

# **NOTICE**

**All drawings located at the end of the document.**



# Rocky Flats Environmental Technology Site

## PRE-DEMOLITION SURVEY REPORT (PDSR)

### BUILDING 881 - STACK S1 CLOSURE PROJECT

REVISION 0

October 9, 2003



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

ADMIN RECORD

B881-A-000034

1/29

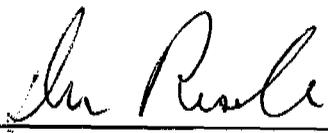
# PRE-DEMOLITION SURVEY REPORT (PDSR)

## BUILDING 881 - STACK S1 CLOSURE PROJECT

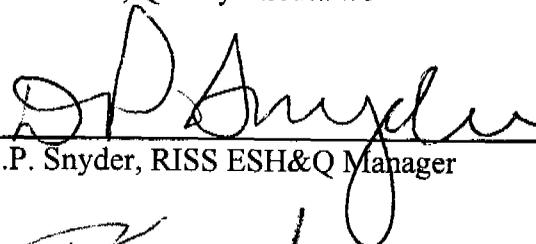
REVISION 04

October 9, 2003

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### ATTACHMENTS

- A Facility Location Map
- B Radiological Data Summaries and Survey Maps
- C Chemical Data Summaries and Sample Maps
- D Data Quality Assessment (DQA) Detail

## ABBREVIATIONS/ACRONYMS

ACM	Asbestos Containing Material
Be	Beryllium
CDPHE	Colorado Department of Public Health and the Environment
DCGL <sub>EMC</sub>	Derived Concentration Guideline Level – elevated measurement comparison
DCGL <sub>w</sub>	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

## EXECUTIVE SUMMARY

A Pre-Demolition Survey (PDS) was performed to enable compliant disposition and waste management of the Building 881 Stack S1. Because this Type 2 structure will be demolished, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP). Building surfaces characterized as part of this PDS included the walls and floor. Environmental media beneath and surrounding the facility was not within the scope of this PDS and will be addressed in accordance with the Soil Disturbance Permit process and in compliance with RFCA.

The PDS encompassed both radiological and chemical characterization to enable 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 for the Building 881 Cluster facilities.

Results indicate that no radiological or chemical contamination exists in excess of the PDSP unrestricted release limits. All beryllium results obtained during the PDS were below the investigative level of  $0.1 \mu\text{g}/100\text{cm}^2$ . There are no potentially PCB-containing hazardous waste items or asbestos containing materials in, or on the Stack.

Based upon the PDSR, the Building 881 Stack S1 structure can be demolished and the waste managed as PCB Bulk Product waste or sanitary waste and the concrete can be used for backfill on-site per the RFCA RSOP for Recycling Concrete. To ensure that the facility remains free of contamination and that PDS data remain valid, isolation controls have been established and the area posted accordingly.

## **1 INTRODUCTION**

A Pre-Demolition Survey (PDS) was performed to enable compliant disposition and waste management of the Building 881 Stack S1. Because this Type 2 structure will be demolished, the characterization was performed in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP). Building surfaces characterized as a part of this PDS included the walls and floor. Environmental media beneath and surrounding the facility was not within the scope of this PDS and will be addressed in accordance with 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 the Building 881 Stack S1 structure. The location of this structure is shown in Attachment A, Facility Location Map. This structure no longer supports the RFETS mission and will be removed to reduce Site infrastructure, risks and/or operating costs.

Before this Type 2 structure can be demolished, the Data Quality Objectives (DQOs) for a Pre-Demolition Survey (PDS) must be satisfied; this document presents the PDS results for the Building 881 Stack S1. 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 was built upon physical, chemical and radiological hazards identified in the facility-specific Historical Site Assessment Report and Reconnaissance Level Characterization Report for the Building 881 Cluster, dated November 6, 2001, Revision 0.

### **1.1 Purpose**

The purpose of this report is to communicate and document the results of the Building 881 Stack S1 PDS effort. A PDS is performed prior to building demolition to define the final radiological and chemical conditions of a facility prior to demolition. 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 the Building 881 Stack S1 structure. Environmental media beneath and surrounding the facility was not within the scope of this PDSR and will be addressed in accordance with 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.

## 2 HISTORICAL SITE ASSESSMENT

A Facility-specific Historical Site Assessment (HSA) and Reconnaissance Level Characterization (RLC) was conducted to understand the facility history and related hazards. The HSA consisted of facility walkdowns, interviews, and document review, including review of the Historical Release Report, and were used to design the RLC. The Building 881 Stack S1 RLC was performed in FY 2001 as part of the Building 881 Cluster RLCR (Refer to *Reconnaissance Level Characterization Report for the Building 881 Cluster*, dated November 6, 2001, Rev. 0). Based on the RLC results, the Building 881 Stack S1 structure was classified as a Type 2 facility, therefore, a PDS characterization was required before demolition of the facility. This report documents the results of that PDS. The HSA and RLC results were used to identify PDS data gaps and needs, and to develop radiological and chemical PDS characterization packages. The Building 881 Cluster RLC did not identify any radiological or chemical hazards in Stack S1 above the PDSP unrestricted release criteria. HSA and RLC documentation are located in the RISS Characterization Project files.

## 3 RADIOLOGICAL CHARACTERIZATION AND HAZARDS

The Building 881 Stack S1 structure 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 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 881 Stack S1 Radiological Characterization Plan). Radiological survey unit package 881-S1-001 was developed for the interior of the stack. Individual radiological survey unit packages are maintained in the RISS Characterization Project files.

The Building 881 Stack S1 structure survey unit package was 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*. 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*. Radiological survey data, statistical analysis results, survey locations, and radiological scan maps are presented in Attachment B, Radiological Data Summary and Survey Maps.

Prior to performing the Building 881 Stack S1 PDS, airflow modeling was performed to determine the most likely area of potential contamination inside the stack. The 3-dimensional flow pattern through the stack (assuming a nominal flow rate of 180,000 cfm) indicated the highest probability of contamination would occur several feet above and below the south airflow entrance to the stack. This general area was subject to turbulent airflow that would increase the potential for surface contamination from particulates. As indicated by the airflow model, contamination on other surfaces of the stack would exist at lower levels. Therefore, a thorough survey of the accessible surfaces of the areas around the existing airflow entrance to the stack (below and around the entrance) was performed and provides an indication of the highest levels of contamination that can be expected in the stack. Since the entrance of the stack is located within the lower 20 feet of the stack, PDS surveys were concentrated in these areas.

### **Survey Unit 881-S1-001**

The Building 881 Stack S1 interior was classified as a MARSSIM Class 2 Survey Unit. A total of seventeen (17) TSA measurements (15 systematically grid, 2 QC), fifteen (15) RSA measurements (15 systematically grid) were collected. Surface scan surveys of 100% of the floor and >50% of the lower wall (< 20 feet) surfaces (140 m<sup>2</sup> minimum) were also performed. During the scan surveys, elevated contamination above the transuranic limits but below the uranium limits was identified uniformly across the floor and wall surfaces. Therefore, five (5) concrete surface media samples were collected from TSA locations 1, 3, 12, 13 and 14, and five (5) post TSA and RSA media sample measurements were collected as part of the PDS characterization to determine the presence of transuranic isotopes.

The Canberra ISOCS gamma-spec analysis results of the concrete surface samples determined the elevated activity was due to the uranium decay series, with much of the activity coming from naturally occurring radium. Transuranic isotopes of the concrete surface samples were less than MDA values. The concrete sample results also correlated well with the sludge sample results collected in the bottom of the stack during PDS preparations (i.e., the sludge sample results showed >99% uranium activity, with minimal transuranic activity present). Therefore, the uranium limits were used as the DCGLs in the unrestricted release decision process.

