE FAN	<0.1
43	3RD STAGE	04Z2536	451-09032004-602-043	B451 PDS BIAS SAMPLE, FLOOR IN FRONT OF MIDDLE FAN	<0.1
44	3RD STAGE	04Z2536	451-09032004-602-044	B451 PDS BIAS SAMPLE, ON TOP OF SCREEN/BAR TO EASTERN MOST FAN	<0.1
45	3RD STAGE	04Z2536	451-09032004-602-045	B451 PDS BIAS SAMPLE, ON ELECTRICAL OUTLET/CONDUIT, SOUTH WALL CENTER	<0.1
46	3RD STAGE	04Z2536	451-09032004-602-046	B451 PDS BIAS SAMPLE, EAST AIRLOCK, FLOOR IN FRONT OF DOOR TO PLENUM	<0.1

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
47	3RD STAGE	04Z2536	451-09032004-602-047	B451 PDS BIAS SAMPLE, EAST AIRLOCK, INSIDE HANDLE TO OUTER DOOR	<0.1
48	2ND STAGE	04Z2536	451-09032004-602-048	B451 PDS BIAS SAMPLE, WEST AIRLOCK, FLOOR, CENTER SECTION	<0.1
49	2ND STAGE	04Z2536	451-09032004-602-049	B451 PDS BIAS SAMPLE, FLOOR, EAST SECTION, CENTER	<0.1
50	2ND STAGE	04Z2536	451-09032004-602-050	B451 PDS BIAS SAMPLE, FLOOR, CENTER SECTION, ON STAIN	<0.1
51	2ND STAGE	04Z2536	451-09032004-602-051	B451 PDS BIAS SAMPLE, FLOOR, WEST SECTION, IN FRONT OF AIRLOCK DOOR	<0.1
52	2ND STAGE	04Z2536	451-09032004-602-052	B451 PDS BIAS SAMPLE, ON ELECTRICAL OUTLET/CONDUIT, EAST SECTION, NORTH WALL	<0.1
53	2ND STAGE	04Z2536	451-09032004-602-053	B451 PDS BIAS SAMPLE, ON FILTER FRAME, DOWNSTREAM SIDE OF 1ST STAGE FILTERS, NORTH WALL EAST SECTION	<0.1
54	2ND STAGE	04Z2536	451-09032004-602-054	B451 PDS BIAS SAMPLE, EAST AIRLOCK, FLOOR IN FRONT OF DOOR TO PLENUM	<0.1
55	1ST STAGE	04Z2536	451-09032004-602-055	B451 PDS BIAS SAMPLE, EAST AIRLOCK, FLOOR IN FRONT OF DOOR TO PLENUM	<0.1
56	1ST STAGE	04Z2536	451-09032004-602-056	B451 PDS BIAS SAMPLE, EAST AIRLOCK, PLENUM DOOR HANDLE	<0.1
57	DEMISTER STAGE	04Z2565	451-09112004-01-057	B451 PDS BIAS SAMPLE, ON ELECTRICAL BOX, NORTH WALL WEST END	0.191
57	DEMISTER STAGE	04D1180	451-09152004-602-057	B451 POST FIXATIVE PDS BIAS SAMPLE, ON ELECTRICAL BOX, NORTH WALL WEST END	<0.1
58	DEMISTER STAGE	04Z2565	451-09112004-01-058	B451 PDS BIAS SAMPLE, ON UPSTREAM SIDE OF IMPACT PLATE, WEST END	0.108
58	DEMISTER STAGE	04D1180	451-09152004-602-058	B451 POST FIXATIVE PDS BIAS SAMPLE, ON UPSTREAM SIDE OF IMPACT PLATE, WEST END	<0.1

Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
59	DEMISTER STAGE	04Z2565	451-09112004-01-059	B451 PDS BIAS SAMPLE, INSIDE WEST DUCT	0.151
59	DEMISTER STAGE	04D1180	451-09152004-602-059	B451 POST FIXATIVE PDS BIAS SAMPLE, INSIDE WEST DUCT	<0.1
60	DEMISTER STAGE	04Z2565	451-09112004-01-060	B451 PDS BIAS SAMPLE, ON DOWNSTREAM SIDE OF IMPACT PLATE, EAST END	0.171
60	DEMISTER STAGE	04D1180	451-09152004-602-060	B451 POST FIXATIVE PDS BIAS SAMPLE, ON DOWNSTREAM SIDE OF IMPACT PLATE, EAST END	<0.1
61	DEMISTER STAGE	04Z2565	451-09112004-01-061	B451 PDS BIAS SAMPLE, INSIDE EAST DUCT	<0.1
61	DEMISTER STAGE	04D1180	451-09152004-602-061	B451 POST FIXATIVE PDS BIAS SAMPLE, INSIDE EAST DUCT	<0.1
62	DEMISTER STAGE	04Z2565	451-09112004-01-062	B451 PDS BIAS SAMPLE, ON UPSTREAM SIDE OF IMPACT PLATE, EAST END	<0.1
62	DEMISTER STAGE	04D1180	451-09152004-602-062	B451 POST FIXATIVE PDS BIAS SAMPLE, ON UPSTREAM SIDE OF IMPACT PLATE, EAST END	<0.1
63	DEMISTER STAGE	04Z2565	451-09112004-01-063	B451 PDS BIAS SAMPLE, BOTTOM PORTION OF DEMISTER FRAME, EAST END	<0.1
63	DEMISTER STAGE	04D1180	451-09152004-602-063	B451 POST FIXATIVE PDS BIAS SAMPLE, BOTTOM PORTION OF DEMISTER FRAME, EAST END	<0.1
64	DEMISTER STAGE	04Z2565	451-09112004-01-064	B451 PDS BIAS SAMPLE, BOTTOM PORTION OF DEMISTER FRAME, CENTER SECTION	0.372
64	DEMISTER STAGE	04D1180	451-09152004-602-064	B451 POST FIXATIVE PDS BIAS SAMPLE, BOTTOM PORTION OF DEMISTER FRAME, CENTER SECTION	<0.1
65	DEMISTER STAGE	04Z2565	451-09112004-01-065	B451 PDS BIAS SAMPLE, ON OVERHEAD FIRE LINE, WEST END	0.141

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
65	DEMISTER STAGE	04D1180	451-09152004-602-065	B451 POST FIXATIVE PDS BIAS SAMPLE, ON OVERHEAD FIRE LINE, WEST END	<0.1
66	DEMISTER STAGE	04Z2565	451-09112004-01-066	B451 PDS BIAS SAMPLE, INSIDE WEST DOORFRAME	0.128
66	DEMISTER STAGE	04D1180	451-09152004-602-066	B451 POST FIXATIVE PDS BIAS SAMPLE, INSIDE WEST DOORFRAME	<0.1
67	1ST STAGE	04Z2565	451-09112004-01-067	B451 PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, WEST END	<0.1
67	1ST STAGE	04D1180	451-09152004-602-067	B451 POST FIXATIVE PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, WEST END	<0.1
68	1ST STAGE	04Z2565	451-09112004-01-068	B451 PDS BIAS SAMPLE, ON OVERHEAD BEAM, NORTH WALL, WEST END	<0.1
68	1ST STAGE	04D1180	451-09152004-602-068	B451 POST FIXATIVE BIAS SAMPLE, ON OVERHEAD BEAM, NORTH WALL, WEST END	<0.1
69	1ST STAGE	04Z2565	451-09112004-01-069	B451 PDS BIAS SAMPLE, ON VERTICLE FIRE LINE, NORTH WALL, WEST END	0.219
69	1ST STAGE	04D1180	451-09152004-602-069	B451 POST FIXATIVE PDS BIAS SAMPLE, ON VERTICLE FIRE LINE, NORTH WALL, WEST END	<0.1
70	1ST STAGE	04Z2565	451-09112004-01-070	B451 PDS BIAS SAMPLE, ON OVERHEAD LIGHT AND CONDUIT, EAST END	0.274
70	1ST STAGE	04D1180	451-09152004-602-070	B451 POST FIXATIVE PDS BIAS SAMPLE, ON OVERHEAD LIGHT AND CONDUIT, EAST END	<0.1
71	1ST STAGE	04Z2565	451-09112004-01-071	B451 PDS BIAS SAMPLE, AROUND DOOR FRAME TO DEMISTER STAGE, EAST END	<0.1
71	1ST STAGE	04D1180	451-09152004-602-071	B451 POST FIXATIVE PDS BIAS SAMPLE, AROUND DOOR FRAME TO DEMISTER STAGE, EAST END	<0.1
72	1ST STAGE	04Z2565	451-09112004-01-072	B451 PDS BIAS SAMPLE, ON DOOR TO EAST AIRLOCK	0.208

