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Remediation Services, L.L.C.
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RF/RMRS-97-030

**Close-Out Radiological Survey Plan
For The Building 980 Cluster**

Rocky Mountain Remediation Services, L. L. C.

September 1997

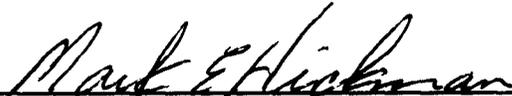
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**CLOSE-OUT RADIOLOGICAL SURVEY PLAN
FOR THE BUILDING 980 CLUSTER**

REVISION 0

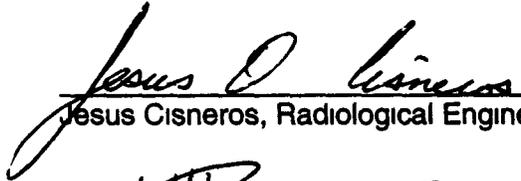
SEPTEMBER 1997

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Date



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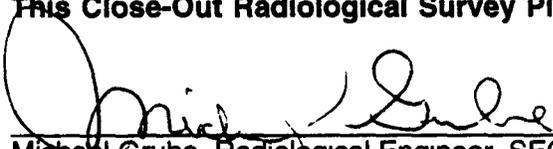
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CLOSE-OUT RADIOLOGICAL SURVEY PLAN

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CLOSE-OUT RADIOLOGICAL SURVEY PLAN FOR THE BUILDING 980 CLUSTER

1.0 PURPOSE

The purpose of the Close-Out Radiological Survey Plan (CRSP) is to define the methods for collecting, analyzing, and documenting data to demonstrate that residual radioactive material existing in the Building 980 Cluster are below levels that comply with established Rocky Flats Environmental Technology Site (RFETS) unrestricted release criteria identified in Appendix A, (Appendix 1, 1-P73-HSP-18 10, *Radioactive Lateral Transfers and Unrestricted Release of Property and Waste*), "Summary of Contamination Values for Unrestricted Release" Those areas that contain radioactive material above the unrestricted release criteria will be decontaminated to meet the release criteria or be released in a restricted manner

2.0 DESCRIPTION

2.1 DECOMMISSIONING CLOSE-OUT RADIOLOGICAL SURVEY SCOPE

The scope of the Building 980 Cluster Decommissioning Close-out Radiological Survey consists of the survey of the interiors of Buildings 965, 968 and 980 to the criteria established in 1-P73-HSP-18 10, "Radiological Material Transfer and Unrestricted Release of Property and Waste" Reconnaissance Level Characterization surveys indicated that the interiors of these buildings contain no radioactive material above the unrestricted release criteria. Reconnaissance level characterization surveys of the exteriors of Buildings 965, 968 and 980 show that radioactive material above the unrestricted release criteria is present. In-Process radiation characterization surveys (See Attachment C) confirmed that there is limited contamination on the exterior of Buildings 965 and 968 while there is no radioactive contamination on the interior surfaces of 980, 965 nor 968. A final survey will not be performed on the exterior of Building 980 since the exterior surfaces will not be decontaminated and will be released in a restricted manner

Portions of Buildings 965 and 968 will also be removed and handled as low-level radioactive material

2.2 FACILITY HISTORY

The Building 980 Cluster consists of three metal skinned buildings located near the center of RFETS within the Protected Area. They were utilized as warehouses which contained construction equipment, building material, and supplies for on-site contractors

Building 965 is approximately 625 square feet in area and functioned as a maintenance shop until 1996. In addition, it was utilized for various carpentry services and equipment repairs

Building 968 is approximately 11,000 square feet in area and was used by the construction subcontractor for storage, warehousing, and support shop activities

Building 980 is approximately 13,000 square feet in area and was previously used for storage, warehousing, and as a support shop for construction activities. Operations within the Building 980 included sheet metal work, painting, iron work, asbestos abatement, carpentry, millwrighting, and motorpool operation. About 1/5 of the area was used as a radiological buffer area for the storage of a radiologically contaminated pumping truck

3.0 SCOPE OF SURVEY

The surveys for Buildings 965, 968 and 980 will include all floors, interior wall surfaces, the accessible surfaces of the roof and fixed equipment

The scope of the Building 980 Cluster Decommissioning Project CRSP as defined in this document is to

- Provide a description of the graded approach used in determining the intensity of sampling and survey data gathering which must be obtained to make the determination that the Building 980 Cluster meets the release criteria of Appendix A
- State how the characterization data obtained during the project completion will be used to support the final decommissioning decision
- Develop a survey and sampling approach which, when implemented, will obtain adequate information to demonstrate that the buildings identified have no contamination levels above the unrestricted release levels stated in Appendix A
- State the release criteria which will be used to free release the buildings.

4.0 CONTAMINATION IDENTIFICATION

Based on the review of the historical records and process knowledge of the identified project's buildings/equipment/systems, there was no expectation that radioactive material would be present above unrestricted release levels in the building interiors except in one area. This area is located in the east end of Building 980 where a radiological buffer area and contamination area existed. Based on the reconnaissance level characterization radiological survey data, no radioactive material has been detected above the unrestricted release criteria within the interiors of Buildings 965, 968 and 980. Based on the review of the historical records and process knowledge of the identified project's buildings/equipment/systems, there was an indication that radioactive material may be present above unrestricted release levels on the building exteriors. This was apparently due to the Buildings 965, 968 and 980 being directly adjacent to the Solar Evaporation Ponds which contained radioactive material. The presence of radioactive material above the unrestricted release criteria was confirmed by the Reconnaissance Level Characterization surveys of the Building 965, 968 and 980 exteriors. These elevated readings are predominately located on the north facing walls, although some values have been discovered on the exterior metal surfaces of the other walls.

