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ROCKY FLATS FIELD OFFICE
10808 HIGHWAY 93, UNIT A
GOLDEN, COLORADO 80403-8200

CORRESPONDENCE
CONTROL

03-DOE-01028

DUE DATE
ACTION

AUG 14 2003

DIST.	LTR	ENC
BERARDINI, J. H.	X	X
BOGNAR, E. S.	X	X
CROCKETT, G. A.		
DECK, C. A.	X	X
DEGENHART, K. R.		
DIETER, T. J.	X	X
DIETERLE, S. E.		
FERRERA, D. W.		
FERRI, M. S.	X	X
GIACOMINI, J. J.		
ISOM, J. H.		
LINDSAY, D. C.	X	X
LONG, J. W.		
LYLE, J. I.		
MARTINEZ, L. A.	X	X
NAGEL, R. E.	X	X
NORTH, K.		
PARKER, A. M.	X	X
RODGERS, A. D.		
SHELTON, D. C.	X	X
SPEARS, M. S.		
TRICE, K. D.		
TUOR, N. R.	X	X
WILLIAMS, J. L.		
Brooks, L.	X	X

Mr. Steven H. Gunderson
Rocky Flats Cleanup Agreement Project Coordinator
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Mr. Gunderson:

The purpose of this letter is to transmit the Building 776/777 Radiological Pre-demolition Survey Plan for your approval. We appreciate the Colorado Department of Public Health and Environment (CDPHE) support in the consultative development of these documents. Due to the unique nature of this facility, two project specific documents are being developed and the Non-Radiological Characterization Plan will be submitted for your approval in another transmittal.

We also look forward to further consultation with the CDPHE technical staff as the detailed characterization procedures, which implement this plan are developed. Your support to accomplish the closure and removal of Building 776/777 in a safe and timely manner is greatly appreciated.

Please feel free to direct any questions to John Schneider at (303) 966-5924 or Gary Schuetz at (303) 966-3016.

Sincerely,

Joseph A. Legare
Assistant Manager
for Environment and Stewardship

COR. CONTROL	X	X
ADMIN. RECORD	X	X
EATS/130		

Reviewed for Addressee
Corres. Control RFP

Enclosure

8/19/03 by
Date By

cc w/Encl.:
J. Schneider, AAMP, RFFO
G. Schuetz, FCWM, RFFO
T. Reider, USEPA
E. Kray, CDPHE
M. Ferri, K-H
Administrative Record

Ref. Ltr. #

DOE ORDER #
NONE

cc w/o Encl.:
E. Schmitt, OOM, RFFO



DOCUMENT CLASSIFICATION
REVIEW WAIVER PER
CLASSIFICATION OFFICE

B776-A-000149

Radiological
Pre-Demolition Survey Plan
Building 776/777

August 8, 2003

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1. INTRODUCTION

The decommissioning process for Building 776/777 will involve decontamination, removals, and application of controls inside the building before demolition and application of controls outside the building during demolition. The Building 776/777 Decommissioning Operations Plan (DOP) addresses the activities associated with preparing the facility for demolition and the demolition. Following decontamination and/or removal efforts, a final characterization will be conducted to verify that residual contamination is consistent with the objectives of the DOP and ALARA-based decontamination efforts, followed by air modeling to verify the 0.1 mrem maximum dose contribution from Building 776/777 demolition will not be exceeded. Radiological surveys will be conducted in accordance with this project-specific characterization plan, which will be submitted to the LRA for review and approval. This characterization plan can only be used for the Building 776/777 Closure Project.

The absolute goal of the 776/777 demolition project is to maintain releases to the environment and doses to the workers as low as reasonably achievable (ALARA). Before the pre-demolition characterization and demolition, selected contaminated areas will be removed, and others will be hydrolased. The ALARA goals will be accomplished by the usage of a combination of reasonable decontamination techniques including component removal, fixation and/or encapsulation of remaining contamination, and demolition techniques designed to minimize releases of any residual contamination. The following is a simplified outline of the Building 776/777 decommissioning process:

1. Facility decontamination (hydrolasing) and component removal (risk reduction) are initiated with concurrent in-process characterization.
 - Decisions are made throughout the facility to decontaminate, fix, or remove contamination and/or contaminated components.
 - Based on initial/in-process characterization data, areas will be divided into three categories: areas to be decontaminated or removed; areas that require additional characterization; and areas that probably do not need remediation or additional characterization.
2. Resource Conservation and Recovery Act (RCRA) units are closed.
3. Chemicals and hazardous substances are removed.
4. Beryllium regulated and controlled areas are closed.
5. Polychlorinated biphenyls (PCB) hazards and equipment are removed.
6. Asbestos is abated.
7. The final characterization is conducted. (radiological characterization is addressed by this plan)
 - Areas exceeding the Table 1 values will be further remediated.
8. Areas with contamination or with potential contamination are fixed and encapsulated.
9. The *Final Characterization Report* is prepared, reviewed, and concurred to by the Lead Regulatory Agency (LRA). (the radiological characterization report is addressed by this plan)
10. The Contractor Demolition Plan and work packages for demolition are prepared and reviewed.
11. Demolition is completed.
12. Final project closeout reports and documentation are prepared, reviewed and approved by the LRA.
13. Remediation activities (soil and groundwater) are initiated, as necessary.

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Although this process is laid out in a sequential manner, many of the activities overlap. For instance, characterization may be conducted in rooms adjacent to decontamination activities. All of the steps/processes described will have the opportunity for information exchanges and participation with DOE, Kaiser-Hill and its subcontractors, the regulatory agencies, and the public.

2. PURPOSE

The purpose of this plan is to provide direction on conducting the final radiological characterization survey of Building 776/777. These characterization efforts are to demonstrate the extent and magnitude of the existing radiological contamination before demolition of the building. The final characterization survey of the building will include surveys on accessible areas of floors, interior walls and ceiling surfaces, and any remaining fixed equipment as well as some investigations on inaccessible areas.

The final characterization data will enable project personnel to:

- Finalize the work area controls required during the demolition to minimize the dose to the workers, the environment and the public from exposure to DOE-added radioactive material.
- Verify that the Waste Acceptance Criteria (WAC) for demolition debris are met.
- Model the emissions that could result from the demolition activity for the immediate and co-located workers, and the public.

3. SCOPE

This plan addresses the following:

- Provides the approach used in performing surveys.
- Describes the survey boundaries used in setting up the survey.
- Describes isolation control methods to be used during the final survey.
- Describes the survey design for gathering data.
- Provides the methods for documenting, reviewing and approving the final surveys.

This plan also identifies the process performed with the final characterization survey data to determine the building can be demolished safely.

Upon completion of the final radiological characterization of Building 776/777, a characterization report will be prepared and submitted to the Department of Energy (DOE) for approval. DOE will submit to the Lead Regulatory Agency (LRA) for review and approval.

This procedure contains requirements of the Site Radiation Protection Program (RPP), RPP-0001, Revision 3, which implements 10 CFR 835, Occupational Radiation Protection through MAN-102-SRCM, Site Radiological Control Manual (RCM), and cannot be changed without the approval of the 707/776/777 Project Radiological Safety Manager.

This procedure does not address specific instrument models and their specifications which is addressed in the instruments specific Technical Basis Document (TBD).

4. DEFINITIONS

Average Surface Contamination Value (ASCV). Contamination value based on the assumption that the concentration of residual activity is evenly distributed over a large area, and any existing hot spots have been averaged into the applicable measurement.

Final Characterization Survey. A comprehensive characterization survey performed to quantify the amount of radioactive material present in Building 776/777 prior to the systematic demolition of the building. The data from this survey will be used to ensure that during the demolition process, the workers, the public, and the environment are protected and for waste characterization to satisfy Department of Transportation (DOT) and Nevada Test Site (NTS) or Envirocare waste acceptance criteria (WAC).

Measurement Location. A survey location where the total surface activity measurement is obtained.

Multi-Channel Analyzer. Device used to acquire gamma ray measurements so that different isotopes can be identified by their characteristic gamma ray energies.

Sodium Iodide Detector. A detector that detects gamma rays by measuring the light produced in a glass-like substance (sodium iodide) when gamma rays pass through it.

Survey Area. The most general category comprised of surfaces to be further defined as one or more survey units.

Survey Design. The process of determining the type, location, number and density of radiological measurements to be taken for final characterization survey.

Survey Package. A collection of information in a standardized format for controlling and documenting field measurements taken for final survey. A survey package is prepared for each survey unit. The survey package typically includes the survey instructions, data sheets and maps.

Survey Point. A smaller subdivision within a survey unit where measurements are obtained. This area generally refers to the area covered by a detector measurement.

Survey Instructions. Written instructions that specify the type and number of measurements to be taken.