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Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
72	1ST STAGE	04D1180	451-09152004-602-072	B451 POST FIXATIVE PDS BIAS SAMPLE, ON DOOR TO EAST AIRLOCK	<0.1
73	1ST STAGE	04Z2565	451-09112004-01-073	B451 PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, EAST END	0.133
73	1ST STAGE	04D1180	451-09152004-602-073	B451 POST FIXATIVE PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, EAST END	<0.1
74	1ST STAGE	04Z2565	451-09112004-01-074	B451 PDS BIAS SAMPLE, ON CENTER CEILING BEAM	<0.1
74	1ST STAGE	04D1180	451-09152004-602-074	B451 POST FIXATIVE PDS BIAS SAMPLE, ON CENTER CEILING BEAM	<0.1
75	1ST STAGE	04Z2565	451-09112004-01-075	B451 PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, CEILING BRACKETS, WEST END	0.227
75	1ST STAGE	04D1180	451-09152004-602-075	B451 POST FIXATIVE PDS BIAS SAMPLE, 1ST STAGE FILTER FRAME, CEILING BRACKETS, WEST END	<0.1
76	2ND STAGE	04D1180	451-09152004-602-076	B451 BIAS SAMPLE, FLOOR, EAST END CENTER	<0.1
77	2ND STAGE	04D1180	451-09152004-602-077	B451 BIAS SAMPLE, FLOOR, WEST END CENTER	<0.1
78	3RD STAGE	04D1180	451-09152004-602-078	B451 BIAS SAMPLE, FLOOR, EAST END CENTER	<0.1
79	3RD STAGE	04D1180	451-09152004-602-079	B451 BIAS SAMPLE, FLOOR, WEST END CENTER	<0.1
80	1ST STAGE	04D1180	451-09152004-602-080	B451 BIAS SAMPLE, WEST AIRLOCK FLOOR, OUTSIDE PLENUM DOOR	<0.1
111	OUTSIDE	04D1178	451-09142004-620-111	B. 451 PDS BIAS SAMPLE POINT- IN CENTER ACCESS DOOR INSIDE DUCTWORK ON ROOM (EAST END)	<0.1
112	OUTSIDE	04D1178	451-09142004-620-112	B. 451 PDS BIAS SAMPLE POINT- IN CENTER ACCESS DOOR INSIDE DUCTWORK ON ROOM (WEST END)	<0.1

