



Rocky Flats Environmental Technology Site

RECONNAISSANCE-LEVEL CHARACTERIZATION REPORT (RLCR)

BUILDING 575

REVISION 0

June 26, 2000

▲
JUL 1 2000
RECEIVED
RECORDS CENTER

This report was approved by

Tom Scott
Tom Scott, Project Manager, KH D&D Advanced Planning

6/26/00
Date

Jeff Stevens
Jeff Stevens, Manager, Planning & Control, 771 Project

6/26/00
Date

Joseph Mahaffey
Joseph Mahaffey, Manager, Radiological Engineering

6-28-00
Date

Stephen Luker
Stephen Luker, Project Manager, Quality Assurance

6/26/00
Date

Andre Gonzalles
Andre Gonzalles, Industrial Hygiene

6/26/00
Date

ADMIN RECCRD

Doug Hebert
Doug Hebert, K-H Safety & Industrial Hygiene

6/27/00
Date

B575-A-000004

REVIEWED FOR CLASSIFICATION
By [Signature] UNB
Date 7/5/00

1/81

TABLE OF CONTENTS

ABBREVIATIONS/ACRONYMS	4
EXECUTIVE SUMMARY	5
1 0 INTRODUCTION	6
1 1 Purpose	6
1 2 Scope	6
2 0 OPERATING HISTORY AND PHYSICAL DESCRIPTION	8
2 1 Building 575	8
3 0 SUMMARY OF CHARACTERIZATION ACTIVITIES	9
3 1 Data Quality Objectives	9
3 2 Radiological Characterization	11
3 2 1 Summary of Historical Information	11
3 2 2 Summary of RLC Data Collected	11
3 2 3 Sampling and Field Measurement Methods, Procedures and Equipment	12
3 2 4 Laboratory Analysis	13
3 3 Chemical Characterization	13
3 3 1 Summary of Historical Information	13
3 3 2 Summary of RLC Data Collected	14
4 0 HAZARDS	15
4 1 B575	16
4 1 1 Physical Hazards	16
4 1 2 Radiological Hazards	16
4 1 3 Chemical Hazards	17
5 0 DATA QUALITY ASSESSMENT (DQA)	18
5 1 Verification of Results	20
5 2 Validation of Results	20
5 2 1 Precision	21
5 2 2 Accuracy (and Bias)	22
5 2 3 Representativeness	23
5 2 4 Completeness	23
5 2 5 Comparability	24
5 2 6 Sensitivity	24
5 2 7 Other QA Elements	25
5 3 DQA Summary	25
6 0 FACILITY CLASSIFICATION	26
7 0 REFERENCES	27
TABLES	
Table 4-1 Summary of Group B Facilities Chemical Hazards	16
Table 5-1 Building 575 RLC Compliance with MARSSIM Data Quality Guidelines	19

EXHIBITS

Exhibit 1-1, Site Map

7

APPENDICES

APPENDIX A, BUILDING 575

A-1 B575 – Radiological Survey Data for Exterior Survey Unit

- Summary of Radiological Survey/Sample Results
- Map of Locations
 - Scans
 - Surveys
- Removable and Total Survey Results – Detail
- Laboratory Alpha Spec (Sample) Results – Detail

A-2 B575 – Radiological Survey Data for Interior Survey Unit

- Summary of Radiological Survey/Sample Results
- Map of Locations
 - Scans
 - Surveys
- Removable and Total Survey Results - Detail

A-3 B575 – Asbestos Inspector's Report

A-4 Historical PCB Remediation in 575 Vicinity

APPENDIX B, GENERAL SURVEY AND SAMPLING DOCUMENTATION

- Chain-of-Custody (for all samples)
- MARSSIM Pre-Survey Calculations for Survey Frequency
- MARSSIM Post-Survey Calculation for Survey Frequency (typical)
- Verification of OASIS Results – Offsite (GEL) Alpha Spectroscopy Results

ABBREVIATIONS/ACRONYMS

ACM	Asbestos containing material
ASD	Analytical Services Division
Be	Beryllium
CBDPP	Chronic Beryllium Disease Prevention Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CDPHE	Colorado Department of Public Health and the Environment
DCGL _{EMC}	Derived Concentration Guideline Level – elevated measurement comparison
DCGL _{LW}	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
DOT	Department of Transportation
DPP	Decommissioning Program Plan
DQA	Data quality assessment
DQO	Data quality objective
EPA	U S Environmental Protection Agency
FDPM	Facility Disposition Program Manual
GEL	General Engineering Labs, Inc
HVAC	Heating, ventilation, air conditioning
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Program
K-H	Kaiser-Hill
LBP	Lead-based paint
LCS	Laboratory control samples
LLW	Low-level waste
LSDW	Life safety disaster warning
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum detectable activity
MDC	Minimum detectable concentration
NA	Not Applicable
NORM	Naturally occurring radioactive material
NRA	Non-Rad-Added Verification
OSHA	Occupational Safety and Health Administration
OASIS	Oxford Alpha Spectroscopy Integrated System
PAC	Potential area of concern
PARCC	Precision, accuracy, representativeness, comparability and completeness
PCBs	Polychlorinated biphenyls
PDS	Pre-demolition survey
PLM	Polarized Light Microscopy
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
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
RSP	Radiological Safety Practices
SVOCs	Semi-volatile organic compounds
TRU	Transuranic
TSA	Total surface activity
V&V	Verification & Validation
VOCs	Volatile organic compounds

EXECUTIVE SUMMARY

A Reconnaissance Level Characterization (RLC) was performed to release Building 575 (as part of the Group B Characterization effort although reported separately in this document) The RLC included both radiological and chemical characterization Because this structure was classified as a MARSSIM Class 3 (RFCA Type 1) facility, the RLC also implemented a Pre-Demolition (Final Status) Survey design based upon the Multi-Agency Radiation Survey and Site Investigation Manual (NUREG-1575) Physical, chemical and radiological hazards were assessed based on historical reviews, process knowledge, and newly acquired RLC data

Results indicate that no radioactive or chemical contamination exists and that no significant physical hazards are present The building contains no asbestos Based on the assessment, the building is confirmed to be a Type I facility and can be released to commerce (i e , for sale and re-use)

1.0 INTRODUCTION

As part of the Rocky Flats Environmental Technology Site (RFETS) Closure Project, numerous buildings and structures will be removed. Among these is Building 575, which is currently located west of Building 776. Exhibit 1-1 shows the location of the Building. This facility no longer supports the RFETS mission and needs to be removed to reduce Site infrastructure, risks and/or operating costs.

Before the facility can be released, hazards must first be identified. Hazards identified will be used to plan final disposition. This document presents the existing physical, radiological and chemical hazards associated with the facility, and classifies the facility pursuant to the RFETS Decommissioning Program Plan (DPP, K-H, 1999, Type 1, 2 or 3). The hazards assessment is based on facility history and process knowledge, operating and spill records, and results of the reconnaissance level characterization (RLC). The RLC was conducted pursuant to the RFETS Decontamination and Decommissioning Characterization Protocol (DDCP, K-H, 1999). The content and outline of this report are consistent with the Kaiser-Hill (K-H) Facility Disposition Program Manual (FDPM, K-H, 1998).

1.1 Purpose

The purpose of this report is to communicate and document the results of the RLC effort. The purpose includes summarizing the data into a concise, usable format and interpreting the data for use in management decisions, primarily

- Definition of individual hazards and overall risk associated with facility decontamination and decommissioning (D&D),
- Typing of the facility based on hazards identified, and
- Ability to release the facility from the Site

1.2 Scope

This report covers physical, radiological and chemical characterization of Building 575. Based on the hazards identified, the facility was typed and assessed against release criteria. The slab is not being released at this time, and therefore, is not part of this characterization effort. Also, environmental media beneath and surrounding the facility are not within the scope of this characterization. All Site facilities and environmental media will be dispositioned pursuant to the Rocky Flats Cleanup Agreement (RFCA).

Exhibit 1-1 Site Map Showing Building 575

2.0 OPERATING HISTORY AND PHYSICAL DESCRIPTION

Site documents, personnel interviews, and facility walkdowns are conducted to determine the history of each facility. The facilities are evaluated for any evidence of staining or spills that would indicate an industrial process had occurred at some point in time. Chemical sampling and evaluation is based on the information obtained during this process.

2.1 Building 575

In 1969 weatherproof switchgear was placed on the hillside west of Building 776, in between transformer 515 and transformer 516. The switchgear sits on a concrete pad approximately 8 to 12 inches thick. In 1973, Building 575 was built to enclose the switchgear. This structure is a Butler-type building approximately 15' wide and 30' long. To support the steelwork frame of the building, the foundation walls extend approximately 2 feet above the slab and are 8 inches thick. The siding is galvanized steel that has paint on the exposed side. The paint appears to be baked on enamel. Two doors allow entry into the building, a double door on the north side and a single door on the south, both doors are on the east side of the ends of the building. There is no insulation in the building. No chemicals were used or stored in the building. A copper grounding mat is buried underground in the yard and under the building and adjacent transformers. The substation is not located on an Individual Hazard Substance Site (IHSS) or Potential Area of Concern (PAC).

3.0 SUMMARY OF CHARACTERIZATION ACTIVITIES

An RLC was designed to demonstrate that DOE-added radioactive materials are not present or have been removed to the extent that residual levels of contamination are below the Derived Concentration Guideline Levels (DCGLs) and that the facility can either be released or disposed of as sanitary waste (i.e., possesses no radiological or chemical contamination). This section of the RLC Report (RLCR) presents data quality objectives (DQOs) used, historical and process knowledge, and RLC performed to release the facilities.

Section 3.0 also describes the survey units established for characterizing the facility, and defines the methods used to perform radiological surveys, scans and sampling. The RLC followed the guidance provided in NUREG-1575, the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

3.1 Data Quality Objectives

The following section revisits the original DQOs used in designing the RLC Characterization Package (see Section 5.2.3).

The Problem

The problem consists of the unknown extent of radiological and chemical contamination on and in floors, walls (interior and exterior), ceilings and roofing.

The Decision

The decision is whether release criteria for radiological and chemical constituents have been met based on types and quantities of any radiological and chemical contamination present.

Inputs to the Decision

The inputs to the decision include historical and process knowledge, data collected from this RLC, and release criteria and waste management regulations.

Decision Boundaries

The decision boundaries include the floors, walls (interior and exterior), ceilings, and roofing with the facility.

Decision Rules

This section presents the rules to support the characterization decisions, specific to each type of contamination.

Radionuclides

- If all radiological survey and scan measurements are below the surface contamination guidelines provided in DOE Order 5400.5 (Radiation Protection of the Public and Environment), the related surface is considered not radiologically contaminated
- If any radiological survey or scan measurement exceeds the surface contamination guidelines provided in DOE Order 5400.5, the related survey unit must be evaluated per the statistical tests described in Section 7.0 of the RFETS Pre-Demolition Survey Plan

Beryllium

If surface concentrations of beryllium are equal to or greater than $0.2 \mu\text{g}/100 \text{ cm}^2$, the material is considered beryllium contaminated per the Occupational Safety and Industrial Hygiene Program Manual, Chapter 28, Chronic Beryllium Disease Prevention Program (CBDPP)

Polychlorinated Biphenyls (PCBs)

If an item contains PCBs in regulated concentrations, the item is considered PCB-regulated material and subject to the requirements of 40 CFR 761

Asbestos

If any one sample of a sample set representing a homogeneous medium results in a positive detection for asbestos (i.e., >1% by volume), then material is considered asbestos containing material (ACM, 40 CFR 763 and 5 CCR 1001-10)

Tolerable Limits on Decision Error

The maximum value for false positive and false negative errors is 5% when calculating the number of samples required

Optimization of Plan Design

Radiological characterization was conducted on interior floors, walls and ceilings, and exterior walls and roofs as necessary. The following criteria were used to develop the radiological survey/sampling characterization package

- RFETS Radiological Safety Practices (RSP) 16.01, "Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure"
- RFETS RSP 16.02, "Radiological Surveys of Surfaces and Structures"

- RFETS RSP 16 04, "Radiological Survey/Sample Data Analysis "
- RFETS RSP 16 05, "Radiological Survey/Sample Quality Control "
- RFETS RSP 18 10, "Radiological Material Transfer and Unrestricted Release of Property and Waste "

If beryllium, PCB or asbestos surveys/samples are required, sampling and analysis will be conducted in accordance with Section 6 0 of the D&D Characterization Protocol

3.2 Radiological Characterization

Radiological characterization was performed to define the nature and extent of radioactive materials that may be present on or in the facility This section discusses the historical radiological information on this facility or lack thereof and the RLC conducted Radiological hazards are discussed in Section 4 0, and RLC data are presented in Appendix A and B

3.2.1 Summary of Historical Information

Historically, radiological surveys for Building 575 may have been performed, but the data are not readily available There are no Plant Action Tracking System items outstanding on this facility, which indicates no associated radiological program deficiencies Also, Building 575 is individually listed in I-P73-HSP-18 10, *Radioactive Material Transfer And Unrestricted Release Of Property And Waste, Appendix 4, Unrestricted Release Building/Facility List* This listing authorizes the unrestricted release of administrative, non-hazardous property located in the facility without radiological surveys or Radiological Safety signature for either off-site shipment or transfer to Property Utilization and Disposal The HSP 18 10 Listing is indicative of structures with a low probability of radioactive contamination based on historical activities associated with the facility

3.2 2 Summary of RLC Data Collected

Although historical review indicates no use of DOE-added radioactive material, insufficient quantitative radiological data existed to designate Building 575 as non-impacted pursuant to MARSSIM Therefore, radiological surveys and scans were performed (refer to Reconnaissance Level Characterization Package for Group B Trailers, Integrated Work Control Package (IWCP) Work Control No T0102834, K-H 2000a) Total surface activity (TSA), removable activity, and surface scans were performed on the interior and exterior of the facility for alpha and beta contamination per MARSSIM guidance The interior and exterior of the facility were designated as separate survey units Surface scans were performed in areas where contamination would be expected to accumulate (i e , high traffic areas on the floors, etc) A minimum of 10% of each survey unit was scanned Twenty-eight randomly selected TSA and removable activity measurements were taken in each survey unit TSA and removable activity measurements were

taken independently of the surface scans to maximize the probability of finding contamination. Five of the twenty-eight randomly selected TSA measurement locations were resurveyed by an independent Radiological Control Technician (RCT) for quality control (QC) purposes. In addition, 5% of the 10% surface scan area was resurveyed for QC purposes.

Two roof media samples with a duplicate (3 samples total) were analyzed to determine if elevated radioactivity was due to naturally occurring radioactive material (NORM), specifically Po-210 (Polonium). Sampling requirements are delineated in the Characterization Package for Sampling and Analysis of Roofing Material from Groups B & C for Isotopic Analysis, March 16, 2000 (K-H 2000b).

3.2.3 Sampling and Field Measurement Methods, Procedures and Equipment

TSA measurements for alpha and beta were taken with a NE Electra using a DP-6 probe. Removable activity measurements for alpha and beta were analyzed with an Eberline SAC-4 and BC-4, respectively. Surface scans for alpha and beta were taken with the NE Electra at a scan rate of 1.5 inches per second and 4 inches/second, respectively. Radiological survey packages were developed for each survey unit in accordance with RFETS Radiological Safety Practices (RSP) 16 01, "Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure," RFETS RSP 16 02, "Radiological Surveys of Surfaces and Structures," and RFETS RSP 16 05, "Radiological Survey/Sample Quality Control." Radiological surveys and scans were taken per the requirements of Appendix 8 of RFETS SWP-RFCSS-00002-00, "Reconnaissance Level Characterization", Revision 0, dated February 2000.

Specific TSA and removable measurement locations were selected using a random number generator while scan locations were biased toward heavy foot-traffic areas and areas likely to collect airborne particulates. Random measurements were taken at the center of each grid location. If grid locations were inaccessible, the measurement was obtained as close as possible to the original grid location, and the new location was annotated on the survey map.

Measurement locations were clearly identified with labels to provide a method of referencing measurement results to survey measurement locations. These measurement locations were incorporated into a grid map at survey densities of 1 m². Measurement results as well as statistical data analyses are presented in the Appendix for each survey unit.