All survey results were less than the applicable PDS uranium DCGL values. Since there was no contamination found in the lower sections of the stack, which is where the airflow modeling data indicated the highest likelihood of contamination would be found, it was determined that surveys of the upper areas of the stack were not required for demolition. This determination is also consistent with PDS results of the Building 771 stack, in which all of the Building 771 stack contamination was found in the lower levels near the airflow entrance. Radiological survey data, statistical analysis results, survey locations, radiological scan maps, and the concrete and sludge sample results for survey unit 881-S1-001 are presented in Attachment B-1, *Radiological Data Summary and Survey Maps*.

The Building 881 Stack S1 exterior was characterized in accordance with the Pre-Demolition Survey Plan (MAN-127-PDSP) requirements as part of the Building 881 Cluster RLCR, completed September 17, 2001. All of the Building 881 Stack S1 exterior surveys performed during the Building 881 Cluster RLCR were less than the applicable PDS transuranic and uranium DCGL values. An additional seven (7) confirmatory RSA measurements of the Building 881 Stack S1 exterior were performed during the Stack S1 interior PDS, and all results were less than the applicable PDS transuranic and uranium DCGL values. Refer to Attachment B-2, *Building 881 Stack S1 Exterior Confirmatory Survey, Radiological Data and Survey Maps* for the radiological survey data, statistical analysis results, survey locations and maps.

To ensure the facility remains free of contamination and PDS data remain valid, Level 1 Isolation Controls have been established and the stack posted accordingly.

#### **4 CHEMICAL CHARACTERIZATION AND HAZARDS**

The Building 881 Stack S1 structure 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, RCRA/CERCLA constituents, and PCBs. Refer to Attachment C, Chemical Summary Data and Sample Maps, for details on sample results and sample locations. To ensure the facility remains free of contamination and PDS data remain valid, Level 1 Isolation Controls have been established and the stack posted accordingly.

##### **4.1 Asbestos**

A CDPHE-certified asbestos inspector conducted an inspection of Stack S1 in accordance with the *Asbestos Characterization Protocol, PRO-563-ACPR, Revision 1*. No building materials suspected of containing friable or non-friable asbestos were observed during the visual and tactile inspection. On this basis, no bulk samples were taken as part of this PDSR.

##### **4.2 Beryllium (Be)**

Five (5) random and five (5) biased beryllium smear samples were collected on the interior of Stack S1 in accordance with the PDSP and the *Beryllium Characterization Procedure, PRO-536-BCPR, Revision 0, September 9, 1999*.

All beryllium PDS smear sample results for the Building 881 Stack S1 were less than the investigative limit of  $0.1 \mu\text{g}/100\text{cm}^2$ . PDS beryllium laboratory sample data and location maps are contained in Attachment C-1, *Beryllium Data Summaries and Sample Maps*.

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

Based on the HSAR, facility walk-downs and a review of RFETS waste management databases, the Building 881 Stack S1 was an exhaust stack for general building air, and does not have a history of RCRA/CERCLA contamination. Based on the above historical and process knowledge, RCRA/CERCLA sampling was not performed as part of this PDSR. This facility does not contain RCRA regulated materials such as mercury switches, batteries, and fluorescent lamps.

Sampling for lead in paint in this facility was not performed. Environmental Waste Compliance Guidance #27, *Lead-based Paint (LBP) and Lead-based paint Debris Disposal*, states that LBP debris generated outside of currently identified high contamination areas shall be managed as non-hazardous (solid) wastes, and additional analysis for characteristics of hazardous waste derived from LBP is not a requirement for disposal.

#### **4.4 Polychlorinated Biphenyls (PCBs)**

Based on the HSAR, facility walk-downs and a review of RFETS waste management databases, the Building 881 Stack S1 was an exhaust stack for general building air, and does not have a history of PCB contamination. Based on the age of the building (constructed prior to 1980), paints used are assumed to contain PCBs, and all painted surfaces will be managed as PCB Bulk Product Waste. This facility does not have fluorescent light ballasts containing PCBs. Based on the above historical and process knowledge, PCB sampling was not performed as part of this PDSR.

### **5 PHYSICAL HAZARDS**

Physical hazards associated with the Building 881 Stack S1 consists of those common to standard industrial environments. There are no energized systems or utilities associated with this facility. The Building 881 Stack S1 is approximately 16 feet in diameter at the base and 10 feet in diameter at the top. Approximately 75 feet of the stack is above ground, and another 35 feet is below ground. There is only one entrance into the stack within the Building 881 complex. The entrance is on the north side of the 1<sup>st</sup> floor and consists of a 2 foot by 2 foot opening in the stack wall and is approximately 8 feet off of the stack floor. There are buildings, equipment and power lines adjacent to the stack. The structure is made of mainly concrete and rebar; there is a small amount of metal wall stubs and drywall constructed at the entrance to the stack. The structure has been relatively well maintained and is in good physical condition, and 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 decommissioning of the Building 881 Stack S1, 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.

## 7 DECOMMISSIONING WASTE TYPES AND VOLUME ESTIMATES

The demolition and disposal of the Building 881 Stack S1 structure will generate sanitary concrete waste. Estimated waste types and waste volumes are presented below. All wastes can be disposed of as sanitary waste, except PCB Bulk Product Waste. There are no PCB ballast or hazardous waste items to remove or manage. All concrete surfaces can be used as backfill onsite in accordance with the RFCA RSOP for Recycling Concrete.

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)
Bldg. 881 Stack S1	15,570	0	50	0	10	0	None

## 8 FACILITY CLASSIFICATION AND CONCLUSIONS

Based on the analysis of radiological, chemical and physical hazards, the Building 881 Stack S1 structure is classified as an RFCA Type 2 structure pursuant to the RFETS Decommissioning Program Plan (DPP; K-H, 1999). PDS results indicated that no radiological or chemical contamination exists in excess of the PDSP unrestricted release limits.

The PDS for the Building 881 Stack S1 structure 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 in accordance with the Soil Disturbance Permit process and in compliance with RFCA. To ensure that the Building 881 Stack S1 structure remains free of contamination and that PDS data remain valid, Level 1 isolation controls have been established and the facility posted accordingly.

## 9 REFERENCES

- DOE/RFEO, 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 881 Cluster*, Dated November 6, 2001, Revision 0

# ATTACHMENT A

## Facility Location Map

# Area 1-881 Cluster Stack 1 S1

## Standard Map Features

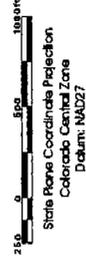
-  Buildings and other structures
-  Demolished buildings and other structures
-  Lakes and ponds
-  Streams, ditches, or other drainage features
-  Fences and other barriers
-  Paved roads
-  Dirt roads

### DATA SOURCE BASE FEATURES:

Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by ES&G, RSL, Las Vegas. Digitized from the orthophotographs 1/95