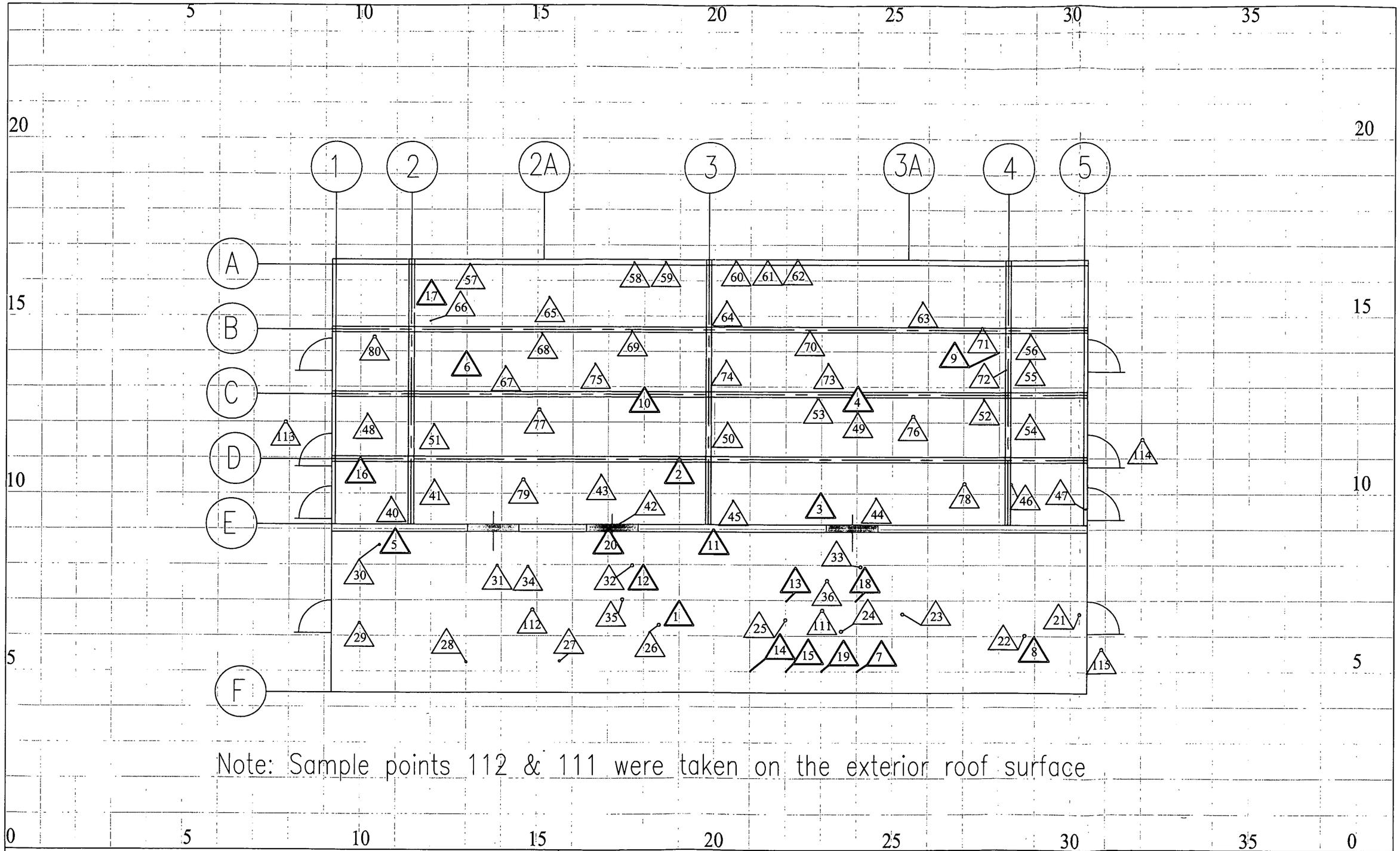
Table C-1 Beryllium Data Summary

Sample Map Location #	Room	RIN	Sample Number	Sample Location	Result (ug/100 cm2)
113	OUTSIDE	04D1178	451-09142004-620-113	B. 451 PDS BIAS SAMPLE POINT- CONCRETE PAD OUTSIDE OF CENTER PORTAL ON WEST SIDE OF BUILDING	<0.1
114	OUTSIDE	04D1178	451-09142004-620-114	B. 451 PDS BIAS SAMPLE POINT- CONCRETE PAD OUTSIDE OF CENTER PORTAL ON EAST SIDE OF BUILDING	<0.1
115	OUTSIDE	04D1178	451-09142004-620-115	B. 451 PDS BIAS SAMPLE POINT- SOUTH EAST CORNER NEAR ROOM EXHAUST VENT - TAKEN ON TOP LEDGE OF UNIT	<0.1

Footnotes:

(1) Shaded rows are beryllium results prior to the application of fixative. The unshaded rows are the final "as left" condition sample results. Fixative was applied over all elevated locations as well as extending to the boundaries of clean sample locations surrounding the elevated locations. No further investigation sampling is required.
All initial sample locations above 0.1 ug/100cm2 had fixative applied and were then re-sampled.
Also, additonal biased post-fixative samples were collected in the same general area of the initial elevated sample locations.

(2) Gaps in the sample numbering sequence are acceptable. Some sample numbers were never used. Some sample numbers were elevated, then decontaminated, and then resampled using the same initial sample number.



PDS BERYLLIUM SAMPLE MAP

BLDG: 451 Survey Area: 3 Survey Unit: N/A Classification: N/A

Survey Area / Unit Description: Bldg 451 Plenum

Floor Area: 260 sq.m Total Area: N/A Grid Spaceing for Survey Area: N/A

SURVEY POINT LEGEND

- Radiological RSA & TSA Location
- Radiological RSA , TSA & Sample Location
- Beryllium Sample Location
- RCRA/CBRCLA Sample Location
- PCB Sample Location
- Radiological Scan Area
- Open/Inaccessible Area
- Area in Another Survey Unit

N

0 FEET 8

0 METERS 2.5

1 inch = 8 feet

1 grid sq. = 1 sq. m.

U.S. Department of Energy

Rocky Flats Environmental Technology Site

Prepared by: RFCSS Rocky Flats Closure Site Services, LLC.