Roof media sampling requirements are delineated in the Characterization Package for Sampling and Analysis of Roofing Material from Groups B & C for Isotopic Analysis, March 16, 2000. Samples were managed to ensure an accurate record of sample collection, transport, analysis, and disposal. Chain-of-custody documentation captures this process for all samples submitted for laboratory analysis and ensures that samples are neither lost nor tampered with.

and that the samples analyzed are traceable to a specific location in the field Chain-of-custody forms are included as part of survey documentation in Appendix B (note that Building 575 is incorrectly denoted relative to location identification on the Chain-of-Custody forms as "TB595")

3.2.4 Laboratory Analysis

Radiological samples were analyzed using the Oxford Alpha Spectroscopy Integrated System (OASIS) Radiological samples used to verify and validate OASIS results were analyzed in accordance with K-H Analytical Services Division contractual requirements, specifically Module RC01, *Isotopic Determinations by Alpha Spectroscopy*

All samples collected for RFETS laboratories or approved contracted laboratories were analyzed via a Site-approved method (See Section 5.2.3) The laboratory analytical methods used are capable of measuring levels at or below 50% of the established release criteria All results state the detection limit for the analysis Results are detailed in the Appendix for each individual survey unit

3.3 Chemical Characterization

Chemical characterization was performed to determine the nature and extent of chemical contamination that may be present on or in the facility Characterization was based on a review of historical process knowledge and visual inspections and is presented in this section No samples were required Related hazards are discussed in Section 4.0

3.3.1 Summary of Historical Information

Information on contaminants of concern (i.e., asbestos, beryllium, RCRA/CERCLA constituents, lead in paint, and PCBs) is presented below

Asbestos: No historical asbestos inspection data exist for Building 575 Therefore, an asbestos inspection was required for the RLC

Beryllium There is no record of beryllium operations or storage being conducted in Building 575 (refer to Type I Facility Checklist) Building 575 has always contained electrical switchgear and has had no operations conducted within the building An RFETS study confirmed that administrative buildings with no record of beryllium activities (including 60 buildings) have no detectable beryllium contamination (refer to *RFETS Administrative Equipment Characterization for Beryllium Contamination Project Plan Report, January 1998*) Therefore, beryllium sampling is unnecessary and was not conducted

RCRA/CERCLA Constituents [including metals and volatile and semi-volatile organic compounds (VOCs & SVOCs)] According to historical and process knowledge, no chemicals were used or stored in the facility (refer to Type I Facility Checklist) In addition, the walkdown did not identify any areas of concern based on staining Therefore, sampling for chemical contaminants is unnecessary and was not conducted

Lead in paint: The galvanized steel has paint on one side that was not characterized for lead content Since the facility is to be released to commerce, only notification is required that it may contain lead-based paint

Polychlorinated Biphenyls (PCBs) The transformers adjacent to Building 575 previously contained PCB oil This oil was drained and replaced with non-PCB oil in 1986 Some PCB contamination was detected in soil immediately east of the 516 transformer (on the south side of the substation), and the area was remediated in August of 1995 ((RF/RMRS-97-044, Appendix A-4) No contamination was found on the slab No PCB oils were used in Building 575 equipment, and therefore, the equipment and structure is expected to be PCB-free

Fluorescent light ballasts containing PCBs may exist If these are leaking, they may not be released to commerce, and must be removed prior to release Therefore, inspection of fluorescent light ballasts for leakage of PCBs was required for RLC Intact PCB-containing fluorescent light ballasts may be released to commerce provided that notification of that fact is given

3.3.2 Summary of RLC Data Collected

Based on historical information presented in Section 2.0 and the inspections conducted, the only RLC field activities required were evaluating the possible presence of asbestos-containing material and inspection of fluorescent light ballasts for PCBs An asbestos inspection of the facility was conducted by a CDPHE-certified asbestos inspector Light ballasts were evaluated by knowledgeable staff A visual inspection of the facility roof, interior and exterior walls and floors revealed no evidence of chemical spills or releases (i.e., stains, discoloration, odors, or other physical characteristics)

4.0 HAZARDS

This sections presents physical, radiological and chemical hazards, including data from radiological field measurements and laboratory analysis. Data are presented in Appendix A.

The RLC (serving also as the Pre-Demolition Survey, PDS) confirmed that Building 575 (inside and outside) does not contain radiological contamination above the Surface Contamination values provided in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The potential for a chemical hazard due to each of the following contaminants was considered:

- Asbestos
- Beryllium,
- Lead and other metals,
- VOCs/SVOCs,
- PCBs

Each potential chemical hazard was evaluated primarily based upon historical and process knowledge coupled with visual inspections, given that Building 575 only housed switchgear (refer to Section 3.3). In addition, Building 575 was inspected for asbestos containing materials (ACM) and chemical spills, including PCB leaks from PCB light ballasts. The chemical hazards are summarized in Table 4-1.

Table 4-1 Summary of Group B Facilities Chemical Hazards

Contaminant of Concern	Analysis	Historical or RLC?	Below release limit or regulatory thresholds?
Asbestos	No asbestos was detected	RLC	Yes
Metals, including Be	No history of use or storage No sampling was required	Historical	Yes
VOCs/SVOCs	No history of use or storage No known releases No sampling was required	Historical	Yes
Lead in paint	No sampling is required for release to commerce	Historical	Yes ¹
PCBs	No specialized paints or coatings were observed No sampling for PCB in paint was required PCB ballasts were removed, no leaks noted	RLC	Yes

¹ Notification of the buyer that lead-based paint may be present is required for release to commerce

4 1 Building 575

No hazards are associated with Building 575

4.1 1 Physical Hazards

The structure presents no special physical hazards Building 575 is structurally in good condition and is empty of any hazardous equipment Current physical hazards consist of those common to an empty building The building is no longer connected to Site electricity Physical hazards are controlled by the Site Safety and Industrial Hygiene Program, which is based on OSHA regulations and standard industry practices

4 1.2 Radiological Hazards

Based on historical and process knowledge, Building 575 is classified as a MARSSIM Class 3 area and a Type I facility pursuant to the DPP The RLC (serving also as the PDS) confirms that this trailer does not contain radiological contamination above the Surface Contamination values provided in DOE Order

5400 5 and the RFETS Radiological Control Manual Building 575 was separated into two distinct survey units Interior and Exterior The Interior and

16

Exterior survey units contained no measurements (Total Surface Activity or Removable Activity) above the Surface Contamination values provided in DOE Order 5400.5 and the RFETS Radiological Control Manual. The roof (weathered sheet metal) was sampled and analyzed. OASIS results indicated relatively low levels of Po-210 (<75 dpm/100cm²) and the absence of DOE-added material at levels of approximately one half of the DCGL_w. Lab results for TSA were consistent with those measured in the field with hand instruments. Survey and sample results are presented in Appendixes A and B. Surface scan results were $<75\%$ of the DCGL_{EMC}, hence precluding the requirement for scan documentation and additional surveys (refer to Section 3.2.2).

4.1.3 Chemical Hazards

4.1.3.1 Asbestos

No historical asbestos data were available for Building 575, so an asbestos inspection was performed as part of RLC. Since Building 575 is being released to commerce, only material potentially containing friable asbestos was required to be sampled. The potential presence of non-friable asbestos must be disclosed to the buyer, but sampling of non-friable material is not required.

No potentially ACM was identified during inspection by a CDPHE-certified asbestos inspector (see Appendix A-3 and as authenticated in IWCP SWP-RFCSS-00002-00, Revisions 0 and 1.0). No sampling was required.

4.1.3.2 Metals (including beryllium and lead in paint)

According to historical and process knowledge, no metals, including Be, were used or stored in Building 575, and therefore, no related hazards are present.

The paint on the interior and exterior surfaces of Building 575 has not been characterized for lead in paint. Since the structure is to be released to commerce, only notification is required that it may contain lead-based paint.

4.1.3.3 VOCs/SVOCs

According to historical and process knowledge, no chemicals were used or stored in Building 575, and therefore, no related hazards are present.

4.1.3.4 PCBs

All PCB-containing fluorescent light ballasts have been removed. PCB-contaminated soil was removed from an area south of Building 575 in August, 1995, and the site was confirmed at <10 ppm PCBs by weight in soil using EPA Method 8080 (*Closure Report for the Source Removal of Polychlorinated Biphenyls*, RF/RMRS-97-044, Rev. 0, July 1997, see Appendix A-4). No PCB oils were used in B575 equipment.

5.0 DATA QUALITY ASSESSMENT

Data used in making disposition decisions must be of adequate quality. Adequate data quality for decision-making is required by applicable K-H corporate policies (K-H QAPD, 1997, §7.1.4 and 7.2.2), as well as by the customer (DOE, RFFO, Order O 414.1A, Quality Assurance, §4.1(b)). Regulators and the public also expect decisions and data that are technically and legally defensible. Verification and validation of the data ensure that data used in decisions resulting from the RLC are usable and defensible.

The Data Quality Assessment (DQA) consists of revisiting the DQOs used and determining whether those objectives were met. This data evaluation also consists of verifying and validating the RLC data, which ensures that data input into decisions are accurate, precise, representative, complete, and comparable.

Original DQOs of the project are stated in Section 3.1, where problems, decisions, decision inputs, project boundaries, and error tolerances were adequately defined. The decision for the Group B facilities is whether contamination levels are below release criteria, for both chemicals and radionuclides. No asbestos was identified in the building. No evidence of chemicals were noted (e.g., stains or fluorescent light ballasts with PCBs). The conclusion with respect to radiological contamination is derived from measurements at a 95% confidence level, using MARSSIM methodology in the survey units' design. Original estimates of survey quantities were confirmed by using measured values (vs. assumed values) in the sample quantity derivation (Appendix B).

The RLC for Building 575 was conducted in accordance with the FDPM and the DDCP. These programs conform with the Site's DOE-approved QA Program, which in turn conforms with DOE Order 414.1, *Quality Assurance*. The program also conforms with MARSSIM guidance, which reflects elements of DOE Order 414.1. Adequate implementation of the quality elements required by DOE Quality Assurance was corroborated through the verification and validation process described within this section.

The DQA presented in this section supports conclusions through implementation of the guidelines taken from the following MARSSIM sections:

- Section 4.9, Quality Control
- Section 8.2, Data Quality Assessment
- Section 9.0, Quality Assurance & Quality Control
- Appendix E, Assessment Phase of the Data Life Cycle
- Appendix N, Data Validation using Data Descriptors

The MARSSIM-recommended criteria for verification and validation of pre-demolition (final status) survey data, listed above, are summarized in Table 5-1. The MARSSIM criteria are listed across the top of the table, whereas the project's proof of implementation is listed along the left side of the table.

**Table 5-1 Group B Final Status Surveys' Compliance with MARSSIM
Data Quality Guidelines**

5.1 Verification of Results

Verification ensures that data produced and used by the project are documented and traceable per quality requirements. Verification confirmed that

- Chain-of-custody was intact from initial sampling through transport and final analysis,
- Preservation and hold-times were within tolerance,
- Format and content of the data are clearly presented relative to goals of the project

Verification of the Building 575 dataset also confirmed the presence of records representing implementation of the following quality controls

- Calibrations/periodic performance checks (alpha spectroscopy, surveys and scans), for accuracy,
- Laboratory control samples (LCS -- alpha spectroscopy), for accuracy,
- Blanks/backgrounds (alpha spectroscopy), for accuracy,
- Lab and field duplicate measurements, for precision,
- Chemical yield (alpha spectroscopy), for accuracy,
- Count times (alpha spectroscopy surveys and scans), for sensitivity,
- Sample preparations (alpha spectroscopy), for accuracy, representativeness

Upon completion of the data management activities listed above, peer and quality assurance reviews were performed on the data and this, the final report

In summary, the verification confirmed that documentation and quality records are intact for the project, which in turn corroborates implementation of the required technical quality controls and administrative requirements, particularly verification of those documents and records that will ultimately support the CERCLA Administrative Record. This report and all relevant Quality records associated with the project will be submitted to the CERCLA Administrative Record, for permanent storage, within 30 days of approval of the final report.

5.2 Validation of Results

Validation consisted of a technical review of all survey data that directly support the RLC decisions and replicate analysis of selected OASIS samples by an offsite lab via standard alpha spectroscopy (ASD Module RC01). Any limitations of the data relative to project goals are delineated, and the associated data are qualified accordingly. Data were validated relative to quality criteria discussed throughout previously noted MARSSIM sections, RSP requirements, and PARCC parameters. Precision, Accuracy, Representativeness, Comparability, and Completeness (PARCC) parameters are consistent with "data descriptors" in MARSSIM and address characteristics of the data that must be defined for scientific integrity and defensibility. The PARCC parameters also include

discussion on bias and sensitivity, two more data descriptors emphasized in MARSSIM

Validation of the OASIS methodology was performed on four (4) samples representing the highest TSA values acquired in the field from both Group B and Group C facilities. Validation of the method consisted of 2 parts: 1) establishing presence/absence of DOE-added radionuclides at the sensitivities specified for the OASIS (i.e., $\leq 50\%$ DCGL_w), and 2) quantification of Po-210 concentrations relative to levels measured in the field with hand-held instruments.

Most importantly, the offsite results (4 total) confirmed the absence of DOE-added radionuclides at the sensitivities cited for the OASIS. Of secondary interest were how well OASIS results for Po-210 levels corresponded with standard alpha spectroscopy that includes wet chemistry sample preparations (Module RC01). The offsite lab yielded two (2) results with excellent agreement between methods (<5% difference), whereas two (2) other results reflect a potential high bias in the OASIS method (58% - 195% greater than offsite results for Po-210). A high bias is conservative with respect to unrestricted release decisions, and does not impact decisions made on this project.

5.2.1 Precision

5.2.1.1 Radiological Surveys and Scans

Precision of the radiological instrumentation was satisfactory based on tolerance charting of daily source measurements for each individual sensor used on the project, which includes all measurement types (scans and static measures for total contamination and swipes for removable). Adequate precision was established through instrument performance within a $\pm 20\%$ range as defined by measurement results compared to a standard source value. Based on site protocol (i.e., RSPs), any measurement exceeding the defined tolerance limits required corrective action (repair or replacement) prior to the instrument's use during pre-demolition survey.

Duplicate measurements were acquired for total and removable surface activity measurements at $\geq 10\%$ frequency per survey unit. All duplicate measurements were within tolerance based on the acceptance criterion that both results be below Derived Concentration Guideline Level-Averaged Measures (DCGL_w). Note that even if populations were "significantly" different between real and duplicate results, if both duplicate and real population statistics are less than action levels, the difference between duplicate and real values is, ultimately, insignificant relative to release decisions.

5.2.1.2 Alpha Spectroscopy

Media samples were analyzed for the presence/absence of DOE-added radionuclides through the use of the onsite OASIS. Acceptable precision of the system was proven through the use of multiple analyses of standard reference materials (^{237}Np) within acceptance limits as established through control charting. Acceptable precision (repeatability) is exhibited through multiple measurements consistently falling within ± 3 standard deviations (i.e., control limits) of an average value, typically illustrated through control charting.

Replicates of project samples, to determine overall sampling precision, were not analyzed through OASIS but were submitted to an offsite laboratory to better evaluate independent repeatability of the results (based on the relatively new application of OASIS in RFETS Pre-Demolition Surveys). Four (4) samples of the collective Group B and C sample sets, or ~10% of the collective, were submitted for duplicate analyses, consistent with industry standard quality control sampling frequency. The four samples were selected (biased) with respect to the highest TSA values measured by the OASIS on the trailers. Group B and C sample sets were combined for this evaluation of precision due to the similarity of material types (weathered sheet metal (3 samples) and tarry substrata (1 sample)), and locations (mobile trailer rooftop surfaces). Results from laboratory indicate adequate repeatability with the OASIS and verify that the highest recorded alpha readings (specifically TSA) are due to Po-210 and not DOE-added material. Refer to Appendices A and B for detail.

Laboratory QC for the V&V samples, for intralaboratory repeatability, were satisfactory based on equivalency calculations.

5.2.2 Accuracy (And Bias)

5.2.2.1 Radiological Surveys and Scans

Accuracy of radiological surveys and scans is satisfactory based on RFETS-programmatic annual calibrations that establish instrument efficiencies and sensitivities for all instrumentation used on this project. Daily source checks also provided periodic checks to ensure that all sensors are within tolerance during daily operations. Calibration and calibration check results were within the RFETS and industry-standard requirement of 20% of the applicable reference standard values. Full-scale, multi-point calibrations provided accuracy of $\pm 10\%$ prior to implementation of survey instruments in the field, consistent with guidelines put forth in ANSI-N323A-1997-N323 d.

5.2.2.2 Alpha Spectroscopy

Accuracies of the alpha spectroscopy results were acceptable based on establishing a batch-specific efficiency for the OASIS and measurement of reference standards within control limits (^{237}Np , as established by ± 3 -sigma bounds about the arithmetic mean).

Background values were approximately 1.2 dpm/100 cm² for the sample batches, which is typical for the OASIS. Background values approaching 2 dpm/100 cm² require corrective actions to the OASIS protocol, but this upper limit was not approached during analysis of the Group B samples.

Preparation blanks were not required, as background values were established, and no wet chemistry sample preparations were necessary or performed. Potential cross-contamination of samples was not an issue, considering all transuranic results were below MDA and, of course, below the DCGL_{ws} as well. Uncertainties of the OASIS results, per sample, were quantified as ± 1 -sigma error, consistent with manufacturer's instructions.