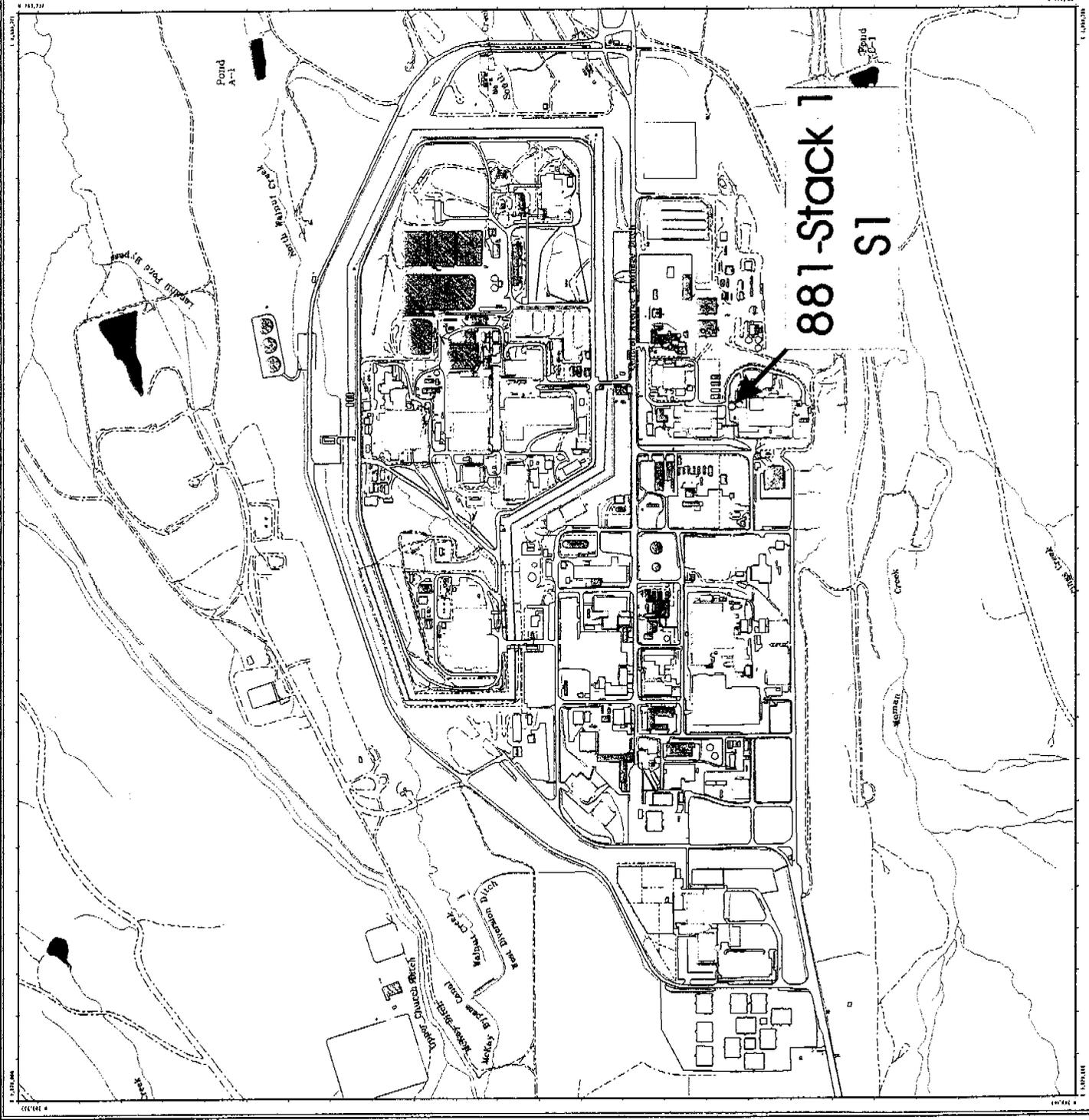


Scale = 1 : 12450  
1 inch represents approximately 1038 feet



State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

# 881-Stack 1 S1



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

GE Dept. 300-906-7707

Prepared by:



CH2MHILL

Prepared for:



KAISER ALUMINUM

MAP ID: PF 2003

Oct. 9, 2003

## ATTACHMENT B

# Radiological Data Summaries and Survey Maps

**ATTACHMENT B-1**  
**Survey Unit 881-S1-001**

**Radiological Data Summary, Survey  
Map, and Concrete and Sludge Sample  
Results**

**SURVEY UNIT 881-S1-001**  
**RADIOLOGICAL DATA SUMMARY - PDS**

**Survey Unit Description: B881 S1 Stack**

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<u>Total Surface Activity Measurements</u>			<u>Removable Activity Measurements</u>		
	15	15		15	15
	Number Required	Number Obtained	Number Required	Number Obtained	Number Obtained
MIN	31.9	dpm/100 cm <sup>2</sup>	(0.4)	dpm/100 cm <sup>2</sup>	
MAX	214.6	dpm/100 cm <sup>2</sup>	5.6	dpm/100 cm <sup>2</sup>	
MEAN	124.7	dpm/100 cm <sup>2</sup>	1.3	dpm/100 cm <sup>2</sup>	
STD DEV	55.8	dpm/100 cm <sup>2</sup>	1.7	dpm/100 cm <sup>2</sup>	
Uranium DCGL <sub>w</sub>	5,000	dpm/100 cm <sup>2</sup>	1,000	dpm/100 cm <sup>2</sup>	

<u>Media (Pre &amp; Post) Total Surface Activity Measurements</u>			<u>Media (Pre &amp; Post) Removable Activity Measurements</u>		
	5	5		5	5
	Number Required	Number Obtained	Number Required	Number Obtained	Number Obtained
MIN	(11.3)	dpm/100 cm <sup>2</sup>	(0.4)	dpm/100 cm <sup>2</sup>	
MAX	214.3	dpm/100 cm <sup>2</sup>	7.6	dpm/100 cm <sup>2</sup>	
MEAN	105.5	dpm/100 cm <sup>2</sup>	1.8	dpm/100 cm <sup>2</sup>	
STD DEV	67.2	dpm/100 cm <sup>2</sup>	2.7	dpm/100 cm <sup>2</sup>	
URANIUM DCGL <sub>w</sub>	5,000	dpm/100 cm <sup>2</sup>	1,000	dpm/100 cm <sup>2</sup>	

<u>Media Samples</u>		
	5	5
	Number Required	Number Obtained
MIN	451	dpm/100 cm <sup>2</sup>
MAX	451	dpm/100 cm <sup>2</sup>
MEAN	451	dpm/100 cm <sup>2</sup>
STD DEV	NA	dpm/100 cm <sup>2</sup>
URANIUM DCGL <sub>w</sub>	5,000	dpm/100 cm <sup>2</sup>

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**SURVEY UNIT 881-S1-001  
TSA - DATA SUMMARY**

Manufacturer:	NE Electra	NE Electra	NE Electra
Model:	DP-6	DP-6	DP-6
Instrument ID#:	1	2	3
Serial #:	2352	1420	1366
Cal Due Date:	2/8/04	12/4/03	11/27/03
Analysis Date:	10/7/03	10/7/03	10/7/03
Alpha Eff. (c/d):	0.228	0.226	0.212
Alpha Bkgd (cpm)	4.0	1.3	4.0
Sample Time (min)	1.5	1.5	1.5
LAB Time (min)	10	10	10
MDC (dpm/100cm <sup>2</sup> )	48.0	48.0	48.0

Sample Location Number	Instrument ID#:	Sample Gross Counts (cpm alpha)	Sample Gross Activity (dpm/100cm <sup>2</sup> alpha)	LAB Gross Counts (cpm alpha)	LAB Gross Activity (dpm/100cm <sup>2</sup> alpha)	Sample Net Activity (dpm/100cm <sup>2</sup> alpha) <sup>1</sup>
1	2	24.0	106.2	8.0	35.4	93.8
2	2	22.0	97.3	4.0	17.7	85.0
3	2	26.7	118.1	2.0	8.8	105.8
4	2	26.7	118.1	2.7	11.9	105.8
5	2	44.7	197.8	2.7	11.9	185.4
6	2	38.0	168.1	4.0	17.7	155.8
7	2	23.3	103.1	2.0	8.8	90.7
8	2	12.7	56.2	1.3	5.8	43.8
9	2	10.0	44.2	1.3	5.8	31.9
10	2	32.0	141.6	2.0	8.8	129.2
11	2	44.7	197.8	2.7	11.9	185.4
12	2	51.3	227.0	2.0	8.8	214.6
13	2	44.0	194.7	3.3	14.6	182.3
14	2	42.7	188.9	2.0	8.8	176.5
15	2	22.0	97.3	2.0	8.8	85.0