Prepared for: KAISER HILL

File Name: B451 Be.DWG | Sheet 1 of 1 | Rev: 3

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ATTACHMENT D

Data Quality Assessment (DQA) Detail

DATA QUALITY ASSESSMENT (DQA)

VERIFICATION & VALIDATION (V&V) OF RESULTS

V&V of the data confirm that appropriate quality controls are implemented throughout the sampling and analysis process, and that any substandard controls result in qualification or rejection of the data in question. The required quality controls and their implementation are summarized in a tabular, checklist format for each category of data – radiological surveys and chemical analyses (specifically beryllium).

DQA criteria and results are provided in a tabular format for each suite of surveys or chemical analyses performed. The radiological survey assessment is provided in Table D-1 and beryllium in Table D-2. A data completeness summary for all results is given in Table D-3.

Relevant Quality records supporting this report are maintained in the RISS Characterization Project File. The report will be submitted to the CERCLA Administrative Record for permanent storage within 30 days of approval by the Regulators. Radiological data are organized into Survey Packages, which correlate to unique (MARSSIM) Survey Units. Chemical data are organized by RIN (Report Identification Number) and are traceable to the sample number and corresponding sample location.

Survey designs were implemented for Building 451 based on the uranium limits (DCGLs) used in the unrestricted release decision process. Survey results were evaluated against, and were less than the Uranium $DCGL_w$ (5,000 dpm/100cm^2) unrestricted release limits. On this basis, except of the 1st stage plenum and portions of the 2nd stage plenum, all PDS results were less than the PDSP unrestricted release limits.

Consistent with EPA's G-4 DQO process, the radiological survey design for each survey unit performed per PDS requirements was optimized by checking actual measurement results acquired during pre-demolition surveys against the model output with original estimates. Use of actual sample/survey (result) variances in the MARSSIM DQO model confirms that an adequate number of surveys were acquired.

DQA SUMMARY

In summary, the data presented in this report have been verified and validated relative to the quality requirements and project decisions as stated in the original DQOs. All data are useable based on qualifications stated herein and are considered satisfactory without qualification. All media surveyed and sampled yielded results less than their associated action levels and with acceptable certainties, except for the following anomalous conditions:

- The 1st Stage Plenum and portions of the 2nd stage plenum will be managed as LLW during demolition and were not surveyed as part of this PDSR. These contaminated areas are discussed in Section 3.1 above and have been highlighted in red on survey maps contained in Attachment B-1, *Radiological Survey Unit Data Summaries and Survey Maps.*

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- After decontamination efforts and prior to application of fixative, several locations had levels of Beryllium contamination above action levels. All areas containing loose beryllium contamination above 0.1 $\mu g/100cm^2$ were immobilized using fixatives to below the unrestricted release limit of 0.2 $\mu g/100cm^2$. Levels up to 0.474 $\mu g/100cm^2$ were immobilized using fixative.

Based upon an independent review of the radiological data, it was determined that the original project DQOs satisfied MARSSIM guidance. All facility contamination levels were below applicable PDSP DCGL unrestricted release levels. Minimum survey requirements were met, sampling/survey protocol was performed in accordance with applicable RSPs, survey units were properly designed and bounded, and instrument performance and calibration were within acceptable limits. All results meet the applicable PDS unrestricted release criteria.

Chain of Custody was intact; documentation was complete, hold times were acceptable (where applicable,) and packaging integrity/custody seals were maintained throughout the sampling/analysis process. Level 2 Isolation Controls have been posted to prevent the inadvertent introduction of further contamination into Building 451. On this basis, Building 451 is acceptable for demolition.

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Table D-1 V&V of Radiological Results - Building 451

V&V CRITERIA, RADIOLGICAL SURVEYS		K-H RSP 16.00 Series MARSSIM (NUREG-1575)		
QUALITY REQUIREMENTS				
	Parameters	Measure	Frequency	COMMENTS
ACCURACY	Initial calibrations	90%<x<110%	≥1	Multi-point calibration through the measurement range encountered in the field; programmatic records.
	Daily source checks	80%<x<120%	≥1/day	Performed daily/within range.
	Local area background: Field	Typically < 10 dpm	≥1/day	All local area backgrounds were within expected ranges (i.e., no elevated anomalies.)
PRECISION	Field duplicate measurements for TSA	≥5% of real survey points	≥10% of reals	N/A
REPRESENTATIVENESS	MARSSIM methodology: Survey Units 451102 and 451103 (interior).	Statistical and biased	NA	Random w/ statistical confidence.
	Survey Maps	NA	NA	Random and biased measurement locations controlled/mapped to ±1m.
	Controlling Documents (Characterization Pkg; RSPs)	qualitative	NA	Refer to the Characterization Package (planning document) for field/sampling procedures (located in Project files); thorough documentation of the planning, sampling/analysis process, and data reduction into formats.
COMPARABILITY	Units of measure	dpm/100cm^2	NA	Use of standardized engineering units in the reporting of measurement results.
COMPLETENESS	Plan vs. Actual surveys Usable results vs. unusable	>95% >95%	NA	See Table D-3 for details.
SENSITIVITY	Detection limits	TSA: ≤2,500 dpm/100cm^2 RA: ≤500 dpm/100cm^2	all measures	PDS MDAs ≤ 50% $DCGL_w$