V&V sample result accuracies were adequate based on satisfactory % (tracer) yields and LCS recoveries between 80% and 120%. Random (counting) error was quantified as ± 2 -sigma.

5.2.3 Representativeness

Samples, surveys and scans are representative based on the following criteria:

- Familiarity with facilities -- multiple walk-downs and collaborations by management and technical staff,
- Implementation of industry-standard chain-of-custody protocols,
- Compliance with sample preservation and hold times,
- Documented and (site) approved methods, particularly RSPs for scans/surveys and the following documents for alpha spectroscopy
 - TBD-00143, Direct Analysis of Alpha Emitters using the Oxford Alpha Spectroscopy Integrated System (OASIS),
 - TBD-000143, Use of the OASIS for Direct Differentiation between Po-210 and DOE-enhanced Materials (in progress),
 - Module GR01, General Laboratory Requirements, and,
 - Module RC01, Isotopic Determinations for Alpha Spectroscopy
- Standard Work Package SWP-RFCSS-00002-00, Revisions 0 and 1.0
- Characterization Package for Sampling and Analysis of Roofing Material from Groups B & C for Isotopic Analysis, March 16, 2000
- IWCP Work Control No. T0102834
- Reconnaissance Level Characterization Package for Group B Trailers, Feb 2000, Rev 0
- IWCP Work Control No. T0102836
- IWCP Work Control No. T0103087

5.2.4 Completeness

The data set for this project is complete with respect to surveys, scans, samples and associated quality records ("data packages") resulting from the collective RLC and Pre-Demolition process. Based on process knowledge of the building,

coupled with detailed visual inspections, chemical (non-radiological) analyses were not warranted for Building 575. Completeness of radiological surveys and samples is detailed, by individual survey unit, in Appendix A.

Consistent with the DQO process, the sampling design (for the minimum number of MARSSIM-based survey locations) was optimized through back-calculating actual measurement results (acquired during RLC) and comparing model output with original estimates. The Post Survey Removable Contamination Summary Statistics Calculation verification worksheet is included in Appendix B. Use of actual sample/survey/scan (result) variances in MARSSIM's DQO model provided confirmation that an adequate number of samples/surveys/scans had been acquired.

All radiological results for Building 575 are valid without qualification. The results of verification samples from an offsite, independent laboratory (Appendix B) corroborated the absence of DOE-added radionuclides, and, likewise, confirmed that Po-210 was comparable to activities measured in the field with survey instrumentation as well as onsite alpha spectroscopy.

5.2.5 Comparability

All results presented are comparable with radiological survey/scan and alpha spectroscopy data on a RFETS- and DOE-complex wide basis. This comparability is based on:

- Use of standardized engineering units in the reporting of measurement results,
- Consistent sensitivities of measurements at approximately 50% or less of the $DCGL_W$ (approximately 50% or less of the $DCGL_{EMC}$ for scans), qualifications of selected alpha spectroscopy results are described in the next subsection,
- Use of RFETS-approved procedures,
- Systematic quality controls, and
- Thorough documentation of the planning, sampling/analysis process, and data reduction into formats designed for making decisions based on the project's original DQOs.

5.2.6 Sensitivity

Adequate sensitivities, in units of $dpm/100\text{ cm}^2$, were attained for all surveys/scans and alpha spectroscopy methods implemented based on minimum detectable activities (MDAs) at 50% of the transuranic $DCGL_W$ ($\leq 50\%$ $DCGL_{EMC}$ for scans). The nominal MDAs for each survey and alpha spectroscopy method are summarized as follows:

- Removable alpha contamination (Eberline SAC-4) 8.3 $dpm/100\text{ cm}^2$,
- Removable beta contamination (Eberline BC-4) 200 $dpm/100\text{ cm}^2$,
- Total alpha contamination (NE Electra) 49 $dpm/100\text{ cm}^2$,

- Total beta contamination (NE Electra) 351 dpm/100cm²,
- Alpha spectroscopy (OASIS) 12 – 30 dpm/100cm² (cumulative transuranics – Am-241 and Pu-239/240), offsite alpha spec (RC01) <5 dpm/100cm² per isotope

5.2.7 Other QA Elements

All personnel performing activities affecting quality within the RLC project were qualified to perform their specific tasks. Suitable training and qualification documentation for personnel performing the work, from the laborers to technical

professionals to management, is documented in the IWCP, applicable Human Resource files, or subcontract language.

5.3 DQA Summary

In summary, the data presented in this report have been verified and are valid without qualification for comparison with unrestricted release criteria (action levels) as stated in the DQOs. All media sampled, surveyed and scanned, relative to total and removable alpha activities, yielded results less than release limits associated with the stated contaminants of concern. Therefore, Building 575 meets the release criteria with the statistical and qualitative confidences stated in this section and throughout the report.

6.0 FACILITY CLASSIFICATION

Based on the analysis of radiological, chemical and physical hazards, Building 575 is classified as a Type I Facility (i.e., "free of contamination") pursuant to the RFETS Decommissioning Program Plan (DPP, K-H, 1999). Classification was based on a review of historical and process knowledge, and newly acquired RLC data. Results indicate that no radioactive or chemical contamination exists and that no significant physical hazards are present. The building contains no asbestos.

7.0 REFERENCES

ANSI-N323A-1997-N323a-1997, Radiation Protection Instrumentation Test and Calibration

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 1, "Quality Assurance "

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

K-H, 1997 "Kaiser-Hill Team Quality Assurance Program", Rev 5, 12/97

K-H, 1998 Facility Disposition Program Manual, MAN-076-FDPM, Revision 1, September 1999

K-H, 1999a Decontamination and Decommissioning Characterization Protocol, MAN-077-DDCP, Revision 1, June 19, 2000

K-H, 1999c Decommissioning Program Plan, June 21, 1999

K-H, 2000a Reconnaissance Level Characterization Package for Group B Trailers, Rev 0, IWCP Work Control No T0102834, February 2000

K-H, 2000b Characterization Package for Sampling and Analysis of Roofing Material from Groups B & C for Isotopic Analysis, March 16, 2000

MARSSIM – Multi-Agency Radiation Survey and Site Investigation, 12/97
(NUREG-1575, EPA 402-R-97-016)

RFETS Chronic Beryllium Disease Prevention Program, "List of Known Beryllium Areas" (Maintenance Work Package Planning Package, I-E33-IWCP-3, Revision 3) January 1998

RF/RMRS-97-044, Closeout Report for the Source Removal of Polychlorinated Biphenyls, RMRS, July 1997



**Rocky Flats Environmental Technology
Site**

**RECONNAISSANCE-LEVEL CHARACTERIZATION
REPORT (RLCR)**

BUILDING 575

REVISION 0

**APPENDICES
(A & B)**

Appendix A, B575

- A-1 B575 – Radiological Survey Data for Exterior Survey Unit
- Summary of Radiological Survey/Sample Results
 - Map of Locations

Scans
Surveys

- Removable and Total Survey Results – Detail
- Laboratory Alpha Spec (Sample) Results – Detail

- A-2 B575 – Radiological Survey Data for Interior Survey Unit
- Summary of Radiological Survey/Sample Results
 - Map of Locations

Scans
Surveys

- Removable and Total Survey Results - Detail

- A-3 B575 – Asbestos Inspector's Report

- A-4 Historical PCB Remediation in 575 Vicinity

B575 – Radiological Survey Data for Exterior Survey Unit

- Summary of Radiological Survey/Sample Results
- Map of Locations
 - Scans
 - Surveys
- Removable and Total Survey Results – Detail
- Laboratory Alpha Spec (Sample) Results – Detail

Radiological Survey/Sample Results for B575

Total Surface Activity Measurements dpm/100 cm²

	Alpha	Beta
	# Required	# Obtained
Interior	28	28
MIN	-9.8	-609.4
MAX	28.7	754.2
MEAN	7.7	-91.4
STD DEV	10.3	434.9
Exterior	28	28
MIN	6.8	-599
MAX	76.7	923
MEAN	39.7	100.3
STD DEV	17.0	384.3
DCGL _w	100	5000

Removable Activity Measurements dpm/100 cm²

	Alpha	Beta
	# Required	# Obtained
Interior	28	28
MIN	-1.5	-45.2
MAX	4.5	32.0
MEAN	0.9	-2.9
STD DEV	1.5	21.6
Exterior	28	28
MIN	-0.9	-10.8
MAX	4.2	54.8
MEAN	0.9	12.9
STD DEV	1.8	17.5
DCGL _w	20	1000

Media Sample Activity

# Required	# Obtained
2	2

<u>Contaminant</u>	<u>Y/N</u>	<u>Det Sens dpm/100 cm²</u>
U present	N	30
Pu present	N	30

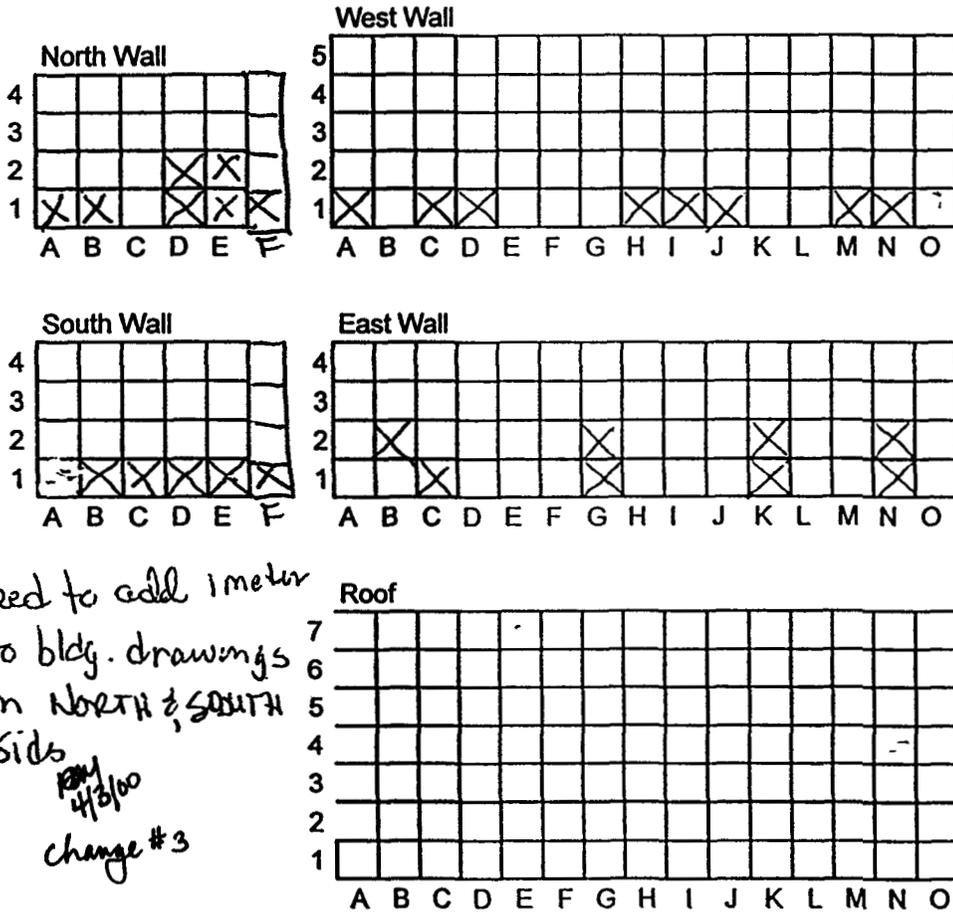
Total Po-210 Results dpm/100 cm²

MIN	45.7
MAX	49.1
MEAN	47.4
STD DEV	2.8

SCAN LOCATIONS:

Bldg. 575 - Exterior

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16



Need to add 1 meter
 to bldg. drawings
 on NORTH & SOUTH
 Sids
 4/3/00
 change #3

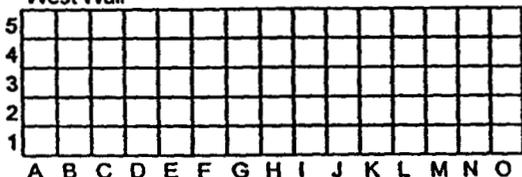
17 18 19 20 21 22 23 24 25 26 27 28 29 30

3/28/02
 32

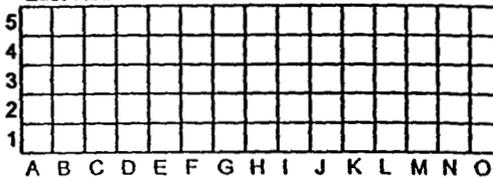
3-621

Bldg. 575 - Interior

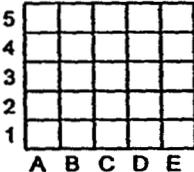
West Wall



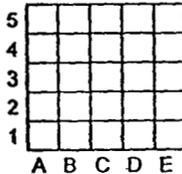
East Wall



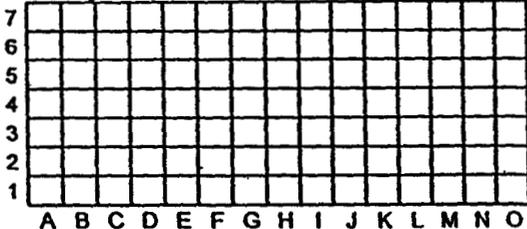
South Wall



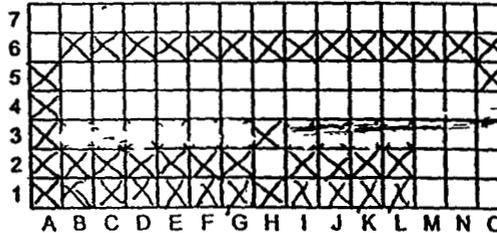
North Wall



Ceiling



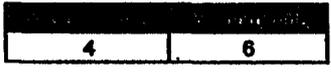
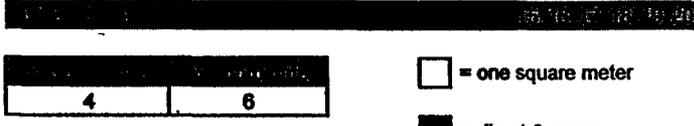
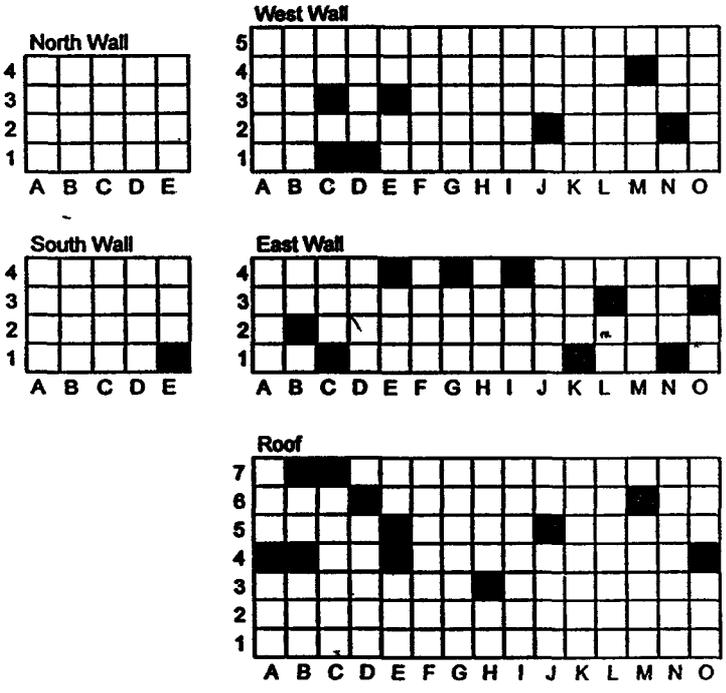
Floor



11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Scam locations were taken in high traffic pattern.