<sup>1</sup> - Average LAB used to subtract from Gross Sample Activity

12.4	Sample LAB Average
MIN	31.9
MAX	214.6
MEAN	124.7
SD	55.8
Uranium DCGLW	5,000

**QC Measurements**

12 QC	1	61.3	268.9	2.7	11.8	257.0
1 QC	1	30.0	131.6	2.7	11.8	119.7

<sup>1</sup> - Average QC LAB used to subtract from Gross Sample Activity

11.8	QC LAB Average
Uranium DCGLW	5,000

20

**SURVEY UNIT 881-S1-001  
RSC - DATA SUMMARY**

<b>Manufacturer:</b>	Eberline	Eberline
<b>Model:</b>	SAC-4	SAC-4
<b>Instrument ID#:</b>	4	5
<b>Serial #:</b>	1158	1164
<b>Cal Due Date:</b>	1/1/04	11/30/03
<b>Analysis Date:</b>	10/8/03	10/8/03
<b>Alpha Eff. (c/d):</b>	0.33	0.33
<b>Alpha Bkgd (cpm)</b>	0.1	0.1
<b>Sample Time (min)</b>	2	2
<b>Bkgd Time (min)</b>	10	10
<b>MDC (dpm/100cm<sup>2</sup>)</b>	9.0	9.0

Sample Location Number	Instrument ID#	Gross Counts (cpm alpha)	Net Activity (dpm/100 cm <sup>2</sup> alpha)
1	4	1	1.6
2	5	3	5.6
3	4	2	3.6
4	5	1	1.6
5	4	0	-0.4
6	5	0	-0.4
7	4	1	1.6
8	5	1	1.6
9	4	0	-0.4
10	5	0	-0.4
11	4	0	-0.4
12	5	1	1.6
13	4	1	1.6
14	5	1	1.6
15	4	1	1.6
		<b>MIN</b>	-0.4
		<b>MAX</b>	5.6
		<b>MEAN</b>	1.3
		<b>SD</b>	1.7
		<b>Uranium DCGL<sub>w</sub></b>	<b>1,000</b>

21

**881-S1-001  
Media TSA Data Summary**

<b>Manufacturer:</b>	NE Electra
<b>Model:</b>	DP-6
<b>Instrument ID#:</b>	2
<b>Serial #:</b>	1420
<b>Cal Due Date:</b>	12/4/03
<b>Analysis Date:</b>	10/7/03
<b>Alpha Eff. (c/d):</b>	0.226
<b>Alpha Bkgd (cpm)</b>	1.3
<b>Sample Time (min)</b>	1.5
<b>LAB Time (min)</b>	10
<b>MDC (dpm/100cm<sup>2</sup>)</b>	48.0

Sample Location Number	Instrument ID#:	Sample Gross Counts (cpm alpha)	Sample Gross Activity (dpm/100cm <sup>2</sup> alpha)	LAB Gross Counts (cpm alpha)	LAB Gross Activity (dpm/100cm <sup>2</sup> alpha)	Sample Net Activity (dpm/100cm <sup>2</sup> alpha) <sup>1</sup>
Pre 16	2	42.7	188.9	2.0	8.8	176.3
Pre 17	2	44.0	194.7	3.3	14.6	182.0
Pre 18	2	26.7	118.1	2.0	8.8	105.5
Pre 19	2	24.0	106.2	8.0	35.4	93.5
Pre 20	2	51.3	227.0	2.0	8.8	214.3
Post 16	2	20.7	91.6	2.7	11.9	78.9
Post 17	2	18.7	82.7	3.3	14.6	70.1
Post 18	2	18.7	82.7	1.3	5.8	70.1
Post 19	2	0.3	1.3	1.3	5.8	(11.3)
Post 20	2	20.0	88.5	2.7	11.9	75.8

<sup>1</sup> - Average LAB used to subtract from Gross Sample Activity

12.7	<b>Sample LAB Average</b>
<b>MIN</b>	(11.3)
<b>MAX</b>	214.3
<b>MEAN</b>	105.5
<b>SD</b>	67.2
<b>Uranium DCGL<sub>w</sub></b>	5,000

22

**881-S1-001**  
**Media RSA Data Summary**

<b>Manufacturer:</b>	Eberline	Eberline
<b>Model:</b>	SAC-4	SAC-4
<b>Instrument ID#:</b>	4	5
<b>Serial #:</b>	1158	1164
<b>Cal Due Date:</b>	1/1/04	11/30/03
<b>Analysis Date:</b>	10/8/03	10/8/03
<b>Alpha Eff. (c/d):</b>	0.33	0.33
<b>Alpha Bkgd (cpm)</b>	0.1	0.1
<b>Sample Time (min)</b>	- 2	2
<b>Bkgd Time (min)</b>	10	10
<b>MDC (dpm/100cm<sup>2</sup>)</b>	9.0	9.0

Sample Location Number	Instrument ID#	Alpha Gross Counts (cpm)	Net Activity (dpm/100 cm <sup>2</sup> alpha)
Pre 16	5	1	1.6
Pre 17	4	1	3.6
Pre 18	4	2	7.6
Pre 19	5	1	3.6
Pre 20	5	1	3.6
Post 16	4	0	-0.4
Post 17	5	0	-0.4
Post 18	4	0	-0.4
Post 19	5	0	-0.4
Post 20	4	0	-0.4
		<b>MIN</b>	-0.4
		<b>MAX</b>	7.6
		<b>MEAN</b>	1.8
		<b>SD</b>	2.7
		<b>Uranium DCGL<sub>w</sub></b>	1,000

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# B881 Stack S1 Sludge Sample Summary

03S0111-004.001

Isotope	Results pCi/gm	MDA pCi/gm	Isotope % of Sample Activity	Uranium Series % of Sample Activity
Am-241	0.089	0.040	0.19	
Pu-239/240	0.290	0.080	0.63	
Th-228	1.260	0.909	2.73	
Th-230	1.390	0.379	3.02	
Th-232	0.408	0.321	0.89	
U-233/234	37.800	0.469	82.05	
U235/236	3.640	0.470	7.90	
U238	1.180	0.398	2.56	99.15
Np-237	0.014	0.300	0.03	
Total Sample Activity	46.070			



\*\*\*\*\*
\*\*\*\*\* GAMMA SPECTRUM ANALYSIS \*\*\*\*\*
\*\* Canberra Mobile Laboratory Services \*\*
\*\*\*\*\*

Report Generated On : 10/8/2003 10:03:55 AM
RIN Number : 04S0008
Analytical Batch ID : 0310074453
Line Item Code : RC10C019
Filename: S:\GENIE2K\CAMFILES\LI009(D)\MOD\D1900093.CNF
Sample Number : 03F0008-006.001
Lab Sample Number : CMLS-3832
Sample Receipt Date : 10/7/2003
Sample Volume Received : 9.25E+001 GRAM
Result Identifier : N/A
Peak Locate Threshold : 2.50
Peak Locate Range (in channels) : 100 - 8192
Peak Area Range (in channels) : 100 - 8192
Identification Energy Tolerance : 1.000 keV
Sample (Final Aliquot Size) : 9.250E+001 GRAM
Sample Quantity Error : 0.000E+000
Systematic Error Applied : 0.000E+000
Sample Taken On : 10/7/2003 1:00:00 PM
Acquisition Started : 10/7/2003 4:18:29 PM
Count Time : 57600.0 seconds
Real Time : 57611.8 seconds
Dead Time : 0.02 %

881-SI-001
Building 881
Concrete Stack SI
Concrete Media Sampler

Energy Calibration Used Done On : 10/2/03
Energy = -0.319 + 0.250\*ch + -6.90E-009\*ch^2 + 0.00E+000\*ch^3

Corrections Applied:
None

Efficiency Calibration Used Done On : 10/8/03
Efficiency Geometry ID : 04S0008-006.001

Analyzed By: Marilyn Umbaugh Date: 10/8/03
Reviewed By: Sean Stanfield Date: 10/8/03

\*\*\*\*\*  
\*\*\*\*\* Sample and QC Sample Results Summary \*\*\*\*\*  
\*\*\*\*\*

Site Sample ID : 03F0008-006.001  
 Analytical Batch ID : 0310074453  
 Sample Type (Result Identifier): D19  
 Lab Sample Number : CMLS-3832  
 Geometry ID : 04S0008-006.001  
 Filename: S:\GENIE2K\CAMFILES\LI009(D)\MOD\D1900093.CNF  
 Detector Name: BEGE

MDA = Curie method as specified in Genie-2000 Customization Tools Manual  
 Appendix B; Basic Algorithms.