Survey Unit. A contiguous area with similar characteristics and contamination potential. Survey units are established to facilitate the process and aid in the statistical evaluation of the final characterization survey data.

Total Surface Activity. Surface activity comprised of both removable activity and fixed activity that cannot be removed by wiping the surface with moderate pressure.

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5. BACKGROUND

Under the existing radiological controls program as defined by the Site RPP and implemented through the Site RCM, Building 776/777 Project intends to perform the following:

- Complete the strip-out of highly contaminated components. In-process characterization surveys will be performed during the removal of fixed equipment. Based on surveys results some building systems (e.g., fire suppression, steam, zone 2 supply, zone 2 exhaust plenum and downstream ducting, etc.) may remain in the building and be demolished with the remainder of the building.
- Decontaminate the higher contaminated areas of the accessible building surfaces to acceptable contamination levels. Reconnaissance characterization surveys have been performed on a majority of the Building 776/777 floor surfaces to date and will be used to define which areas need to be remediated prior to final survey. (The inaccessible areas of the building make up approximately 2% of the total surface area of the facility.)
- Perform a final characterization survey. Final characterization surveys will be performed on the remaining building surfaces and equipment that are left. Also, if any decontamination is needed, final surveys will be conducted after decontamination is complete. The final characterization surveys of the building will include in-process surveys and investigations on inaccessible areas using a variety of measurements and sampling techniques.
- Determine the waste qualification as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) in accordance with the applicable procedures for shipment to a low-level waste site for burial.
- Determine an Average Surface Contamination Value (ASCV).
- Model the emissions that could result from the demolition activity and finalize the work area controls that will be required during demolition based on the ASCV. Due to the technical limitations of removing, decontaminating or sampling some of the facility's inaccessible locations, additional radiological controls will be applied, as necessary, to limit the release of contamination.

6. REQUIREMENTS

Requirements for waste characterization are covered in PRO-267-RSP-09.05, Radiological Characterization for Surface Contaminated Objects (SCO), and PRO-1564-RSP-09.09, Radiological Characterization of Low Specific Activity (LSA) Waste by Field Sampling and Analysis. These programs provide the guidance necessary for radiological waste characterization. However, they do not provide a reasonable confidence that the workers, the public, and environment will be protected during the demolition of a moderately contaminated building. This plan has been developed to describe the additional guidance necessary to provide this added confidence.

Radiological Engineering Technical Basis Document 00159, Rev. 0 provides justification for Building 776/777 to be surveyed for Weapons Grade Plutonium (WGPu) contamination only.

Instrument approval and technical justifications for the methods used are detailed in the White paper, "Detecting Weapons Grade Plutonium Through Coatings on Building Surfaces" and/or in the specific instrument TBD. Low-resolution gamma spectroscopy will be performed using sodium iodide detectors attached to Multi-channel analyzers (MCA's). High purity germanium system may be used when higher resolution measurements are required. Measurements on surfaces without paint or surface media will be performed with standard health physics instrumentation.

RCTs and RCT Supervisors will receive documented on-the-job training regarding this document and its applicability to final survey. RCTs are currently trained on Site to contamination, sampling, and instrument procedures.

7. FINAL CHARACTERIZATION SURVEY PARAMETERS

Data Quality Objectives and Quality Control

Data quality objectives and quality control are an integral part of the radiological protection program. The radiological protection program is defined by the Site RPP and implements the requirements of 10CFR835. The implementation of 10CFR835 was performed in accordance with the Site's Quality Assurance Program Manual (QAPM), MAN-131-QAPM. The Site QAPM implements the requirements of 10CFR830, Nuclear Safety Management, Section 121, Quality Assurance Program.

Survey Boundaries

The survey boundaries are the spatial confines of the building. Concrete, asphalt surfaces, soil and utilities not physically part of the building structures are not within the scope of this survey plan.

Isolation Controls

Implementation of isolation control measures is required to ensure areas prepared for final characterization are not re-contaminated after surveys are performed in the survey unit. Isolation controls will be delineated in the survey package, as applicable. Investigation surveys, as determined by Radiological Engineering, will be performed after any potentially cross-contaminating events.