Bldg. 575 - Exterior



□ = one square meter
 ■ = direct & swipe

Total Surface Area = 280 m²
 10% Scan Surface Area = 28 m²

X' Y	X Y	X Y	X Y
10 6	20 13	14 6	X1 9 8
17 7	7 13	7 10	X2 19 14
19 9	15 12	10 13	X3 14 8
8 5	8 9	6 13	X4 9 13
9 11	8 10	10 12	X5 12 9
7 8	5 9	13 14	
12 6	18 11	9 5	
10 3	20 7	16 9	
19 4	18 2		
10 8 3	20 15 4		

X1 through X5 are extra random points for use in the field

Survey Area: NA	Survey Unit: Exterior	Building: 575
Survey Unit Description Roof		

Removable Contamination Data Sheet

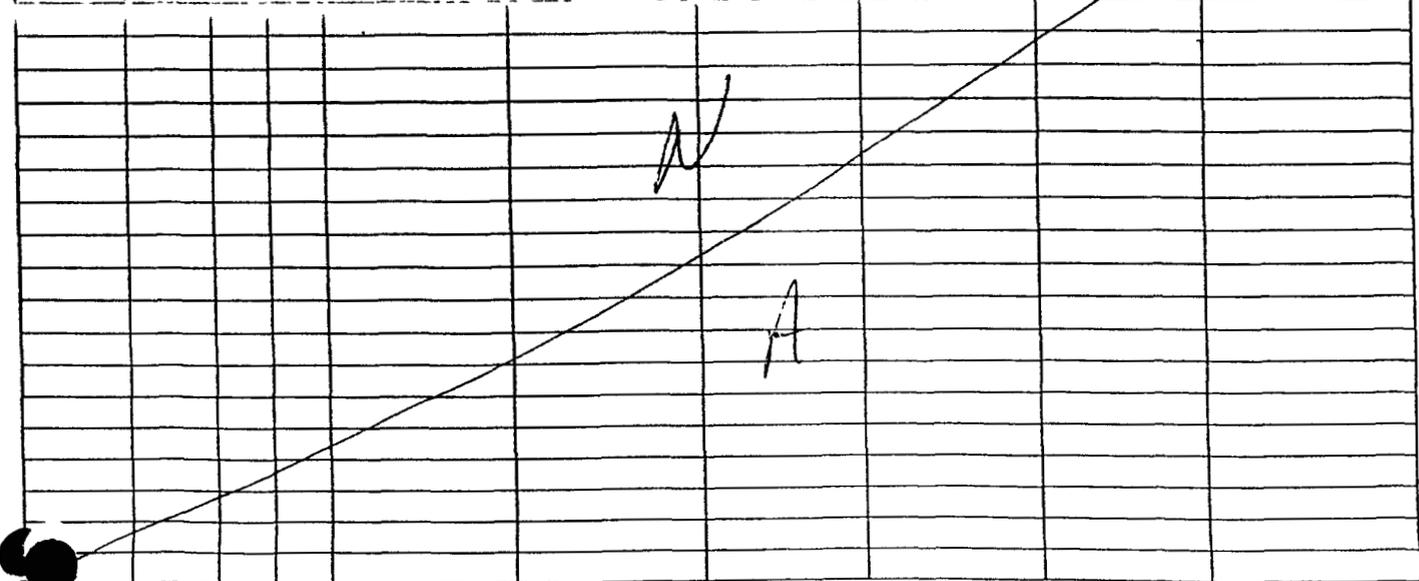
Sample Location	RCT ID #	Inst ID #		Gross Counts (gcpm)		Net Counts (cpm)		Removable Activity (dpm/100cm ²)	
		α	β	α	β	α	β	α	β
D-4R	6	3	4	0	36.5	-0.1	1.7	-0.3	6.8
M-6R	6	5	6	0.5	36.5	0.4	-1.5	1.2	6.04 8.7 ^{4.5}
C-5R	6	3	4	1.0	48.5	0.9	13.7	2.7	54.8
J-5R	6	5	6	1.0	58	0.9	0.0	2.7	0.0
H-5R	6	3	4	0.5	59.5	0.4	4.7	1.2	18.8
D-4R	6	5	6	1.5	41	1.4	3.0	4.2	12.0
C-7R	6	3	4	0.0	41.5	-0.1	6.7	-0.3	26.8
B-7R	6	5	6	1.5	46	1.4	8.0	4.2	32.0
B-4R	6	3	4	0.0	45	-0.1	10.2	-0.3	40.8
A-4R	6	5	6	0.0	40.5	-0.1	2.5	-0.3	10.0
E-4R	6	3	4	1.0	35.5	0.9	3.7	2.7	14.8

N
A

Survey Area: <u>NA</u>	Survey Unit: <u>EXTERIOR</u>	Building: <u>575</u>
Survey Unit Description: <u>WALLS</u>		

Removable Contamination Data Sheet

Sample Location	RCT ID #	Inst ID #		Gross Counts (gcpm)		Net Counts (cpm)		Removable Activity (dpm/100cm ²)	
		α	β	α	β	α	β	α	β
C-1W	5	1	2	0.5	425	0.2	18	0.6	72
C-3W	5	1	2	0.5	410	0.2	0.3	0.6	10.2 12
D-1W	5	1	2	0.5	395	0.2	-1.2	0.6	-4.8
E-3W	5	1	2	0.0	480	-0.3	73	-0.9	29.2
J-2W	5	1	2	0.0	475	-0.3	68	-0.9	27.5 27.2
M-4W	5	1	2	1.5	470	1.2	6.3	3.6	25.2
N-2W	5	1	2	1.5	405	1.2	-0.2	3.6	-0.8
E-1S	5	1	2	1.5	420	1.2	1.3	3.6	5.2
B-2E	5	1	2	0.0	58.0	-0.3	-2.7	-0.9	-10.8
C-1E	5	1	2	0.0	38.5	-0.3	-2.2	-0.9	-8.8
E-4E	5	1	2	0.0	40.5	-0.3	-0.2	-0.9	-0.8
L-4E	5	1	2	1.0	40.0	0.7	-0.7	2.1	-2.8
I-4E	5	1	2	0.5	39.5	0.2	-1.2	0.6	-4.8
1E	5	1	2	0.0	49.0	-0.3	8.3	-0.9	33.2
3E	5	1	2	0.0	39.5	-0.3	-1.2	-0.9	-4.8
1E	5	1	2	0.0	51.5	-0.3	10.8	-0.9	43.2
0-3E	5	1	2	0.0	42.0	-0.3	1.3	-0.9	5.2



Survey Area: NA	Survey Unit: EXTERIOR	Building 575
Survey Unit Description WALLS, ROOF		

Total Surface Activity Data Sheet

Sample location	RCT ID #	Inst ID #		Survey count time (sec)		LAB (cpm)		Gross Count (gcpm)		Net counts (cpm)		Net Activity (dpm/100cm ²)	
		α	β	α	β	α	β	α	β	α	β		
C-1W	2	8	8	90	90	4.7	587	11.3	715	6.6	128	32.3	431
C-3W	2	8	8	90	90	3.3	511	8.0	449	4.7	-62	23.0	-77-209
D-1W	2	8	8	90	90	4.0	587	12.7	750	8.7	163	42.5	549
E-3W	2	8	8	90	90	2.7	550	6.0	431	3.3	-119	16.1	-40.1
J-2W	2	8	8	90	90	3.3	450	10.0	521	6.7	71	32.7	239
M-4W	2	8	8	90	90	4.0	473	11.3	415	7.3	-58	35.7	-19.5
N-2W	2	8	8	90	90	2.7	457	12.7	449	10.0	-8	48.9	-2.7
E-1S	2	8	8	90	90	3.3	551	10.7	457	7.4	-94	36.2	-31.6
C-1E	2	8	8	90	90	2.7	479	5.3	411	2.6	-68	12.7	-22.9
B-2E	2	8	8	90	90	2.0	485	10.7	759	8.7	274	42.5	92.3
E-4E	2	8	8	90	90	1.3	530	5.3	424	4.0	-106	19.6	-35.7
G-4E	2	8	8	90	90	3.3	523	4.7	399	1.4	-124	6.8	-41.8
T-4E	2	8	8	90	90	1.3	514	9.3	403	8.0	-111	39.1	-37.4
-1E	2	8	8	90	90	3.3	505	12.7	732	9.4	227	45.9	76.4
-3E	2	8	8	90	90	0.7	478	6.7	401	6.0	-77	29.3	-25.9
N-1E	2	8	8	90	90	2.0	619	11.3	745	9.3	126	45.4	42.4
O-3E	2	8	8	90	90	2.7	571	18.0	393	15.3	-178	74.8	-59.9
A-4R	6	12	12	90	90	1.3	360	8.0	453	6.7	93	32.1	31.1
B-4R	6	12	12	90	90	1.3	386	12.7	424	11.4	38	54.7	12.7
B-7R	6	12	12	90	90	1.3	375	14.7	433	13.4	58	64.3	19.4
C-7R	6	12	12	90	90	4.0	362	13.3	441	9.3	79	44.6	26.4
D-6R	6	12	12	90	90	1.3	372	9.3	440	8.0	68	38.4	22.8
E-4R	6	12	12	90	90	1.3	368	15.3	435	14.0	67	67.1	22.4
E-5R	6	12	12	90	90	2.0	375	10.7	433	8.7	58	41.7	12.7
H-3R	6	12	12	90	90	1.3	367	17.3	410	16.0	43	76.7	14.4
J-5R	6	12	12	90	90	4.0	361	12.7	465	8.7	104	41.7	34.8
M-6R	6	12	12	90	90	1.3	362	8.7	490	7.4	128	35.5	42.8
O-4R	6	12	12	90	90	2.7	365	9.3	485	6.6	120	31.7	40.1
C-1WQC	8	10	10	90	90	5.3	866	26.7	802	21.4	-64	98.3	-20.8
K-2WQC	8	10	10	90	90	4.7	650	12	747	7.3	117	33.5	38.1
E-1SQC	8	10	10	90	90	6	533	4.7	601	-1.3	68	-6.0	22.1
K-1EQC	8	10	10	90	90	5.3	801	10.7	693	5.4	-108	24.8	-35.1
N-1EQC	8	10	10	90	90	6.7	585	6	716	-0.7	131	-3.2	42.6

Note: QC measurements are to be collected by a different technician than the original survey. Mark the QC location number in the "Sample Location" column. Material background is assumed to be zero unless otherwise noted. "LAB" ~ local area background.

Sample ID: 00A1148-037.001 **Type:** Unknown
Batch ID: unknowns
Acquisition Start: April 27, 2000 09:27:34
Analysis Date: May 01, 2000 06:34:12
Procedure: Po210 count
Device: Oasis:01:03
Analysis Method: ROI Analysis
Spectrum File: 00000511.OXS **LiveTime:** 28,800.00

Calibrations.

Energy = 6.596E+01 +2.779E+00 * Chn Coeff of Correlation: -0.998
 Calibration Date: April 24, 2000 13:03:27 Std 1:3 Energy Cal
 Shape not Calibrated.
 Efficiency = 3.120E-01 ± 4.098E-03
 Calibration Date: April 24, 2000 10:05:48 Std: TS4189

External Recovery No Ext.Recovery

Original Sample Amount:

1.000 ± 0.000 samp

Aliquot Amount:

1.000 ± 0.000 samp

ROI DATA

ROI ID #	ASSOCIATED NUCLIDE	EXTENTS		PK EN (keV)	FWHM (keV)
		START	END		
1	Po218	5550.0	6104.5	5827.5	2.8
2	Po214	6588.5	7874.7	7231.0	2.8
3	Po212	8393.8	8808.6	8601.2	4.2
4	Po210	2180.3	5343.3	5285.5	9.6

ROI ANALYSIS RESULTS

ROI ID	NET COUNTS	BKG/INTERF	CPM	ROI TYPE
Po218	7.3 ± 2.9	0.68	0.015 ± 6.06E-03	Unknown
Po214	6.3 ± 2.7	0.68	0.013 ± 5.69E-03	Unknown
Po212	7.6 ± 3.2	1.37	0.016 ± 6.57E-03	Unknown
Po210	354.9 ± 19.7	19.13	0.739 ± 0.041	Unknown

NUCLIDE ANALYSIS RESULTS

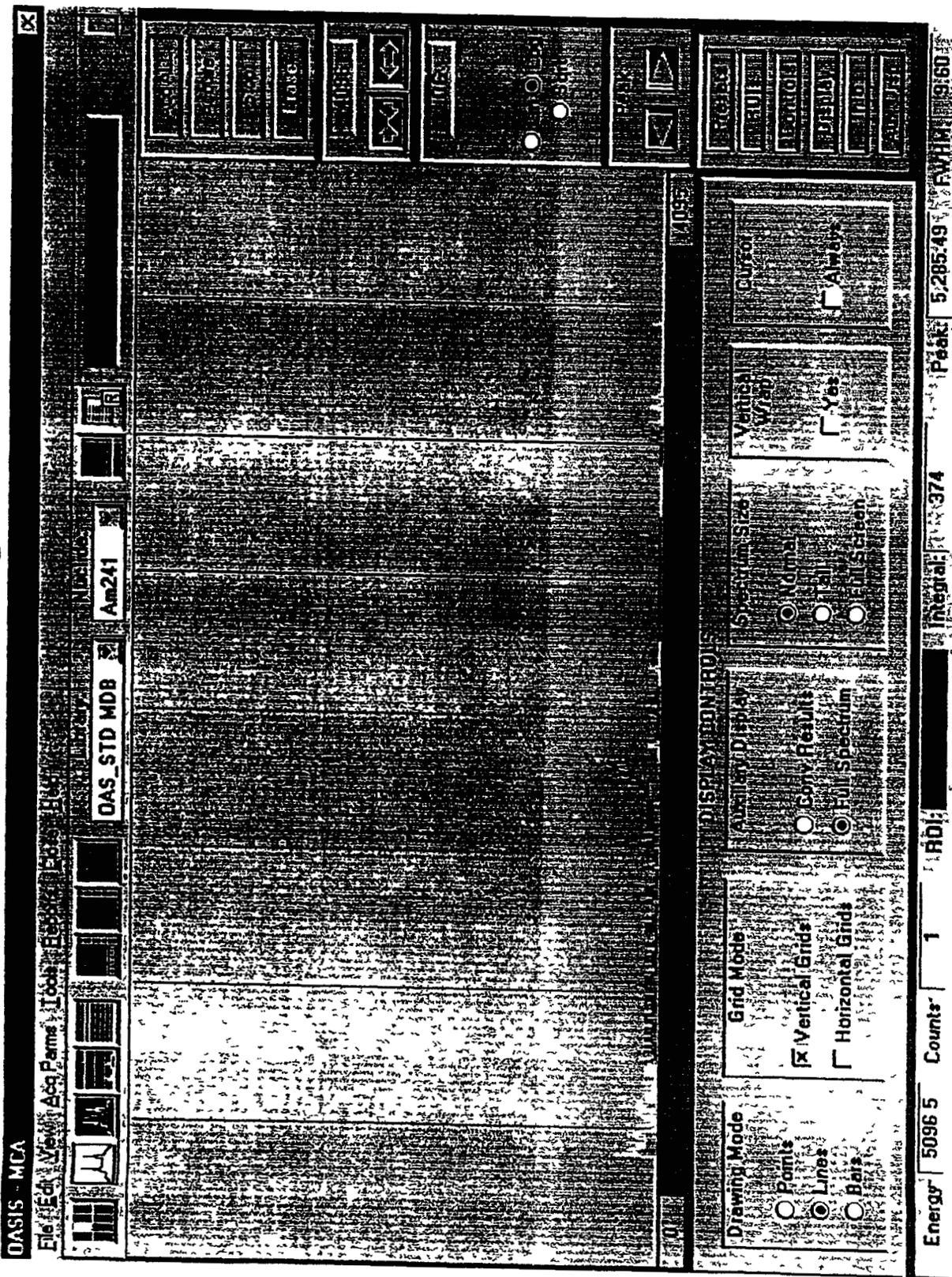
ROI ID	ASSOC NUC	EMM. PROB	ACTIVITY (dpm/samp)	MDA (dpm)
Po218	Po218	1.000	0.049 ± 0.019	4.16E-02
Po214	Po214	1.000	0.042 ± 0.018	4.16E-02
Po212	Po212	1.000	0.051 ± 0.021	5.14E-02
Po210	Po210	1.000	2.370 ± 0.135	1.43E-01

Activity reported as of April 27, 2000 09:27 34

ANALYSIS REVIEWED BY:

[Handwritten Signature]
[Handwritten Signature] 5/9/00

APPROVED BY



00A1148-037.001

Figure 30 Example Po-210 spectrum (log scale mode)

Oasis Device # 2

RFETS; Golden, CO

Apr 24, 2000 09:53.44

Sample ID: 00A1148-038.001 Type: Unknown
Batch ID: unknown
Acquisition Start: April 19, 2000 10:33:42
Analysis Date: April 24, 2000 09:53:38
Procedure: polonium210 samples
Device: Oasis:02:02
Analysis Method: ROI Analysis
Spectrum File: 00000288.OXS LiveTime: 72,000.00

Calibrations:

Energy = $1.436E+01 + 2.491E+00 * \text{Chn}$ Coeff. of Correlation -0.998
Calibration Date: April 04, 2000 15:25:18 Std: 2:2 energy calibration
Shape not Calibrated.
Efficiency = $3.436E-01 \pm 4.641E-03$
Calibration Date: April 05, 2000 09:05:57 Std AS 4188

External Recovery No Ext.Recovery

Original Sample Amount:

1.000 ± 0.000 samp

Aliquot Amount:

1.000 ± 0.000 samp

ROI DATA

ROI ID #	ASSOCIATED NUCLIDE	EXTENTS		PK EN (keV)	FWHM (keV)
1	Po218	5552.6	6077.8	5814.5	2.5
2	Po214	7420.0	7770.1	7593.4	2.5
3	Po212	8521.5	8850.6	8687.1	1.2
4	Po210	2263.7	5402.1	5273.8	7.9

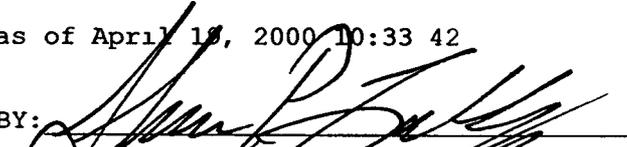
ROI ANALYSIS RESULTS

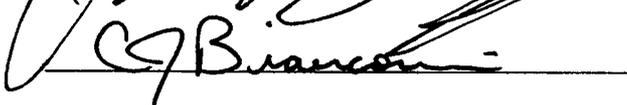
ROI ID	NET COUNTS	BKG/INTERF	CPM	ROI TYPE
Po218	6.0 ± 5.7	10.00	$5.00E-03 \pm 4.76E-03$	Unknown
Po214	-3.0 ± 3.2	5.00	$-2.50E-03 \pm 2.68E-03$	Unknown
Po212	0.0 ± 0.0	0.00	$0.00E+00 \pm 0.00E+00$	Unknown
Po210	774.0 ± 31.4	80.00	0.645 ± 0.026	Unknown

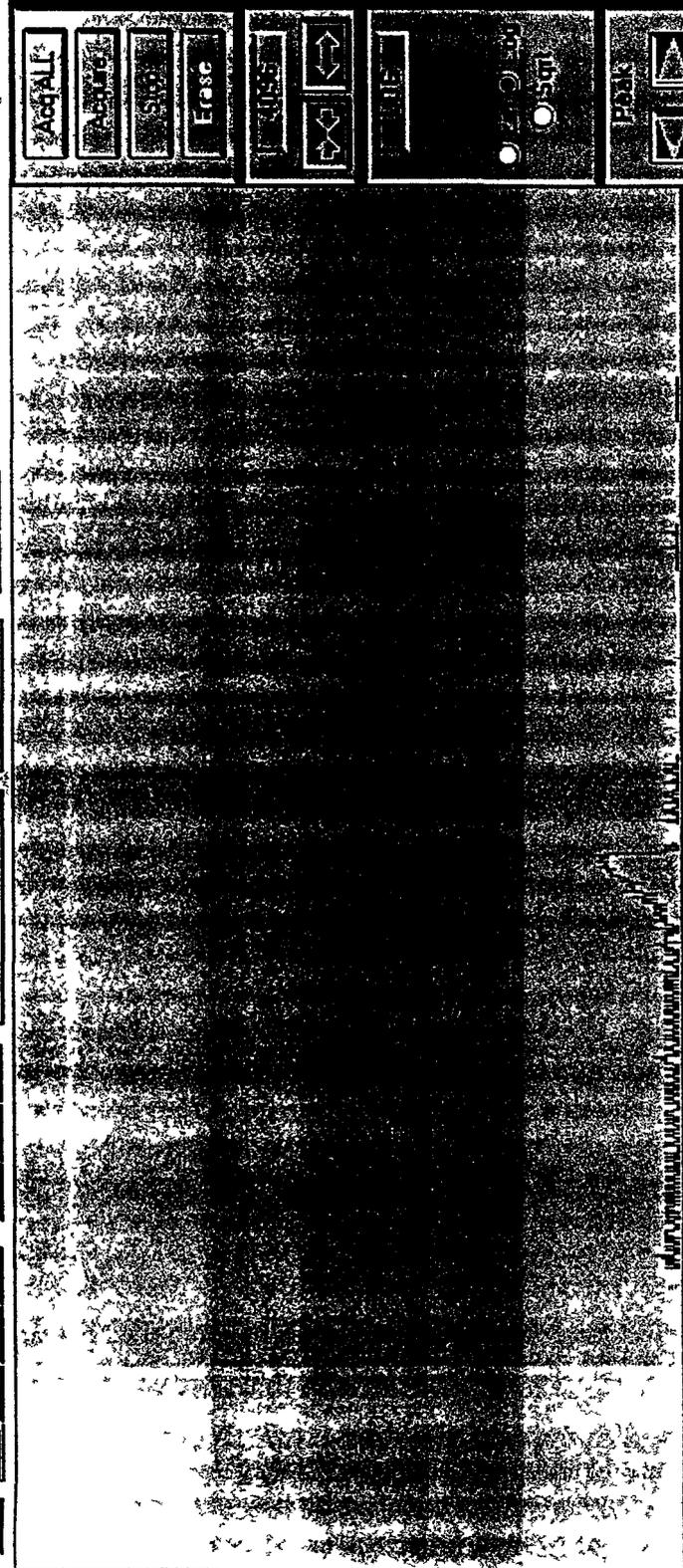
NUCLIDE ANALYSIS RESULTS

ROI ID	ASSOC NUC	EMM. PROB	ACTIVITY (dpm/samp)	MDA (dpm)
Po218	Po218	1.000	0.015 ± 0.014	4.78E-02
Po214	Po214	1.000	$-7.28E-03 \pm 7.80E-03$	3.57E-02
Po212	Po212	1.000	$0.00E+00 \pm 0.00E+00$	6.56E-03
Po210	Po210	1.000	1.877 ± 0.080	1.23E-01

Activity reported as of April 19, 2000 10:33 42

ANALYSIS REVIEWED BY: 

APPROVED BY: 



0

Spectrum ID

00A1148-038 001

System Date

10-May-2000 06:59:33

Channel: 1692

Elapsed Real Time: 72000.08

Elapsed Live Time: 72000.00

Decay Time: 0.0

Energy: 4231.1

Counts: 0

ROI: 854

Integral: 15273.93

Peak: 792

Oasis Device # 2

RFETS; Golden, CO

Apr 20, 2000 07:01:56

Sample ID: 00A1148-039.001 Type Unknown
Batch ID. unknown
Acquisition Start: April 19, 2000 10:33:43
Analysis Date: April 20, 2000 06:56:35
Procedure: polonium210 samples
Device: Oasis:02:03
Analysis Method: ROI Analysis
Spectrum File: 00000287.OXS LiveTime 72,000.00

Calibrations:

Energy = $1.604E+02 + 2.389E+00 * \text{Chn}$ Coeff. of Correlation -0.998
Calibration Date: April 04, 2000 15:34:53 Std 2 3 energy cal
Shape not Calibrated.
Efficiency = $3.357E-01 \pm 4.547E-03$
Calibration Date: April 05, 2000 09:20:34 Std AS 4188

External Recovery No Ext.Recovery

Original Sample Amount: 1.000 ± 0.000 samp
Aliquot Amount 1.000 ± 0.000 samp

ROI DATA

ROI ID #	ASSOCIATED NUCLIDE	EXTENTS START	EXTENTS END	PK EN (keV)	FWHM (keV)
1	Po218	5552.6	6077.8	5815.3	3.6
2	Po214	7420.0	7770.1	7595.1	2.4
3	Po212	8521.5	8850.6	8686.9	2.4
4	Po210	2263.7	5402.1	5175.0	4.5

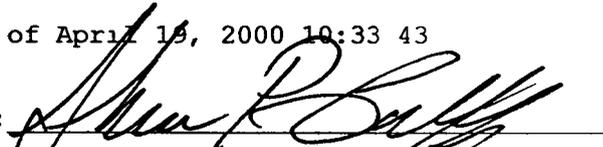
ROI ANALYSIS RESULTS

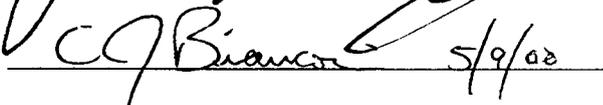
ROI ID	NET COUNTS	BKG/INTERF	CPM	ROI TYPE
Po218	7.0 ± 4.5	5.00	$5.83E-03 \pm 3.76E-03$	Unknown
Po214	1.7 ± 3.2	3.33	$1.39E-03 \pm 2.71E-03$	Unknown
Po212	0.7 ± 3.1	3.33	$5.56E-04 \pm 2.58E-03$	Unknown
Po210	889.3 ± 32.5	61.67	0.741 ± 0.027	Unknown

NUCLIDE ANALYSIS RESULTS

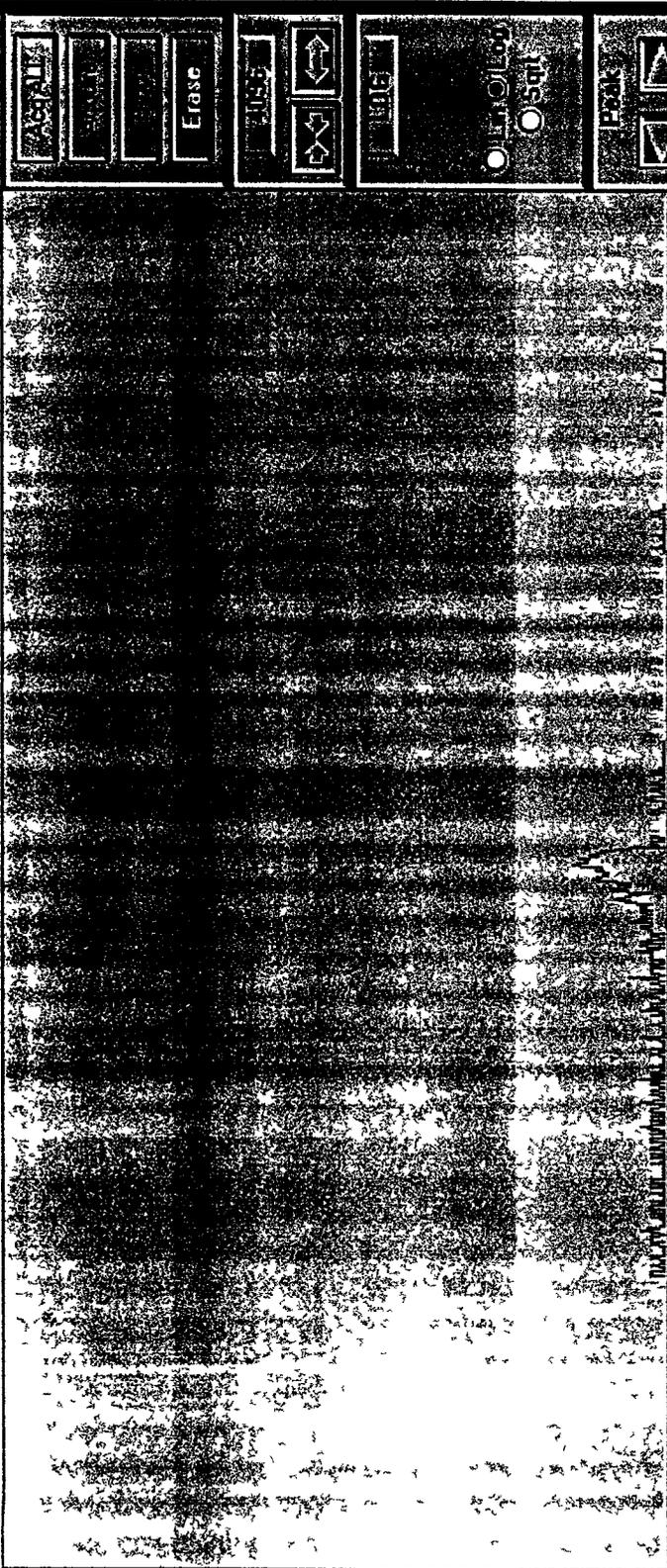
ROI ID	ASSOC NUC	EMM. PROB	ACTIVITY (dpm/samp)	MDA (dpm)
Po218	Po218	1.000	0.017 ± 0.011	$3.65E-02$
Po214	Po214	1.000	$4.14E-03 \pm 8.06E-03$	$3.11E-02$
Po212		1.000	$1.65E-03 \pm 7.67E-03$	$3.11E-02$
Po210	Po210	1.000	2.207 ± 0.086	$1.11E-01$

Activity reported as of April 19, 2000 10:33 43

ANALYSIS REVIEWED BY: 

APPROVED BY:  5/9/02

Library: OAS_STD.MDB Nuclide: Am241 5:Static: 00000287.DXS



0 4095

Spectrum ID: 00A1148-039 001

System Date: 10-May-2000 07:01:17

Channel: 1087

Elapsed Real Time: 72080.04

Elapsed Live Time: 72000 00

Dead Time: 0 0

Message Window

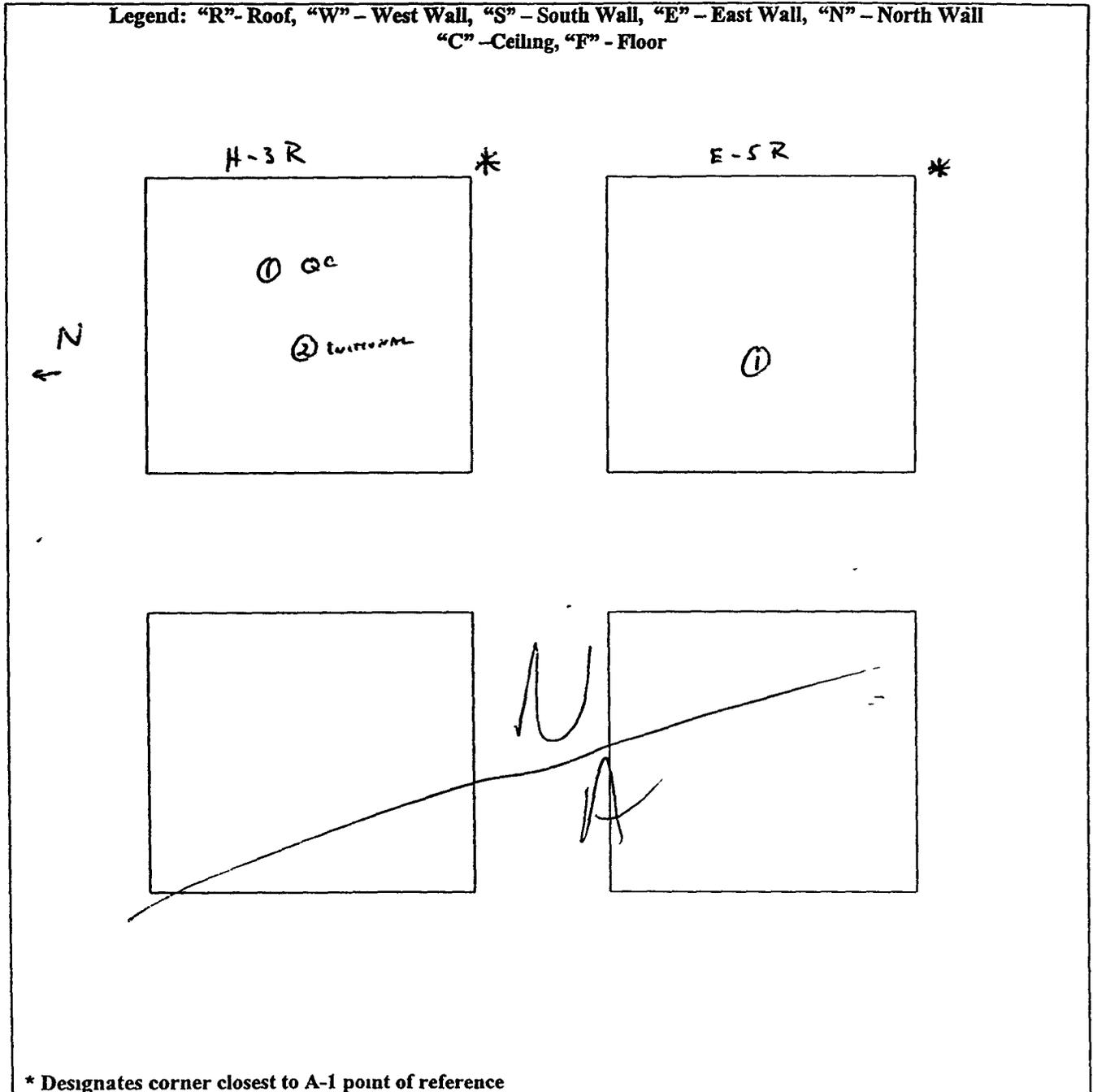
Energy: 2757 7 Counts: 0 ROI: Integral: 951 Peak: 5.175.02 FWHM: 4 51

Final Survey NE Electra Scan & Investigation Survey Map

Survey Area <i>NA</i>	Survey Unit <i>EXTERIOR</i>	Building <i>S75</i>
Survey Unit Description. <i>ROOF SAMPLE LOCATION</i>		
RCT Initials/Date <i>AM / 4.5.00</i>	RCT Initials/Date <i>AM</i>	RCT Initials/Date <i>AM</i>

Refer to the Final Survey NE Electra Scan & Investigation Survey Form for instrumentation, surveyor & approval information

Legend: "R"- Roof, "W" - West Wall, "S" - South Wall, "E" - East Wall, "N" - North Wall
"C" - Ceiling, "F" - Floor



* Designates corner closest to A-1 point of reference

Results/Comments

Electra alpha scans were performed at the locations detailed on the survey map(s) All required accessible areas were scanned All initial scan results were <225 dpm/100cm² unless noted on the survey form.