Analyte	Activity (pCi/GRAM )	2-Sigma Uncertainty (pCi/GRAM )	MDA (pCi/GRAM )
K-40n	1.07E+001	6.03E-001	5.58E-001
CS-137n	0.00E+000	0.00E+000	4.98E-002
TL-208n	3.39E-001	3.92E-002	4.32E-002
PO-210in	2.27E+003	1.02E+003	2.57E+003
BI-212n	1.03E+000	4.27E-001	6.86E-001
PB-212n	1.37E+000	9.64E-002	3.76E-002
BI-214n	6.00E-001	6.24E-002	9.79E-002
PB-214n	6.64E-001	5.30E-002	6.88E-002
RA-226n	2.17E+000	8.97E-001	3.61E-001
AC-228n	7.08E-001	1.24E-001	1.88E-001
TH-230n	0.00E+000	0.00E+000	3.28E+000
Th-231n	2.52E-001	7.94E-002	1.62E-001
PA-234Mn	0.00E+000	0.00E+000	5.93E+000
PA-234n	0.00E+000	0.00E+000	4.46E-002
U-235	7.35E-001	4.58E-002	2.23E-002
U238/234	1.37E+000	1.45E-001	2.12E-001
AM-241	2.82E-002	9.81E-003	3.19E-002

i - If Po-210 is detected in the spectrum, this peak may be the result of the interaction of Pb-206(n,n') which also produces a prompt gamma at 803 keV.

n - Non-contractual Nuclide

## ATTACHMENT B-2

### Building 881 Stack S1 Exterior Confirmatory Surveys

### Radiological Data and Survey Map

**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

**INSTRUMENT DATA**

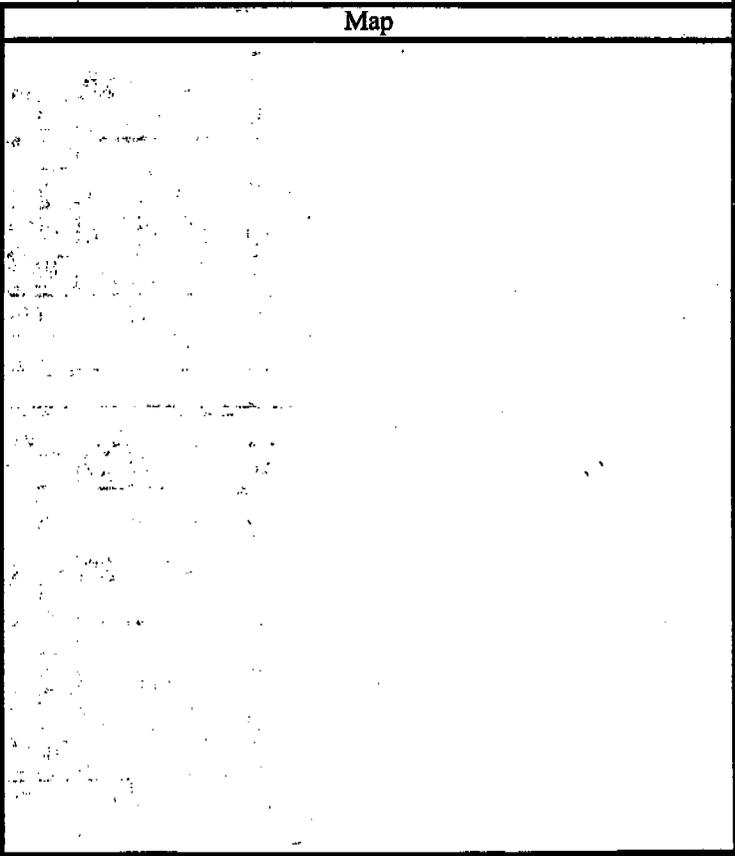
Mfg.	Eberline	Mfg.	Eberline	Mfg.	NE Electra
Model	SAC-4	Model	SAC-4	Model	DP-6
Serial #	1158	Serial #	1164	Serial #	1366
Cal Due	1/1/04	Cal Due	11/30/03	Cal Due	11/27/03
Bkg	0.1 cpm $\alpha$	Bkg	0.1 cpm $\alpha$	Bkg	4 cpm $\alpha$
Efficiency	33.00 %	Efficiency	33.00 %	Efficiency	21.20 %
MDA	20 dpm $\alpha$	MDA	20 dpm $\alpha$	MDA	57 dpm $\alpha$
Mfg.	Eberline	Mfg.	Eberline	Mfg.	NE Electra
Model	BC-4	Model	BC-4	Model	DP-6
Serial #	835	Serial #	700	Serial #	1366
Cal Due	9/19/04	Cal Due	12/19/03	Cal Due	11/27/03
Bkg	36.1 cpm $\beta$	Bkg	34.5 cpm $\beta$	Bkg	410 cpm $\beta$
Efficiency	25.00 %	Efficiency	25.00 %	Efficiency	30.00 %
MDA	200 dpm $\beta$	MDA	200 dpm $\beta$	MDA	323 dpm $\beta$

Survey Type:	Contamination		
Building:	881		
Location:	Exterior Stack #1		
Purpose:	Confirmatory Pre-Demolition		
RWP #:	N/A		
Date:	10/8/03	Time:	1500
RCT:	N/A	/	N/A / N/A
Print name		Signature	Emp. #

PRN/REN #: N/A  
 Comments: Survey of exterior surfaces only

**SURVEY RESULTS**

Swipe #	Location / Description Results in DPM/100sq.cm	Removable		Total	
		Alpha	Beta	Alpha	Beta
1	Exterior Stack #1	<20	<200	<57	<323
2	Exterior Stack #1	<20	<200	<57	<323
3	Exterior Stack #1	<20	<200	<57	<323
4	Exterior Stack #1	<20	<200	<57	<323
5	Exterior Stack #1	<20	<200	<57	<323
6	Exterior Stack #1	<20	<200	<57	<323
7	Exterior Stack #1	<20	<200	<57	<323



Date Reviewed: 10/8/03      RS Supervision:

Print Name      Signature      Emp. #

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# ATTACHMENT C

## Chemical Data Summaries and Sample Maps

### Beryllium Data Summary

Sample Number	Map Survey Point Location	Room	Sample Location	Result (ug/100 cm <sup>2</sup> )
<b>Building 881 Stack S1 - RIN04Z0055</b>				
881-10072003-602-001	1	Stack S1	Interior floor, random	< 0.1
881-10072003-602-002	2	Stack S1	Interior floor, random	< 0.1
881-10072003-602-003	3	Stack S1	Interior floor, random	< 0.1
881-10072003-602-004	4	Stack S1	Interior floor, random	< 0.1
881-10072003-602-005	5	Stack S1	Interior floor, random	< 0.1
881-10072003-602-006	6	Stack S1	Interior wall, biased	< 0.1
881-10072003-602-007	7	Stack S1	Interior wall, biased	< 0.1
881-10072003-602-008	8	Stack S1	Interior wall, biased	< 0.1
881-10072003-602-009	9	Stack S1	Interior wall, biased	< 0.1
881-10072003-602-010	10	Stack S1	Interior wall, biased	< 0.1

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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 asbestos and 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.