Typical isolation controls would include, but not be limited to:

- Training of personnel on isolation controls
- Controls for radioactive material transfers through the area
- Posting appropriate signs, ropes, and/or labels at access points
- Locking entrances
- Temporary personnel barriers with survey instrumentation for monitoring prior to entering
- Installing tamper-indicating devices
- Additional isolation controls as deemed appropriate by Radiological Engineering

Survey Design

The minimum survey density required for this characterization plan is based on standard radiological survey practices as stated in RSP-09.05 and RSP-09.09. These procedures require a minimum of 30 or 15 measurements per survey unit, respectively. Neither document specifies a survey unit size restriction. Both documents specify that survey units have similar contamination potential and both documents provide a statistically based radiological surveying and sampling plan. Based on the above standard radiological safety procedure protocols the minimum sampling frequency specified for each survey unit will be a minimum of 30 total surface activity measurements.

Due to fixed equipment remaining in the building after decommissioning, additional total surface activity measurements will be obtained on the accessible surfaces of the equipment. Sampling and/or investigations on inaccessible areas of the building will also be performed using a variety of measurement and sampling techniques. These techniques will be delineated in the survey package.

The location of radiological survey points, as well as the measurement methods and instrumentation, will be delineated in the survey package. Measurement locations taken in the building will be clearly identified by paint, permanent markers, or labels to provide a method of referencing survey results to survey measurement locations.

Gridding methodology using the following equation will be utilized to determine the appropriate grid spacing.

$$L = \sqrt{\frac{A}{n}}$$

Where:

A = total surface area of the survey unit

n = number of measurements per survey unit, 30 minimum

L = the calculated distance between grid points

Once the distance between points is calculated, a random starting point will be determined using the random number generation system used by Radiological Engineering. The actual measurements will be taken at each grid intersection. If unable to obtain the measurement at the grid intersection due to interference's, the measurement will be obtained as close as possible to the grid intersection and the new location annotated on the survey map.

Survey Documentation

Surveys are conducted in accordance with standard radiological safety survey protocols and are described in the Radiological Safety Practices (RSP) Manual. Surveys are performed by trained individuals and conducted with approved written procedures using properly calibrated instruments that are sensitive to the suspected contaminant.

Survey results will be documented in accordance with 3-PRO-165-RSP-07.02, Contamination Monitoring Requirements. Records of the survey will be maintained in a survey package. See Appendix A for a typical survey package. The survey package will be the primary method of controlling and tracking final characterization survey results. The records compiled in a survey package will include:

- Survey Package Coversheet
- Survey Instruction Forms
- Instrument Data Sheets
- Survey Signature Page
- Survey Data Sheets
- Survey Unit Diagrams/Maps

Radiological Engineering will review the survey results and forward them to the Radiological Safety Manager for approval.

Use of Survey Results

Upon completion of the initial ALARA-based decontamination efforts and the final characterization surveys for each survey unit, Radiological Engineering will calculate an average surface contamination value for the unit (ASC_U). These calculated values will be compared to the values derived in Table 1 below. The ACSV in Table 1 was derived from extrapolating data (linearly) from the Building 776/777 Air Modeling Technical Document based on the day-to-day (four month release) scenario.

Table 1. Average Surface Contamination Value

Resultant Dose	10 mrem @ the site boundary ¹	0.1 mrem @ the site boundary ²
ASCV ³	45,500 $\mu\text{Ci}/\text{m}^2$	455 $\mu\text{Ci}/\text{m}^2$

¹ This value is converted from Colorado Radiation Control – Division of Laboratory and Radiation Services, RH 4.5.4. It states "To implement the ALARA requirements ... a constraint on air emissions of radioactive material to the environment ... such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 0.1 millisevert per year from these emissions."

² This value is a project specific emissions objective as discussed in the Building 776/777 Decommissioning Operations Plan, Appendix I, Demolition Plan.

³ This value is the average contamination over the surfaces of Building 776/777 that if modeled, could result in exceeding the applicable dose to the public at the site boundary. The units of $\mu\text{Ci}/\text{m}^2$ are used for data input into the air quality model.

If the calculated ASCV_U exceeds the value in Table 1, then additional remediation of the survey unit will be required. Once remediation is completed, the survey unit will be re-surveyed and a new ASCV_U will be calculated. Once all survey units have been surveyed and the final characterization survey for the entire building is complete, the average surface contamination value for the entire building, ASCV_B, will be calculated.

The ASCV coincides with the commitment made in the Building 776/777 major modification to the Decommissioning Operations Plan (DOP, Appendix I). The ASCV will not be used to make decisions with respect to decontamination and removals in the building; these decisions will be made using the work process outlined in the DOP. The ASCV is an upper bounds that indicates the absolute maximum allowable contamination level. It is anticipated that there will be few, if any, areas remaining in the building with this contamination level and that the majority of the building will be decontaminated orders of magnitude below this level.