Electra beta scans were performed in required accessible areas Initial scan results indicated no detectable activity above background unless noted on the survey form

44

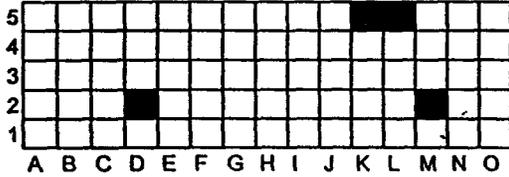
A-2

B575 – Radiological Survey Data for Interior Survey Unit

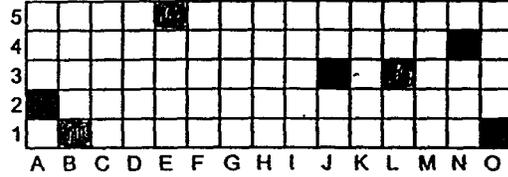
- **Map of Locations**
- **Removable and Total Survey Results - Detail**

Bldg. 575 - Interior

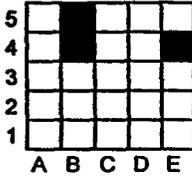
West Wall



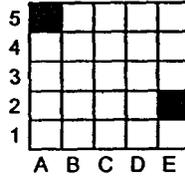
East Wall



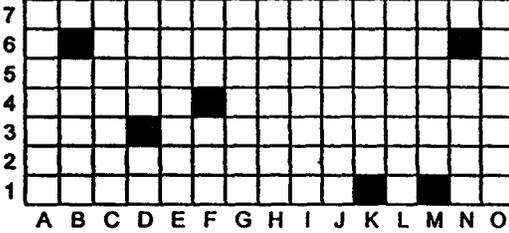
South Wall



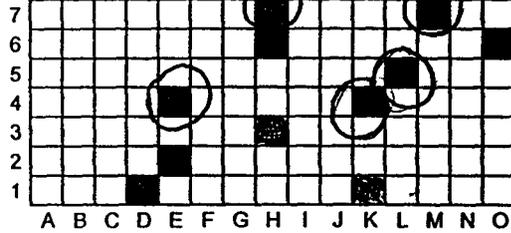
North Wall



Ceiling



Floor



Scan Extension	Coordinate
10	6

□ = one square meter

■ = direct & swipe

⊠ NOT USED

Total Surface Area = 410 m²

10% Scan Surface Area = 41 m²

X	Y	X	Y	X	Y	X	Y
16	4	6	14	28	41	20	1
19	17	4	4	25	3	26	17
29	2	20	9	27	43	27	3
14	12	13	17	23	12	17	5
2	6	12	1	23	41	23	15
13	4	2	7	20	16		
16	6	30	5	26	14		
30	12	11	17	5	7		
11	1	2	12				
4	15	20	20	14			

X1 through X5 are extra random points for use in the field

Note: X1 through X5 were added due to NECESSITY

Survey Area: NA | Survey Unit: INTERIOR | Building: 575
 Survey Unit Description
 WAUS, FLOORS, + Ceilings of B575

Total Surface Activity Data Sheet

Sample location	RCT ID #	Inst ID #		Survey count time (sec)		LAB (cpm)		Gross Count (gcpm)		Net counts (cpm)		Net Activity (dpm/100cm ²)	
		α	β	α	β	α	β	α	β	α	β	α	β
D-2W	2	8	8	90	90	4.7	585	6.7	454	2	-131	9.8	-441.1
K-5W	2	8	8	90	90	6.0	519	6.0	404	0	-115	0	-387.2
L-5W	2	8	8	90	90	4.0	563	4.0	409	0	-154	0	-518.5
M-2W	2	8	8	90	90	4.7	432	6.0	439	1.3	7	6.4	23.6
A-2E	2	8	8	90	90	0.7	539	4.0	436	3.3	-103	16.1	-346.8
B-1E	2	8	8	90	90	1.3	717	5.3	749	4	32	19.6	107.7
E-5E	2	8	8	90	90	6.7	516	4.7	371	-2	-145	-9.8	-488.2
J-3E	2	8	8	90	90	3.3	547	4.0	451	0.7	-96	3.4	-323.2
L-3E	2	8	8	90	90	2.0	538	4.7	451	2.7	-87	13.7	473.0
N-4E	2	8	8	90	90	6.0	493	6.0	411	0	-82	0	-276.1
O-1E	2	8	8	90	90	2.0	681	6.7	757	4.7	76	2.3	255.9
B-4S	2	8	8	90	90	6.0	475	6.0	417	0	-58	0	-195.3
B-5S	2	8	8	90	90	7.3	479	7.3	416	0	-63	0	-212.1
E-4S	2	8	8	90	90	4.7	508	4.7	365	0	-143	0	-481.5
A-5W	2	8	8	90	90	4.0	534	8.7	405	4.7	-129	2.3	473.3
E-2W	2	8	8	90	90	4.0	416	6.7	471	2.7	5	13.2	16.8
B-6C	2	8	8	90	90	4.0	655	2.0	516	-2	-139	-9.8	-468.0
D-3C	2	8	8	90	90	3.3	646	3.3	465	0	-181	0	-609.4
E-4C	2	8	8	90	90	1.3	662	3.3	481	2	-181	9.8	-609.4
K-1C	2	8	8	90	90	2.0	557	4.0	467	2	-90	9.8	-303.0
M-1C	2	8	8	90	90	2.7	503	3.3	472	0.6	-31	2.9	-104.4
N-6C	2	8	8	90	90	2.7	559	4.0	494	1.3	-65	6.4	-218.9
D-1F	3	9	9	90	90	5.3	643	3.3	857	-2	214	-9.6	716.0
E-2F	2	8	8	90	90	0.7	633	5.3	857	4.6	224	22.5	754.2
H-6F	2	8	8	90	90	2.0	633	4.7	777	2.7	144	13.2	484.8
K-1F	2	8	8	90	90	2.0	666	4.0	865	2	199	9.8	670.0
H-3F	2	8	8	90	90	2.0	633	4.7	777	2.7	144	13.2	484.8
O-6F	1	7	7	90	90	3.3	619	9.3	802	6	183	28.7	638.1
__QC				90	90								
__QC				90	90								
__QC				90	90								
__QC				90	90								
__QC				90	90								

Note: QC measurements are to be collected by a different technician than the original survey. Mark the QC location number in the "Sample Location" column. Material background is assumed to be zero unless otherwise noted. "LAB" - local area background.

50

A-3

Building 575

ASBESTOS INSPECTOR'S REPORT

ASBESTOS INSPECTION REPORT/VERIFICATION REPORT

I, the undersigned Certified Asbestos Inspector, certification # 1387
in the state of Colorado, attest to the asbestos inspection and/or sampling results as
described below, for the following RFETS facilities

Building 575 _____

GENERAL FACILITY LOCATION(S)

Building 575 is due west of building 566, due east of building 374

INSPECTION RESULTS

Building 575 did not contain any suspect friable asbestos containing
materials and no samples were collected

SAMPLE RESULTS

None required, none taken

Andre Gonzalez
INSPECTOR'S NAME


SIGNATURE

6/28/00
DATE

A-4

Historical PCB Remediation in 575 Vicinity



Closeout Report for The Source Removal of Polychlorinated Biphenyls

RP/RMRS-97-044
Rev. 0



July 1997

by-site basis. The table also includes results from the Draft Method 4020 immunoassay field screening analysis, confirmational splits, and Method 8080 analysis of clean fill material obtained off-site. Excavations were backfilled with PCB-free structural material (<1 ppm PCBs by weight) obtained from an off-site source and the sites were reclaimed to, at a minimum, their original condition.

3.1 Brief Description of Remediation Activities by Each Site

PCB-10 (555/558 Substation)

Approximately 4.3 yd³ of soil were removed from the northwest corner of the 555/558 substation using shovels during the first week of September 1995. The PCB-10 site was confirmed at <10 ppm PCBs by weight in soil using EPA Method 8080. The confirmation of remediation of soils at this site provide the basis for NFA status.

PCB-12/13 (661/675 Substation)

Approximately 46.7 yd³ of soil were removed from around the substation using hand shovels during the second and third week of February 1996. The PCB-12 & 13 sites were confirmed at <10 ppm PCBs by weight in soil using EPA Method 8080. The confirmation of remediation of soils at this site provide the basis for NFA status.

PCB-17 (Southeast Corner of Building 883)

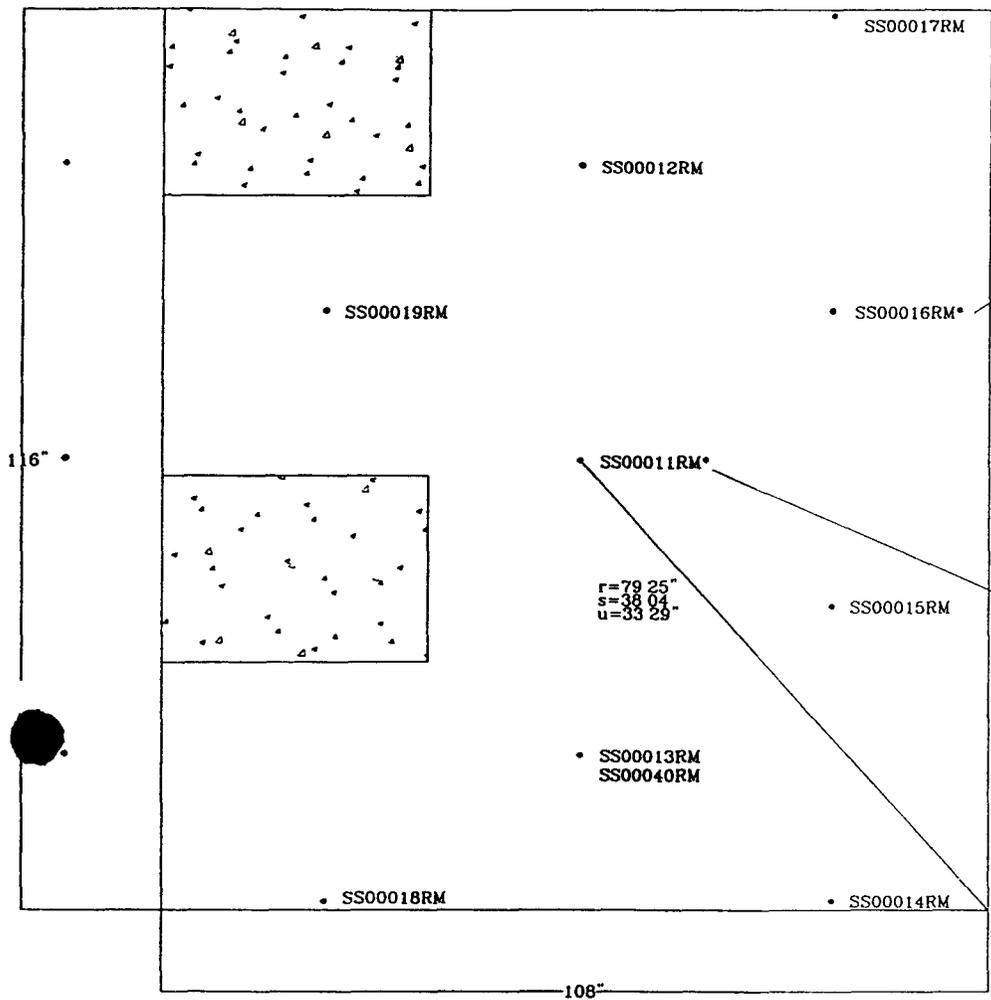
Approximately 22.1 yd³ of soil, 2 yd³ of asphalt and 8.5 yd³ of concrete were removed from the southeast corner of Building 883 using backhoes, front-end loaders, a hydrohammer, and shovels during the second week of September 1995. The PCB-17 site was confirmed at <10 ppm PCBs by weight in soil using EPA Method 8080. The confirmation of remediation of soils at this site provide the basis for NFA status.

PCB-20 (515/516 Substation)

Approximately 5.8 yd³ of soil were removed from the south side of the 515/516 Substation using a backhoe, a bobcat and hand shovels in late August 1995. The contaminated soil was located immediately east of the 516 transformer. The PCB-20 site was confirmed at <10 ppm PCBs by weight in soil using EPA Method 8080. The confirmation of remediation of soils at this site provide the basis for NFA status.

PCB-21 (Northwest Corner of Building 776)

Approximately 177 yd³ of soil and 10.7 yd³ of concrete were removed from the northwest corner of Building 776 with backhoes, front-end loaders, excavators, a hydrohammer, and hand shovels.



Aroclor 1016 U
 Aroclor 1221 U
 Aroclor 1232 U
 Aroclor 1242 U
 Aroclor 1248 U
 Aroclor 1254 U
 Aroclor 1260 0 14 ppm

Aroclor 1016 U
 Aroclor 1221 U
 Aroclor 1232 U
 Aroclor 1242 U
 Aroclor 1248 U
 Aroclor 1254 U
 Aroclor 1260 0 93 ppm

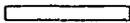
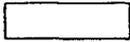
Note.
 All samples are <10ppm PCBs by immunoassay analysis

LEGEND

- Sample Point
- Split Sample
- U Not detected
- SS RM are RFEDS sample numbers

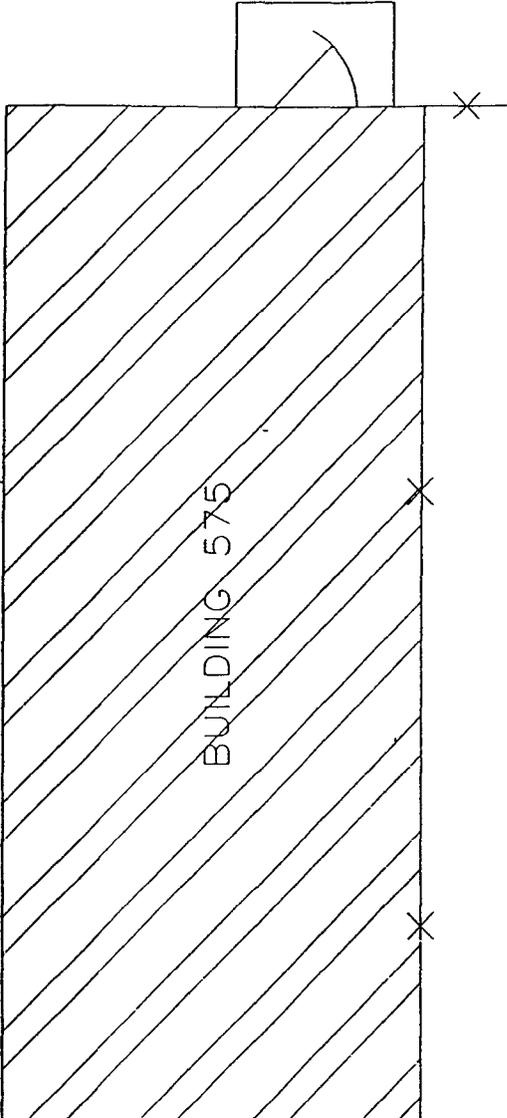
R/V NO A	DATE 3/11/96	FILENAME 515MRI
MRI GRID LAYOUT PCB-20 (515/516 Substation)		
DRWN	CHKD	CHARGE NO

LEGEND

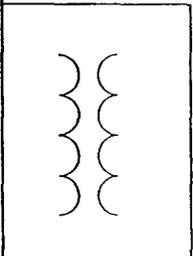
-  BERM
-  CONCRETE SLAB
- OR  SUPPORT BRACE FOR OVERHEAD
-  ACTIVE TRANSFORMER

UTILITY COVER

SCARIFIED



BUILDING 575



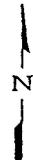
Soil Removed



PCB Site #20

UTILITY LAMP POLE

4 DIA WOODEN COVER GRAVEL WITH SOME VEGETATION - NO APPARENT STAINING



REVISION NO A	DATE 3/12/96	ACAD FILE 515PCB2032
SOIL REMOVED FROM PCB SITE #20		
DE D RMH	CLIENT RFETS	PROJECT NO 98806300
CHK D	LOCATION	FIGURE NO