All 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. All 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.

Beta/gamma survey designs were implemented for Stack S1 based on completed RLCR data (refer to the Building 881 Cluster RLCR) and newly collected concrete surface and sludge samples inside Stack S1. Survey designs were implemented based on the uranium limits used as DCGLs in the unrestricted release decision process. Survey results for the Stack S1 interior floors and walls were evaluated against, and were less than the uranium DCGLs (i.e., < 1,000 dpm/100cm<sup>2</sup> removable surface activity, < 5,000 dpm/100cm<sup>2</sup> average total surface activity, and no hot spots within 1 m<sup>2</sup> over 15,000 dpm/100cm<sup>2</sup>). Survey results for the Stack S1 exterior were evaluated against, and were less than the transuranic DCGLs (i.e., < 20 dpm/100cm<sup>2</sup> removable surface activity, < 100 dpm/100cm<sup>2</sup> average total surface activity, and no hot spots within 1 m<sup>2</sup> over 300 dpm/100cm<sup>2</sup>). Media samples were taken and analyzed by ISOCS Canberra gamma spectroscopy. Transuranic isotope activity and Uranium and/or other naturally occurring isotope activity were evaluated against, and were less than the Transuranic DCGL<sub>w</sub> (100 dpm/100cm<sup>2</sup>) and the Uranium DCGL<sub>w</sub> (5,000 dpm/100cm<sup>2</sup>) unrestricted release limits. Media results were converted to dpm/100cm<sup>2</sup> using the Media Conversion Table, evaluated against the transuranic and uranium DCGL limits, and are the values reported in the Radiological TSA Data Summary in support of the unrestricted release decision process.

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 the below anomalous condition:

- Elevated contamination above the transuranic DCGL limits, but below the uranium limits were identified uniformly across the floor and wall surfaces during the scan surveys. Five (5) concrete surface media samples were collected from TSA locations 1, 3, 12, 13 and 14, and five (5) post TSA and RSA media sample measurements were collected as part of the PDS characterization to determine the presence of transuranic isotopes. The Canberra ISOCs gamma-spec analysis results of the concrete surface samples determined the elevated activity was due to the uranium decay series, with much of the activity coming from naturally occurring radium. Transuranic isotopes of the concrete surface samples were below MDA values. The concrete sample results also correlated well with the sludge sample results collected in the bottom of the stack during PDS preparations (i.e., the sludge sample results showed >99% uranium activity, with minimal transuranic activity present). On this basis, the uranium limits were used as the DCGLs in the unrestricted release decision process. All survey results were less than the applicable PDS uranium DCGL values.

Based upon an independent review of the radiological data, it is determined that the original project DQOs satisfied MARSSIM guidance. All facility contamination levels were below applicable radiological 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 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 contamination into the facility. On this basis, the Building 881 Stack S1 meets the unrestricted release criteria with the confidences stated herein.

Table D-1 V&V of Radiological Results for the Building 881 Stack S1

V&V CRITERIA, RADIOLOGICAL SURVEYS		K-H RSP 16.00 Series MARSSIM (NUREG-1575)	
QUALITY REQUIREMENTS			
	Parameters	Measure	Frequency
ACCURACY	Initial calibrations	90% < x < 110%	≥ 1
	Daily source checks	80% < x < 120%	≥ 1/day
	Local area background: Field	Typically < 2,500 dpm	≥ 1/day
PRECISION	Field duplicate measurements for TSA	≥ 5% of real survey points	≥ 10% of reals
REPRESENTATIVENESS	MARSSIM methodology: Survey Unit 881-S1-001 (interior). Survey Maps	Statistical and biased	NA
	Controlling Documents (Characterization Pkg; RSPs)	NA	NA
COMPARABILITY	Units of measure	Dpm/100cm <sup>2</sup>	NA
COMPLETENESS	Plan vs. Actual surveys Usable results vs. unusable	> 95%	NA
SENSITIVITY	Detection limits	> 95%	NA
		TSA: ≤ 2,500 dpm/100cm <sup>2</sup> RA: ≤ 500 dpm/100cm <sup>2</sup>	all measures
		PDS MDAs ≤ 50% DCGL <sub>w</sub>	
		See Table D-3 for details.	
		Use of standardized engineering units in the reporting of measurement results.	
		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.	
		Random and biased measurement locations controlled/mapped to ± 1m.	
		Random w/ statistical confidence.	
		All local area backgrounds were within expected ranges (i.e., no elevated anomalies.)	
		N/A	
		Performed daily/within range.	
		Multi-point calibration through the measurement range encountered in the field; programmatic records.	
		COMMENTS	

Table D-2 V&V of Beryllium Results for the Building 881 Stack S1

V&V CRITERIA, CHEMICAL ANALYSES		DATA PACKAGE		COMMENTS
BERYLLIUM	Prep: NMAM 7300 METHOD: OSHA ID-125G	LAB ---->	DataChem Laboratories, Inc. Salt Lake City, Utah RIN04Z0055	
<b>QUALITY REQUIREMENTS</b>		<b>Measure</b>	<b>Frequency</b>	No qualifications significant enough to change project decisions, i.e. classification of a Type 2 Facility confirmed; all results were below associated action levels.
<b>ACCURACY</b>	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	
<b>PRECISION</b>	LCSD	80% < %R < 120 %	≥1	
	Field duplicate	(RPD < 20%)		
	COC	all results < RL	≥1	
<b>REPRESENTATIVENESS</b>	Hold times/preservation	Qualitative	NA	
	Controlling Documents (Plans, Procedures, maps, etc.)	Qualitative	NA	
	Measurement units	Qualitative	NA	
	Plan vs. Actual samples	ug/100cm <sup>2</sup>	NA	
<b>COMPLETENESS</b>	Usable results vs. unusable	>95%	NA	
	Detection limits	>95%	NA	
<b>SENSITIVITY</b>		MDL of 0.012 ug/100cm <sup>2</sup>	all measures	

Table D-3 Data Completeness Summary For Building 881 – Stack S1

ANALYTE	Building/Area/ Unit	Sample Number Planned (Real & QC) <sup>A</sup>	Sample Number Taken (Real & QC)	Project Decisions (Conclusions) & Uncertainty	Comments (RIN, Analytical Method, Qualifications, etc.)
Beryllium	Building 881 – Stack S1 (interior and exterior)	10 interior (5 biased/5 random)	10 interior (5 biased/5 random)	No contamination found at any location	10CFR850; OSHA ID-125G  RIN04Z0055  No results above the action level (0.2 ug/100cm <sup>2</sup> ) or investigative level (0.1 ug/100cm <sup>2</sup> ).  Uranium and/or Transuranic DCGL as applicable.
Radiological	Survey Area 1 Survey Unit: 881-S1-001 (interior)	15 α TSA (systematic) and 15 α Smears (systematic)  5 Pre and 5 Post TSA and RSA Media samples  2 QC TSA  100% scan of floor and 50% scan of lower walls < 20 feet	15 α TSA (systematic) and 15 α Smears (systematic)  5 Pre and 5 Post TSA and RSA Media samples  2 QC TSA  100% scan of floor and 50% scan of lower walls < 20 feet	No contamination at any location; all values below unrestricted release levels	Elevated contamination above the transuranic DCGL limits, but below the uranium limits were identified uniformly across the floor and wall surfaces during the scan surveys. The Canberra ISOCS gamma-spec analysis determined the elevated activity was due to the uranium decay series, with much of the activity coming from naturally occurring radium. Transuranic isotopes of the concrete surface samples were below MDA values. On this basis, the uranium limits were used as the DCGLs in the unrestricted release decision process. All survey results were less than the applicable PDS uranium DCGL values. Refer to Section 3.0 for further discussion regarding this anomalous condition.