In addition to the ASCV, there will be criteria for removable contamination once the final characterization is complete and the fixatives and encapsulants are applied. The criteria will be consistent with DOE Order 5400.5 as indicated in Table 2.

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Table 2. Removable Release Criteria

Contaminant	Requirement Source	Unrestricted Release Threshold (dpm/100 cm ²)
Radionuclides		Removable
Transuranics	DOE Order 5400.5, Figure IV-1 DOE "No-Radioactivity Added" Waste Verification Program	20

DOE, 1998. Application of Surface Contamination Guidelines for DOE Order 5400.5 (April 23, 1998)

8. FINAL CHARACTERIZATION SURVEY REPORT

Upon completion of the final characterization of Building 776/777, a characterization report will be prepared. Several sub-reports may be developed in lieu of a single large report in order to simplify and expedite the review process. The report shall provide an analysis of the characterization results and summarize the conclusion. The report shall provide information in adequate detail to allow DOE to make a determination if the facility can be released for demolition. DOE will use the report to confirm the building status, and will transmit the report and a notification letter to the LRA for review and approval.

9. REFERENCES

RPP-0001, Site Radiation Protection Program

10 CFR 835, Occupational Radiation Protection

MAN-102-SRCM, Site Radiological Controls Manual

3-PRO-165-RSP-07.02, Contamination Monitoring Requirements

PRO-267-RSP-09.05, Radiological Characterization For Surface Contaminated Objects

PRO-1564-RSP-09.09, Radiological Characterization of Low Specific Activity Waste By Field Sampling and Analysis

White Paper, "Detecting Weapons Grade Plutonium Through Coatings on Building Surfaces"

Building 776/777 Air Modeling Technical Document

APPENDIX A
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TYPICAL SURVEY PACKAGE

SURVEY PACKAGE COVER SHEET
Special Support Requirements N/A
Special Safety Precautions Fall protection is required for work above 6 ft. Refer to AHA for additional safety precautions.
Isolation Controls No use, storage or movement of radioactive material, with the exception of instrument check sources, is permitted in this survey unit. Final configuration of this area is to be maintained. Authorization shall be obtained prior to the removal of components from this area. Isolation Control signs shall be posted on the doors. Isolation Control signs shall state that "Approval from the Radiological Manager or his designee is required prior to storage or transfer of radioactive material within this area"
Grid Requirements Gridding and labeling is to be performed as indicated on the attached survey unit map(s). If gridding and labeling cannot be performed per the survey unit map(s), contact radiological engineering for assistance. When grid locations fall on areas that are not suited for total surface activity measurements, an adjacent suitable location within one meter of the initial location will be used for the total surface activity measurements. 1-meter by 1-meter grid lines are used on the survey maps for ease of locating sample measurements. A different grid pattern is used for actual measurement density.

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TYPICAL SURVEY PACKAGE

Survey Package Implementation			
This survey package is ready for implementation.			

Radiological Engineer	Employee #	Signature:	Date
Print Name:			

Survey Package Closure			
All required reviews are complete, and data analysis results meet the ASCV. Survey package is authorized for closure.			

Radiological Engineer	Employee #	Signature:	Date
Print Name:			
Rad Safety Mgr or designee	Employee #	Signature:	Date
Print Name:			

SPECIFIC SURVEY INSTRUCTIONS

Total Surface Activity Data Sheet

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APPENDIX A
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TYPICAL SURVEY PACKAGE

INSTRUMENT DATA SHEET Total Surface Activity Instrument Data					
Manufacturer					
Model					
Inst. ID #	1	2	3	4	5
Serial #					
Cal. Due Date					
Survey Date					

Survey Performed By

RCT ID # 1				
	Print Name	Employee #	Signature	Date
RCT ID # 2				
	Print Name	Employee #	Signature	Date
RCT ID # 3				
	Print Name	Employee #	Signature	Date
RCT ID # 4				
	Print Name	Employee #	Signature	Date

Quality Control Measurements Performed By

RCT ID # 5				
	Print Name	Employee #	Signature	Date
RCT ID # 6				
	Print Name	Employee #	Signature	Date

Survey Reviewed By RCT Supervisor

Print Name	Employee #	Signature	Date

14/14