Appendix B, General Survey and Sampling Documentation

- Chain-of-Custody (for all samples)
(note the three samples for Building 575 – 037, 038, and 039 – are erroneously listed as Location TB595 on the Chain-of-Custody, specifically C O C # 00A1148#003)
- MARSSIM Pre-Survey Calculations for Survey Frequency
- MARSSIM Post-Survey Calculation for Survey Frequency (typical)
- Verification of OASIS Results – Offsite (GEL) Alpha Spectroscopy Results

RMRS

REFETS

CHAIN OF CUSTOMER SAMPLE ANALYSIS REQUEST

COC # **1148#001**
 Telephone No **8165 / 4605** MSIN **NA** Page **1** of **2**
 Purchase Order/Charge Code **NG2200C1** FAX
 Ice Chest No **NA** Temp **NA**

Contact/Requester **SZYDLOWSKI TOM / NICK DEMOS**
 Sampling Origin **R&C Facilities**
 Logbook No **NA**
 Method of Shipment **Hand Carry**
 Related COC (if any) **NA**

SCREENING REQUIRED

SPECIAL INSTRUCTIONS **(TRAILERS AROUND THE PLANTSITE) (METAL DISKS)**

Hold Time **PRE** Total Activity Exemption Yes No

POSSIBLE SAMPLE HAZARDS/REMARKS
 Are acid preserved samples DOT hazardous per 40 CFR Part 136.3 Table II? YES or NO
 Are other known hazardous substances present? YES or NO
 ** ** *

Customer Number	Matrix	Date	Time	Location	Container (size/type/quantity)	Sample Analysis	Preservative Packing
00A1148-003 001	SOLID	3/28/00	0820	T881A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-006 001	SOLID	3/22/00	1447	T881B	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-009 001	SOLID	3/28/00	0850	T883A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-012 001	SOLID	3/28/00	0908	T883B	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-015 001	SOLID	3/28/00	0932	T883C	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-018 001	SOLID	3/27/00	1415	T439D	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-021 001	SOLID	3/28/00	1243	T771D	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None

Relinquished By	Date/Time	Received By	Date/Time
<i>[Signature]</i>	4/4/00 1445	<i>[Signature]</i>	4/25/00 0815
<i>[Signature]</i>	4/25/00 1324	<i>[Signature]</i>	4/27/00 0815
<i>[Signature]</i>	4-25-00	<i>[Signature]</i>	
<i>[Signature]</i>		<i>[Signature]</i>	

FINAL SAMPLE DISPOSITION

Disposal Method (e.g. returned to customer, disposed of per lab procedure used in analytical process)

Received By *[Signature]* Date/Time **APR 4 2000**

RMRS

RFETS

CHAIN OF CUSTODY SAMPLE ANALYSIS REQUEST

COC #

1148#003

Page 1 of 4

Sampler(s) **RFETS** Contact/Requester **SZYDLOWSKI TOM** Telephone No **8165** MSIN **FAX**

RIN **00A1148** Sampling Origin **Logbook No.** Purchase Order/Charge Code **NG2200C1** Temp

Project Title **771 DM 4-12-00** Method of Shipment **PRE** Bull of Lading/Air Bill No

To (Lab) **Building 555 Laboratory** Related COC (if any)

Protocol

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption Yes No

SCREENING REQUIRED

POSSIBLE SAMPLE HAZARDS/REMARKS
 Are acid preserved samples DOT hazardous per 40 CFR Part 136 3 Table II? YES or NO
 Are other known hazardous substances present? YES or NO

**** ** ***

Container (size/type/quantity)	Sample Analysis	Preservative, Packing
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None

Relinquished By	Date/Time	Received By	Date/Time
<i>[Signature]</i>	4/13/00 1516	<i>[Signature]</i>	4/13/00 1516
<i>[Signature]</i>	5/11/00 1510	<i>[Signature]</i>	5/11/00 1510
<i>[Signature]</i>		<i>[Signature]</i>	
<i>[Signature]</i>		<i>[Signature]</i>	

Disposal Method (e.g. returned to customer, disposed of per lab procedure, used in analytical process)

Disposed By

62

CHAIN OF CUSTOMER SAMPLE ANALYSIS REQUEST

COC # **1148#003**
 Page **2** of **4**

RIN		Contact/Requestor		Telephone No		MSIN		FAX	
00A1148		SZYDLOWSKI, TOM		8165					
Bottle No	Customer Number	Matrix	Date	Time	Location	Container (size/type/quantity)	Sample Analysis	Preservative Packing	
00A1148-011 001	F-20R	SOLID	3/28/00	0905	T883B	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-013 001	H-11R	SOLID	3/28/00	0942	T883C	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-014 001	A-7R	SOLID	3/28/00	0930	T883C	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-016 001	F-7R	SOLID	3/27/00	1423	T439D	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-017 001	S-1R	SOLID	3/27/00	1400	T439D	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-019 001	O-1R	SOLID	3/28/00	1248	T771D	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-020 001	A-2R	SOLID	3/28/00	1240	T771D	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-022 001	H-1R	SOLID	3/28/00	1430	T331	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-023 001	C-1R	SOLID	3/28/00	1420	T331	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-025 001	H-2R	SOLID	3/29/00	1415	T750E	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
00A1148-026 001	E-3R	SOLID	3/28/00	1405	T750E	1-SAMPLE / P/G /1	PA04A017 (Alpha Spec Qualitative) [Routine]	None	
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time
<i>[Signature]</i>	4/13/00 1170	<i>[Signature]</i>	4/13/00 15:10	<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time
<i>[Signature]</i>	5/11/00 15:00	<i>[Signature]</i>	5/11/00 15:00	<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
FINAL SAMPLE DISPOSITION		Disposal Method (e.g. returned to customer, disposed of per lab procedure, used in analytical process)							
		Disposed By							
		Date/Time							

RMRS

CHAIN OF CUSTODY SAMPLE ANALYSIS REQUEST

COC # 148#003

Page 3 of 4

IRIN		Customer Number		Matrix		Date		Time		Location		Container (size/type/quantity)		Sample Analysis		Preservative, Packing	
00A1148		SZYDLOWSKI, TOM										1-SAMPLE / P/G / 1		PA04A017 (Alpha Spec Qualitative) [Routine]		None	
00A1148-027 001	E-3R/QC	SOLID	3/22/00	1410	T750E	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-028 001	L-1N	SOLID	3/29/00	1315	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-029 001	N-2N	SOLID	3/28/00	1310	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-030 001	N-2N/QC	SOLID	3/29/00	1311	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-031 001	O 1R	SOLID	3/29/00	1325	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-032 001	G-3R	SOLID	3/22/00	1319	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-033 001	G 3R/QC	SOLID	3/29/00	1321	T903A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-034 001	A 16R	SOLID	3/29/00	1510	T331A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-035 001	C 13R	SOLID	3/29/00	1500	T331A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-036 001	C-13R/QC	SOLID	3/29/00	1503	T331A	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
00A1148-037 001	H-3R	SOLID	4/5/00	1205	TB595	1-SAMPLE / P/G / 1	PA04A017 (Alpha Spec Qualitative) [Routine]	None									
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Disposed By	Date/Time								
<i>[Signature]</i>	4/300/1510	<i>[Signature]</i>	4/17/00 1510	<i>[Signature]</i>	4/17/00 1510	<i>[Signature]</i>	4/17/00 1510	<i>[Signature]</i>	4/17/00 1510								
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Disposed By	Date/Time								
<i>[Signature]</i>	5/1/00 1510	<i>[Signature]</i>	5/1/00 1510	<i>[Signature]</i>	5/1/00 1510	<i>[Signature]</i>	5/1/00 1510	<i>[Signature]</i>	5/1/00 1510								
Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time	Disposed By	Date/Time								
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>									

64
CLAN IN 2-7-00

CO.C.# 00A1148#002

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RMRS
 Sample(s) *DEPOS / UEBIL*
 RUN 00A1148
 Project Title *BKC CALIBRATION*
 To (Lab) General Engineering
 Protocol

Telephone No. / #05
 MSIN FAX
 Purchase Order/Charge Code
 NZ220K1
 Ice Chest No. *N/A*
 Temp. *N/A*
 Bill of Lading/Air Bill No.
 P/B 00515-00831-001

Contract/Receptor
 SZYLOWSKI/TDM / *Mike Dumas*
 Samples Orig. *BKC FACILITIES*
 Labbook No.
 Method of Shipment
 Requested COC (if any) *COA IN 8 #001*

SCREENING
 REQUIRED

POSSIBLE SAMPLE HAZARDS/REMARKS
 Are acid preserved samples DOT hazardous per 40 CFR Part 136.3 Table III YES or NO
 Are other known hazardous substances present? YES or NO

Box No.	Customer Number	Matrix	Mass	Date	Time	Location	Container (Identification)	Sample Analyte	Preservative / Packaging
00A1148-015.002	A-7RQC	SOLID	5/28/00	0932	T883C	T771D	1-SAMPLE / P	TR01A187 (Po-210, Pu, Am, U) [21dS]	None
00A1148-018.002	O-1R	SOLID	3/28/00	1248	T771D	T771D	1-SAMPLE / P	TR01A187 (Po-210, Pu, Am, U) [21dS]	None
00A1148-081.002	O-1R	SOLID	3/28/00	1325	T808A	T808A	1-SAMPLE / P	TR01A187 (Po-210, Pu, Am, U) [21dS]	None
00A1148-034.002	A-18R	SOLID	3/28/00	1510	T881A	T881A	1-SAMPLE / P	TR01A187 (Po-210, Pu, Am, U) [21dS]	None

257981

Relinquished By	Date/Time						
<i>[Signature]</i>	5/15/00 1520	<i>[Signature]</i>	5-15-00 1320	<i>[Signature]</i>	5-15-00 1500	<i>[Signature]</i>	5-15-00 1500
<i>[Signature]</i>	5/15/00 1520						
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	
<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>		<i>[Signature]</i>	

FINAL SAMPLE DISPOSITION
 Disposal Method (e.g., returned to customer, disposed of per lab procedure, used in analytical process)
 Disposed By

66

Telephone No: 8165 MSIN: _____
 Purchase Order/Charge Code: NG2200C1
 Ice Chest No: CAS 122199 Temp: _____
 Bill of Lading/Air Bill No: _____
 Protocol: PRE

SPECIAL INSTRUCTIONS: _____ Hold Time: _____ Total Activity Exemption: Yes No
 SCREENING REQUIRED:

Bottle No	Customer Number	Matrix	Date	Time	Location	Container (size/type/quantity)	Sample Analysis	Preservative, Packing
00A1148-040 001	D2R1	SOLID	6/1/00		B331A	1-SAMPLE / P/G 1/1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-041 001	D2RQC	SOLID	6/1/00		B331A	1-SAMPLE / P/G 1/1	PA04A017 (Alpha Spec Qualitative) [Routine]	None
00A1148-042 001	N/A	SOLID	N/A	N/A	N/A	1-SAMPLE / P/G 1/1	PA04A017 (Alpha Spec Qualitative) [Routine]	None

Relinquished By	Date/Time	Received By	Date/Time	Relinquished By	Date/Time	Received By	Date/Time
<i>[Signature]</i>	6/1/00 1245	<i>[Signature]</i>	6/1/00 1245				
<i>[Signature]</i>	6/5/00 1356	<i>[Signature]</i>	6/5/00 1358				
<i>[Signature]</i>	6/5/00 1411	<i>[Signature]</i>	6/5/00 1411				

POSSIBLE SAMPLE HAZARDS/REMARKS: Are acid preserved samples DOT hazardous per 40 CFR Part 136.3 Table II? YES or NO
 Are other known hazardous substances present? YES or NO
 *** **

Disposal Method (e.g., returned to customer, disposed of per lab procedure, used in analytical process) _____
 Disposed By: _____ Date/Time: _____

Survey Area: G

Building 779

Survey Unit (s): 77939 through 77948

Total Surface Activity Measurement Calculation Worksheet

Step 1 Determine the relative shift (Δ/δ) in accordance with MARSSIM, Section 5 5 2 3, as follows

$$\Delta/\delta = (DCGL_{TSA} - LBGR_{TSA}) / SD_{TSA}$$

$$\Delta/\delta_{transuranics} = 2.0 = (100 \text{ dpm}/100\text{cm}^2 - 40 \text{ dpm}/100\text{cm}^2) / 30 \text{ dpm}/100\text{cm}^2$$

Where

Δ/δ is the relative shift or the resolution of measurements in units of measurement uncertainty (MARSSIM recommends a value between 1 and 3)

DCGL_{TSA} is the total surface activity derived concentration guideline value (DOE Order 5400.5 total surface activity limit equals 100 dpm/100cm² for transuranics, per the B779 Cluster Radiological Closeout Survey Plan)

LBGR_{TSA} is the lower bound of the gray region – the lower bound of the range of values of the parameter of interest in a survey unit where the consequences of making a decision error is relatively minor. The LBGR_{TSA} was adjusted to obtain a relative shift between 1 and 3 (i.e., 40 dpm/100cm² for transuranics)

SD_{TSA} is the estimated standard deviation of the total surface activity measurements (MARSSIM recommends assuming a 30% coefficient of variation if scoping or characterization data is not available)

Step 2 Determine the Sign P value by looking up the relative shift (Δ/δ) in Table 5 4 of MARSSIM (the Sign P value is the estimated probability that a random measurement from the survey unit will be less than the DCGL when the survey unit median is actually at the LBGR). The Sign P value from Table 5 4, equals 0.977250 for a relative shift of 2.0

Step 3 Determine the number of total surface activity measurements for the applicable survey unit using the following MARSSIM, Section 5 5 2 3 formula that is based on Plutonium contaminants not being present in the background

$$N = (1.645 + 1.645)^2 / 4(\text{Sign P} - 0.5)^2$$

$$N = (1.645 + 1.645)^2 / 4(0.977250 - 0.5)^2 = 11.88$$

Where

1.645 is the alpha and beta decision error value (95% confidence) per the B779 Cluster Radiological Closeout Survey Plan

Sign P equals 0.977250

Step 4 Increase N by 20% to allow for missing or invalid data points per MARSSIM, Section 5 5 2 3

$$N = 11.88 * 1.2 = 14.25$$

Conclusion A minimum of 15 Total Surface Activity measurements will be obtained in each of the above survey unit(s)

Prepared By Printed Name	Employee #	Radiological Engineer Signature	Date
Reviewed By Printed Name	Employee #	Radiological Engineer Signature	Date

68

Removable Activity
(dpm/100 cm²) Alpha

Survey Area - N/A
 Survey Unit - Exterior
 Building - 575
 Survey Unit Description - Walls and roof of Building 575
 Removable Contamination Data Sheet
 DCG_{LW} 20 dpm/100 cm²
 n 28
 Mean 0.9 dpm/100 cm²
 Std Dev 1.8 dpm/100 cm²

No measurement exceeds the DCG_{LW}

0.6
 0.6
 0.6
 -0.9
 -0.9
 3.6
 3.6
 3.6
 -0.9
 -0.9
 -0.9
 2.1
 0.6
 -0.9
 -0.9
 -0.9
 -0.9
 -0.3
 1.2
 2.7
 2.7
 1.2
 4.2
 -0.3
 4.2
 -0.3
 -0.3
 2.7

**Removable Activity
(dpm/100 cm²) Beta**

7 2
 1 2
 -4 8
 29 2
 27 2
 25 2
 -0 8
 5 2
 -10 8
 -8 8
 -0 8
 -2 8
 -4 8
 33 2
 -4 8
 43 2
 5 2
 6 8
 6 0
 54 8
 0 0
 18 8
 12 0
 26 8
 32 0
 40 8
 10 0
 14 8

Survey Area - N/A
 Survey Unit - Exterior
 Building - 575
 Survey Unit Description - Walls and roof of Building 575
 Removable Contamination Data Sheet
 DCGL_w 1000 dpm/100 cm²
 n 28
 Mean 12.9 dpm/100 cm²
 Std Dev 17.5 dpm/100 cm²

No measurement exceeds the DCGL_w

110/207

**Total Surface Activity
(dpm/100 cm²) Alpha**

32.3
23.0
42.5
16.1
32.7
35.7
48.9
36.2
12.7
42.5
19.6
6.8
39.1
45.9
29.3
45.5
74.8
32.1
54.7
64.3
44.6
38.4
67.1
41.7
76.7
41.7
35.5
31.7

Survey Area - N/A
Survey Unit - Exterior
Building - 575
Survey Unit Description - Walls and roof of Building 575