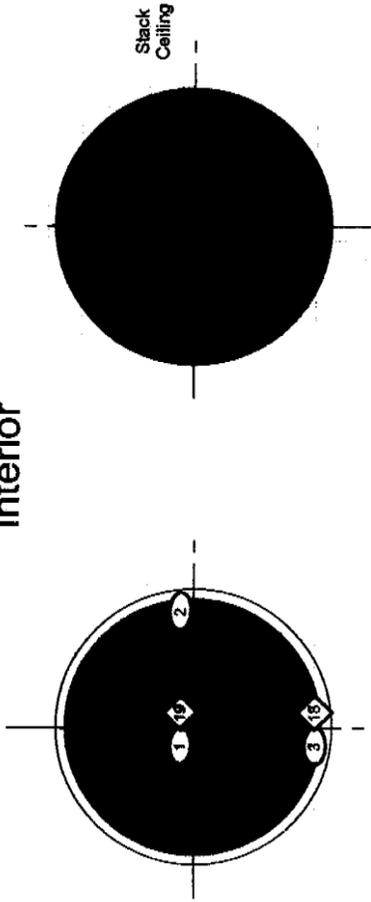
**PRE-DEMOLITION SURVEY FOR B881**

Survey Area: S1      Survey Unit: 881-S1-001      Classification: 2  
 Building: 881  
 Survey Unit Description: B881 North Stack (S1)  
 Total Area: 234 sq. m.      Total Floor Area: 46 sq. m.  
 Grid Spacing for Survey Points: 4m. X 4m.

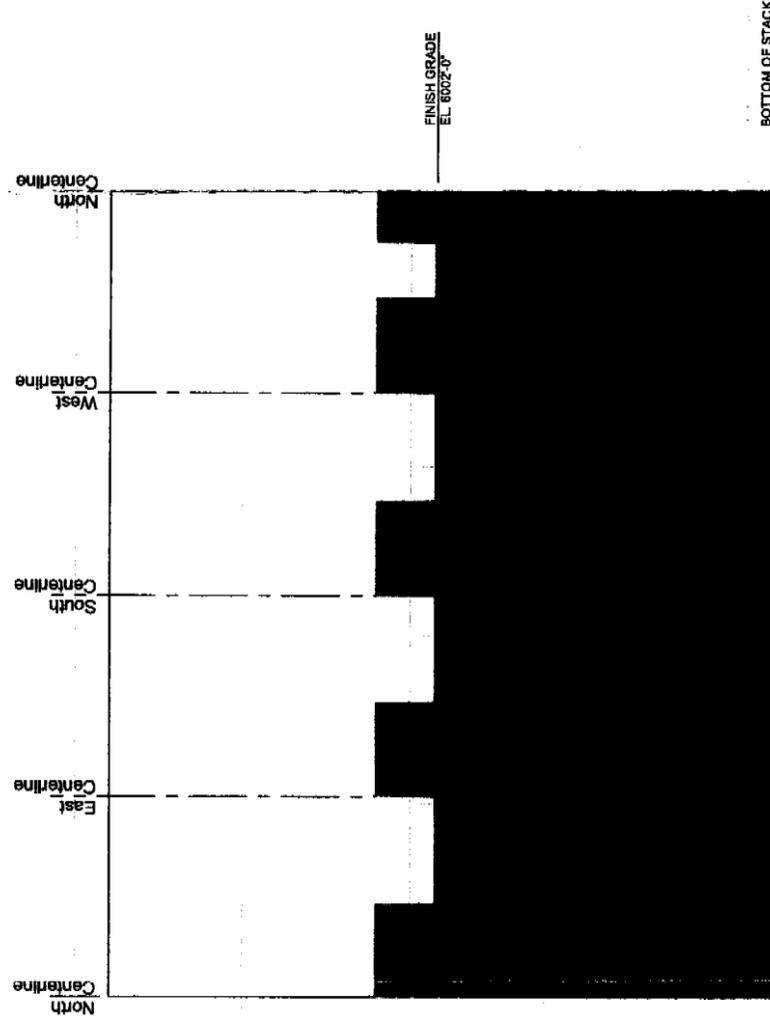
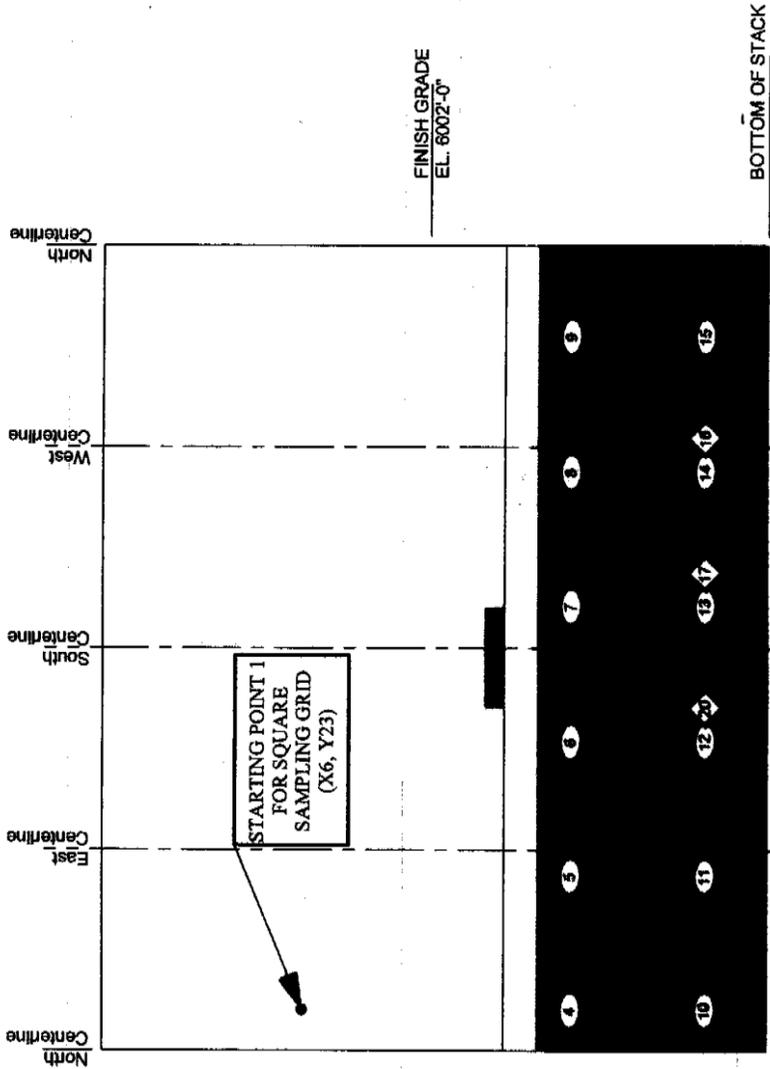
PAGE 1 OF 1