Table D-2 V&V of Beryllium Results - Building 451

V&V CRITERIA, CHEMICAL ANALYSES		DATA PACKAGE		
BERYLLIUM	Prep: NMAM 7300 METHOD: OSHA ID-125G	LAB ---->	Johns Manville Littleton, Colorado	
		RIN ---->	Numerous RINs, see Table D-3 below	
				COMMENTS
QUALITY	REQUIREMENTS	Measure	Frequency	All final "as left" PDS results were below unrestricted release levels.
ACCURACY	Calibrations Initial	Linear calibration	≥1	
	Continuing	80%<%R<120%	≥1	
	LCS/MS	80%<%R<120%	≥1	
	Blanks – lab & field	<MDL	≥1	
	Interference check std (ICP)	NA	NA	
PRECISION	LCSD	80%<%R<120% (RPD<20%)	≥1	
	Field duplicate	All results < RL	≥1	
REPRESENTATIVENESS	COC	Qualitative	NA	
	Hold times/preservation	Qualitative	NA	
	Controlling Documents (Plans, Procedures, maps, etc.)	Qualitative	NA	
COMPARABILITY	Measurement units	Ug/100cm^2	NA	
COMPLETENESS	Plan vs. Actual samples Usable results vs. unusable	>95% >95%	NA	
SENSITIVITY	Detection limits	MDL of 0.00084 ug/swipe	all measures	

Table D-3 Data Completeness Summary – Building 451

ANALYTE	Building/Area/Unit	Sample Number Planned (Real & QC)[A]	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Beryllium	Building 451 (interior and exterior)	30 interior samples (20 random/10 biased)	82 interior samples (20 random/62 biased)	After application of fixative, no Be contamination found at any location, all results were below associated action levels	10CFR850; OSHA ID-125G RIN04Z1178 – map sample locations 111-115. RIN04D1180 – map sample locations 1, 4, 6, 9, 10, 17, 57-66 and 67-80. RIN04Z2451 – map sample locations 1, 5, 7, 8, 11-15 and 18-36. RIN04Z2536 – map sample locations 2, 3, 16, 40-49 and 50-56. RIN04Z2565 – map sample locations 4, 17, 61, 62, 63, 67, 68, 71 and 74 are duplicates of samples identified in the above RINs. The duplicate samples were taken before results of the initial sample locations were received, and after fixative was applied. Consequently, even though the original sample result was less than 0.1 ug/100cm^2, a duplicate sample result for some locations was also received. All results for the initial sample and the duplicate sample were less than associated action levels. After application of fixative, all results were below the action level (0.2 ug/100cm^2) and the investigative level (0.1 ug/100cm^2).

Table D-3 Data Completeness Summary – Building 451

ANALYTE	Building/Area/Unit	Sample Number Planned (Real & QC)[A]	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Radiological	Survey Area 3 Survey Unit: 451102 Building 451 – All Surfaces, Plenum Stage 2	15 β TSA (systematic) 15 β RSA (systematic) 2 QC TSA 50% scan	17 β TSA (systematic) 17 β RSA (systematic) 2 QC TSA 50% scan	Except for LLW areas, no contamination at any location; all values below unrestricted release levels	Uranium DCGLs used.
Radiological	Survey Area 3 Survey Unit: 451103 Building 451 – All Surfaces, Plenum Stage 3 and Fan Room	15 β TSA (random) 15 β RSA (random) 2 QC TSA 10% scan	15 β TSA (random) 15 β RSA (random) 2 QC TSA 10% scan	No contamination at any location; all values below unrestricted release levels	Uranium DCGLs used.