Total Surface Activity Data Sheet

DCGL_w 100 dpm/100 cm²

n 28

Mean 39.7 dpm/100 cm²

Std Dev 17.0 dpm/100 cm²

No measurement exceeds the DCGL_w

One measurement exceeds 75% of the DCGL_w

Precision

Location	C ₁	C ₂	C ₁ -C ₂	(C ₁ +C ₂)/2	RPD
C-1W	32.3	98.3	-66	65.3	-101.072
N-2W	48.9	33.5	15.4	41.2	37.37864
E-1S	36.2	-6.0	42.2	15.1	279.4702
K-1E	45.9	24.8	21.1	35.35	59.68883
N-1E	45.5	-3.2	48.7	21.15	230.26

Precision (RPD) is out of specification due to low value survey measurements

Recalculated N

$$\Delta/\sigma_s = (\text{DCGL-LBGR})/\sigma_s$$

$$\Delta/\sigma_s = (100-50)/17.0$$

$$\Delta/\sigma_s = 2.94 \text{ (default to 3)}$$

$$\text{Sign } p = 0.998650$$

$$N = 10.88$$

$$10.88 * 1.2 = 13.05$$

$$N = 14$$

**Total Surface Activity
(dpm/100 cm²) Beta**

431
-209
549
-401
239
-195
-27
-316
-229
923
-357
-418
-374
764
-259
424
-599 0
311
127
194 0
264
228
224 0
194
144
348 0
428
401

Survey Area - N/A
Survey Unit - Exterior
Building - 575
Survey Unit Description - Walls and roof of Building 575
Total Surface Activity Data Sheet

DCGL_w 5000 dpm/100 cm²

n 28

Mean 100.3 dpm/100 cm²

Std Dev 384.3 dpm/100 cm²

No measurement exceeds the DCGL_w

No measurement exceeds 75% of the the DCGL_w

Precision

Location	C ₁	C ₂	C ₁ -C ₂	(C ₁ +C ₂)/2	RPD
C-1W	431	-208	639	111.5	573.0942
N-2W	-27	381	-408	177	-230.5085
E-1S	-316	221	-537	-47.5	1130.526
K-1E	764	-351	1115	206.5	539.9516
N-1E	424	426	-2	425	-0.470588

Precision (RPD) is out of specification due to low value survey measurements

Recalculated N

$$\Delta/\sigma_s = (DCGL-LBGR)/\sigma_s$$

$$\Delta/\sigma_s = (5000-2500)/384.3$$

$$\Delta/\sigma_s = 6.51 \text{ (default to 3)}$$

$$\text{Sign } p = 0.998650$$

$$N = 10.88$$

$$10.88 * 1.2 = 13.05$$

$$N = 14$$

112(251)

72

OASIS Direct Analysis Measurement Result Information

The samples listed below were analyzed using the Oxford Alpha Spectroscopy Integrated System (OASIS) at the Rocky Flats Environmental Technology Site. These samples were counted directly in the alpha spectrometer chambers, without chemical preparation. The technical basis for this type of analysis has been established in TBD-00143, Direct Analysis of Alpha Emitters Using the Oxford Alpha Spectroscopy Integrated System (OASIS), and TBD-00153, Use of the OASIS for Direct Differentiation between Po-210 and DOE-enhanced Materials.

In order to maintain the quality of OASIS measurements, the instrument is performance tested in accordance with Operations Order OO-771-228, Direct Analysis of Alpha Emitters Using the Oxford Alpha Spectroscopy Integrated System (OASIS). This Operations Order establishes the periodicity of performance test and background measurements, and the criteria against which these measurements are judged. All samples are counted by RCTs or REs qualified per JPM 036-119-53, Direct Analysis of Alpha Emitters Using the Oxford Alpha Spectroscopy Integrated System (OASIS) and approved by qualified REs.

A sample of the calibration and performance test data is attached for your review. All such data are maintained by the OASIS analysts and are available for your perusal.

The samples were 1-in coupons with an area of 4.82 cm². Calculation of the activity per 100 cm² was performed assuming that samples were representative. Errors are quoted at one standard deviation, accounting for all associated analytical uncertainties. Uranium results refer to the presence of U-238, U-234, or U-235.

Sample Number	OASIS dpm ± 1s		dpm/100cm ² ±1s	
00A1148-001 001	2.53	0.22	52.5	4.5
00A1148-002 001	1.88	0.12	37.8	2.6
00A1148-003 001	1.11	0.10	23.0	2.0
00A1148-004 001	2.90	0.24	60.0	4.9
00A1148-005 001	5.87	0.33	121.6	6.8
00A1148-006 001	2.54	0.16	73.3	3.4
00A1148-007 001	3.44	0.25	71.4	5.2
00A1148-008 001	5.93	0.22	122.8	4.5
00A1148-009 001	3.79	0.17	77.4	3.5
00A1148-010 001	4.13	0.27	85.7	5.7
00A1148-011 001	4.83	0.28	99.8	5.8
00A1148-012 001	5.58	0.21	115.7	4.4
00A1148-013 001	0.64	0.05	0.9	1.1
00A1148-014 001	7.91	0.39	163.9	8.1
00A1148-015 001	6.94	0.25	143.8	5.2
00A1148-016 001	7.21	0.38	149.4	7.8
00A1148-017 001	5.12	0.32	106.2	6.6
00A1148-018 001	3.37	0.25	69.8	5.3
00A1148-019 001	11.76	0.46	243.6	9.6
00A1148-020 001	8.92	0.40	184.8	8.4
00A1148-021 001	9.89	0.24	204.9	4.9
00A1148-022 001	0.13	0.08	2.7	1.6
00A1148-023 001	0.96	0.14	19.8	2.9

00A1148-024 001	0 27	0 16	67.7	3 3
00A1148-025 001	0 58	0 37	157.1	7 7
00A1148-026 001	0 11	0 45	209.6	9 3
00A1148-027 001	0 40	0 46	215.6	9 5
00A1148-028 001	0 62	0 12	12.8	2 4
00A1148-029 001	0 17	0 15	59.5	3 1
00A1148-030 001	0 16	0 16	63.8	3 2
00A1148-031 001	0 23	0 46	214.1	9 4
00A1148-032 001	0 25	0 25	68.6	5 2
00A1148-033 001	0 22	0 22	125.6	4 5
00A1148-034 001	0 31	0 31	222.2	6 3
00A1148-035 001	0 42	0 42	197.5	8 8
00A1148-036 001	0 38	0 38	155.6	7 9
00A1148-037 001	0 14	0 14	49.1	2 8
00A1148-038 001	0 08	0 08	38.9	1 7
00A1148-039 001	0 09	0 09	45.7	1 8

Sample ID	Identified Peaks				Detection Sensitivity (dpm/100 cm ²)			
	Pu+Am	Pu-239	Am-241	U	Pu+Am	Pu-239	Am-241	U
00A1148-001 001	No	No	No	No	79	70	10	79
00A1148-002 001	No	No	No	No	32	28	4	32
00A1148-003 001	No	No	No	No	30	26	4	30
00A1148-004 001	No	No	No	No	79	70	10	79
00A1148-005 001	No	No	No	No	79	70	10	79
00A1148-006 001	No	No	No	No	30	26	4	30
00A1148-007 001	No	No	No	No	79	70	10	79
00A1148-008 001	No	No	No	No	30	26	4	30
00A1148-009 001	No	No	No	No	30	26	4	30
00A1148-010 001	No	No	No	No	79	70	10	79
00A1148-011 001	No	No	No	No	79	70	10	79
00A1148-012 001	No	No	No	No	30	26	4	30
00A1148-013 001	No	No	No	No	79	70	10	79
00A1148-014 001	No	No	No	No	79	70	10	79
00A1148-015 001	No	No	No	No	34	30	4	34
00A1148-016 001	No	No	No	No	79	70	10	79
00A1148-017 001	No	No	No	No	79	70	10	79
00A1148-018 001	No	No	No	No	79	70	10	79
00A1148-019 001	No	No	No	No	70	61	8	70
00A1148-020 001	No	No	No	No	79	70	10	79
00A1148-021 001	No	No	No	No	17	15	2	17
00A1148-022 001	No	No	No	No	79	70	10	79
00A1148-023 001	No	No	No	No	79	70	10	79
00A1148-024 001	No	No	No	No	30	26	4	30
00A1148-025 001	No	No	No	No	79	70	10	79
00A1148-026 001	No	No	No	No	79	70	10	79
00A1148-027 001	No	No	No	No	79	70	10	79
00A1148-028 001	No	No	No	No	79	70	10	79

00A1148-029 001	No	No	No	No	30	26	4	30
00A1148-030 001	No	No	No	No	30	26	4	30
00A1148-031 001	No	No	No	No	79	70	10	79
00A1148-032 001	No	No	No	No	79	70	10	79
00A1148-033 001	No	No	No	No	30	26	4	30
00A1148-034 001	No	No	No	No	30	26	4	30
00A1148-035 001	No	No	No	No	75	66	9	75
00A1148-036 001	No	No	No	No	79	70	10	79
00A1148-037 001	No	No	No	No	30	26	4	30
00A1148-038 001	No	No	No	No	12	10	1	12
00A1148-039 001	No	No	No	No	12	10	1	12

Approved by

C J Bianconi 5/10/00
C J Bianconi, CHP
B771 Radiological Engineering
303 966 7262
303 212 5706 dp

00A1148
Data Package Narrative

Four waste samples, under the Subcontract Number KH700331EP6, were received on May 15, 2000. Four samples were analyzed by Alpha Spectroscopy for Polonium-210, Plutonium 239/240, Uranium-233/234,235,238, and Americium 241

- Analytical Method: EPI A-011 (Alpha Spec)
- Matrix Interferences: There are no matrix interferences to report
- QC Deficiencies: There were no deficiencies
- Hold Times: All samples were analyzed within the required holding time
- RDLs: There were no failed detection limits
- Reanalysis Information: There were no reanalysis of the samples.
- Deviations from SOP: See following page

Comments:

1 RC01CAL_EPI_3-JUN-2000, RC01CAL_EPI_4-JUN-2000 correspond to RC01CAL_EPI_01JUN2000.

2 The following samples did not meet the FWHM requirement of < 80 keV.

1000060362_PU	94 keV
1000060364_PU	92 keV
1000061142_UU	85 keV

3 Sample 00A1148-031 002, 00A1148-034 002 and QC 1000061142 were recounted due to failed yield

017

Rocky Flc:

Sample QC Results Summary
6/20/00

Batch #: 2/172

RIN 00A1148

Line Item Code: TR01A187

Matrix: Micro solid

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL, pCi/g	Tracer Yield %
00A1148-015.002	25798001	Polonium-210	2.76E+00	8.17E-01	1.70E-01	1.00	68.72
00A1148-019.002	25798002	Polonium-210	2.74E+00	5.74E-01	1.56E-01	1.00	46.74
00A1148-031.002	25798003	Polonium-210	3.80E+00	8.39E-01	2.84E-01	1.00	54.27
00A1148-034.002	25798004	Polonium-210	5.07E+00	1.26E+00	2.22E-01	1.00	57.88
1000060356	Blank	Polonium-210	5.39E-02	8.61E-02	1.53E-01	1.00	49.73
1000061844	Duplicate 00A1057-002.001	Polonium-210	2.47E+00	5.60E-01	1.65E-01	1.00	70.11
1000060358	LCS	Polonium-210	1.37E+01	1.12E+00	1.73E-01	1.00	59.83

LCS recovery

Nom. Conc.	Recovery:
15.4	89%

Po-210

Equivalency
Po-210

F/E = 1.319

General Engineering Labs, Inc

Sample QC Results Summary
6/13/00

Batch # . 27173
RIN 00A1148
Line Item Code. TR01A187
Matrix: Mil c. solid

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL, pCi/g	Tracer Yield %
00A1148-015.002	25798001	Americium-241	1.09E-01	9.57E-02	5.92E-02	0.30	81.49
00A1148-019.002	25798002	Americium-241	4.20E-02	3.72E-02	4.51E-02	0.30	89.13
00A1148-031.002	25798003	Americium-241	0.00E+00	0.00E+00	3.44E-02	0.30	85.19
00A1148-034.002	25798004	Americium-241	1.45E-02	6.08E-02	1.66E-01	0.30	64.68
1000060359	Blank	Americium-241	3.54E-02	4.01E-02	6.37E-02	0.30	86.16
1000061158	Duplicate 00A1148-031.002	Americium-241	0.00E+00	0.00E+00	4.27E-02	0.30	90.73
1000060361	LCS	Americium-241	4.39E+00	3.71E-01	2.21E-02	0.30	95.55

LCS recovery

Am-241

Equivalency
Am-241

Nom. Conc. 4.5
Recovery. 98%

F/E = 0

Sample QC Results Summary
6/13/00

Batch #: 27174
 RIN 00A1148
 Line Item Code: TR01A187
 Matrix: Misc solid

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL, pCi/g	Tracer Yield %
00A1148-015 002	25798001	Plutonium-239/240	3.74E-01	1.68E-01	5.33E-02	0.30	95.36
00A1148-019 002	25798002	Plutonium-239/240	-9.15E-03	1.79E-02	1.13E-01	0.30	39.51
00A1148-031 002	25798003	Plutonium-239/240	-2.74E-02	3.10E-02	1.58E-01	0.30	62.53
00A1148-034 002	25798004	Plutonium-239/240	1.62E-02	6.79E-02	1.85E-01	0.30	59.66
1000060362	Blank	Plutonium-239/240	0.00E+00	0.00E+00	2.62E-02	0.30	81.37
1000061141	Duplicate 00A1148-031.002	Plutonium-239/240	0.00E+00	0.00E+00	6.05E-02	0.30	66.68
1000060301	LCS	Plutonium-239/240	5.04E+00	3.93E-01	2.16E-02	0.30	97.91

LCS recovery

Pu-239/240

Nom. Conc. 5.7 Recovery* 88%

Equivalency
Pu-239/240

F/E = 0.883

Sample QC Results Summary
6/19/00

Batch #: 2/175
 RIN 00A1148
 Line Item Code: TR01A187
 Matrix: Misc solid

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL † pCi/g	Tracer Yield %
00A1148-015 002	25798001	Uranium-233/234	3.48E-02	6.21E-02	1.24E-01	1.00	104.52
		Uranium-235	-7.52E-03	4.34E-02	1.41E-01	1.00	104.52
		Uranium-238	6.80E-04	4.04E-02	1.24E-01	1.00	104.52
00A1148-019 002	25798002	Uranium-233/234	1.72E-02	2.85E-02	5.57E-02	1.00	99.31
		Uranium-235	-2.69E-03	2.33E-02	6.66E-02	1.00	99.31
		Uranium-238	-9.39E-03	1.93E-02	6.66E-02	1.00	99.31
00A1148-031 002	25798003	Uranium-233/234	1.54E-02	3.96E-02	8.79E-02	1.00	107.82
		Uranium-235	-1.06E-02	1.46E-02	7.70E-02	1.00	107.82
		Uranium-238	1.04E-02	2.04E-02	2.82E-02	1.00	107.82
00A1148-034 002	25798004	Uranium-233/234	1.18E-01	8.36E-02	9.73E-02	1.00	105.49
		Uranium-235	-6.60E-03	1.30E-02	7.90E-02	1.00	105.49
		Uranium-238	6.56E-02	6.58E-02	9.73E-02	1.00	105.49
1000060365	Blank	Uranium-233/234	7.74E-04	2.65E-02	6.85E-02	1.00	104.63
		Uranium-235	-1.24E-02	1.21E-02	5.91E-02	1.00	104.63
		Uranium-238	2.58E-04	1.53E-02	4.69E-02	1.00	104.63
1000061142	Duplicate 00A1148-031-002	Uranium-233/234	2.02E-02	2.87E-02	4.87E-02	1.00	97.21
		Uranium-235	-8.22E-03	1.14E-02	6.00E-02	1.00	97.21
		Uranium-238	8.04E-03	2.52E-02	6.00E-02	1.00	97.21
1000060367	LCS	Uranium-233/234	3.89E+00	3.20E-01	6.78E-02	1.00	99.19
		Uranium-235	2.12E-01	7.62E-02	4.97E-02	1.00	99.19
		Uranium-238	4.19E+00	3.32E-01	5.67E-02	1.00	99.19

LCS recovery

U-238	Nom. Conc 4.336	Recovery, 97%
-------	--------------------	------------------

Equivalency

U-233/234	F/E = 0.098
U-235	F/E = 0.128
U-238	F/E = 0.073

Luker, Steve
From Salmans, Michael
Sent Tuesday, June 13, 2000 3 04 PM
To Luker, Steve
Subject FW 00A1148

Mike Salmans
Analytical Services
Phone # 303-966-5057
Pager # 303-212-3149
Fax # 303-966-3578

-----Original Message-----

From **Lee Heath [SMTP:lh@mail.gel.com]**
Sent Tuesday, June 13, 2000 2 26 PM
To Michael Salmans
Subject 00A1148

The 100% size of these circular disks of metal and rubber were

(1-4 in order)
0 7182 g
1 8692 g
2 1784 g
0 7303 g (rubber)

81/81