**881 - Stack 1 (S1)**

**Interior**



**881 - Stack 1 (S1)**  
**Exterior**



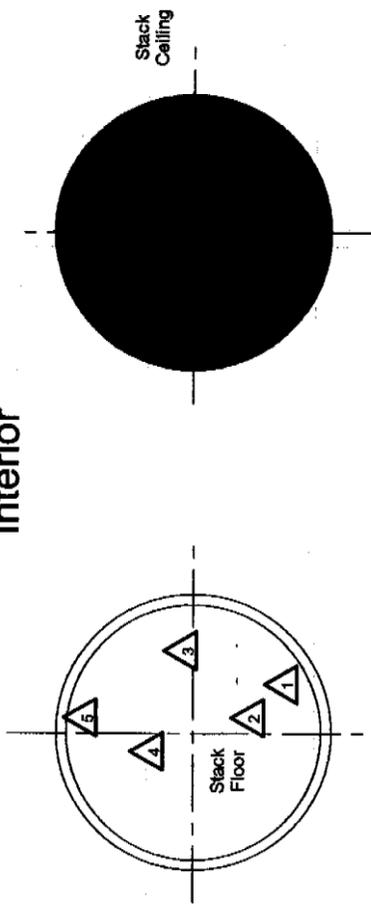
<p><b>SURVEY MAP LEGEND</b></p> <ul style="list-style-type: none"> <li>② Street &amp; TSA Location</li> <li>◇ Street, TSA &amp; Sample Location</li> <li>■ Open/Inaccessible Area</li> <li>▭ Area in Another Survey Unit</li> </ul>	<p>Neither the United States Government nor Kaiser Hill Co., nor CH2MHILL, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.</p> <p><b>Scan Survey Information</b>                  Survey Instrument ID #(s) &amp; RCT ID #(s):                  / / 1 / 3</p>	<p>U.S. Department of Energy                  Rocky Flats Environmental Technology Site                  Prepared by: GIS Dept. 303-466-7707      Prepared for: </p> <p><b>CH2MHILL</b>                  Communications Group                  MAP ID: 03-0568/881-S1-SC      Oct 8, 2003</p>	<p>Scan Area</p>

**CHEMICAL SAMPLE MAP**

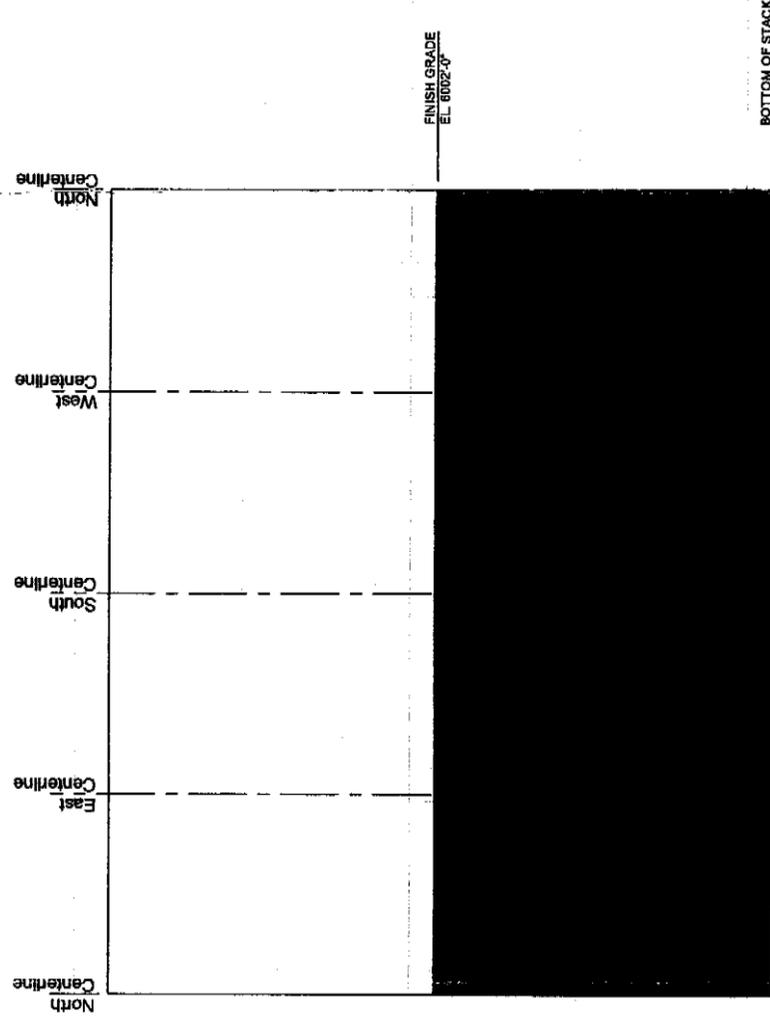
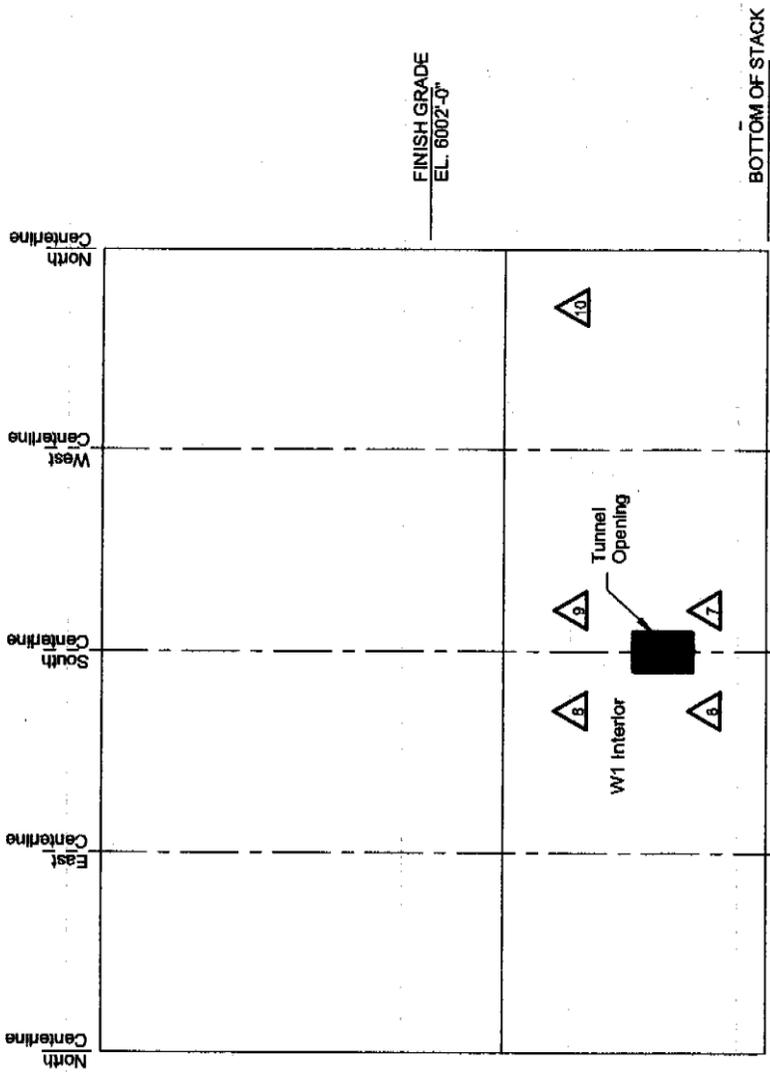
Building: 881, Stack S1  
Beryllium

**881 - Stack 1 (S1)**

**Interior**

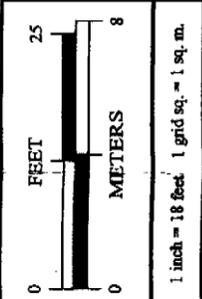
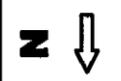


**881 - Stack 1 (S1)**  
**Exterior**



- SURVEY MAP LEGEND**
- ⊕ Asbestos Sample Location
  - △ Beryllium Sample Location
  - Lead Sample Location
  - ◇ RCRA/CERCLA Sample Location
  - ⊙ PCB Sample Location

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