5.0 RADIOLOGICAL RELEASE CRITERIA

The unrestricted release criteria are presented in Appendix A. The survey methods and release criteria of Appendix A are in conformance with the following RFETS procedures

- 1 4-K62-ROI-03 01 *Performance of Surface Contamination Surveys*
- 2 4-S23-ROI-03 02 *Radiological Requirements for Unrestricted Release*
- 3 4-Q97-REP-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*
- 4 1-P73-HSP-18 10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

6.0 SITE ASSESSMENT

6.1 SEVEN STEP DQO PROCESS

The following seven step process derived from EPA QA/G-4, *The Data Quality Objective Process* and the Draft MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual) and Manual (NUREG-1575) is being utilized to develop a CRSP for the 980 complex. The CRSP was designed to identify the survey requirements which, when completed, would demonstrate compliance with the Appendix A release criteria. Much of the survey requirements have been met by In-Process characterization surveys. Due to fairly uniform radioactive contamination, identified on the exterior and roof of Building 980, the building's exterior panels will be removed and discarded as low-level radioactive waste. No CRSP survey requirements apply to the Building 980 exterior and roof panels. Radioactive contamination was also identified (to a lesser extent), on the exteriors of Buildings 968 and 965. The contaminated exterior panels and roof of Buildings 968 and 965 will also be discarded as low-level radioactive waste and are not subject to further CRSP survey.

STEP 1

Why perform this survey?

This survey is being performed to assure that the 980 Cluster facilities' materials to be released contain no radioactive contamination above the unrestricted release criteria outlined in Appendix A.

What types and kind of sampling measurements are required?

The radiological surveys required to assure that the unrestricted release criteria is met are fixed and removable surveys for both gross alpha and gross beta contamination. These surveys are performed at distinct locations on Buildings 965, 968 and 980.

Since small areas of radioactive material may be present between the fixed and removable surveys, scan surveys will also be performed. These surveys are performed across a defined areas of Buildings 965, 968 and 980.

Who needs the information?

The Department of Energy, Environmental Protection Agency, Colorado Department of Public Health and the Environment, Stakeholders, Kaiser-Hill, Safe Sites of Colorado and Rocky Mountain Remediation Services will use the CRSP results to assure that the interior components of Buildings 965, 968 and 980 can be released in an unrestricted manner.

When is the information needed?

The survey results from the CRSP are needed before the dismantlement of buildings 965, 968, and 980.

STEP 2

What decisions will be made from this final survey information?

Structures and components of Buildings 965, 968 and 980 will be released in an unrestricted manner when it is shown that the unrestricted release criteria are met.

If the surveys show that Buildings 965, 968 and 980 do not meet the unrestricted release criteria, the area exceeding the criteria will be decontaminated or removed. The decontaminated area will then be resurveyed to assure that the unrestricted release criteria is met. If the unrestricted release criteria cannot be met, the area exceeding the criteria will not be released in an unrestricted manner.

Are there any alternatives to the decision?

There are no other alternatives for Buildings 965, 968 and 980. The Site Utilization Review Board (SURB) and DOE Management have made the decision that the 980 Cluster facilities are excess.

The alternative of decontaminating the exterior and roof panels of Buildings 965, 968 and 980 so that these panels meet the unrestricted release criteria has been rejected due to cost and schedule constraints.

What is the end use of the equipment, facility or structure (free release, restricted use, low-level waste, etc.)?

Structures and components within Buildings 965, 968 and 980 which have no radioactive material contamination above the unrestricted release criteria, may be released in an unrestricted manner. If areas within the interiors of Buildings 965, 968 and 980 contain radioactive material above the unrestricted release criteria and cannot be decontaminated, these areas will not be released in an unrestricted manner.

The exterior and roof panels of Buildings 965, 968 and 980 which contain radioactive material above the unrestricted release criteria and will not be decontaminated or removed and handled as radioactive material. These exterior and roof panels will not be released in an unrestricted manner.

STEP 3

What information is required to make this decision?

The information required are the radiological survey data that will support a decision to release the remaining structures and components of Buildings 965, 968 and 980 in an unrestricted manner. The radiological surveys required are fixed and removable surveys for both gross alpha and gross beta contamination. These surveys are performed at distinct locations within Buildings 965, 968 and 980, see Appendix C for survey instructions.

Since small areas of radioactive material may be present between the locations where fixed and removable surveys will be taken, scan surveys will also be performed. These scan surveys are performed so that the probability of finding radioactive material above the unrestricted release criteria is maximized. These scan surveys are performed across a defined area within Buildings 965, 968 and 980.

What source(s) can be used to obtain the information?

Reconnaissance level characterization surveys and in-process characterization surveys. If these surveys do not satisfy the requirements of the CRSP, additional surveys will be required so that the requirements of the CRSP are met.

Can the desired analyses be performed at RFETS or will the analysis be sent off-site?

All radiological survey data will be obtained and recorded at Buildings 965, 968 and 980. This data will be reviewed at RFETS. No samples will be sent offsite for analysis.

What type of instrumentation will be required?

The following instrumentation will be used to perform all radiological surveys. The Minimum Detectable Activities (MDA) of the instruments used to perform the surveys required in this CRSP will be a fraction of the unrestricted release criteria outlined in Appendix A. A goal will be to have the MDA of an instrument at or below 50% of the unrestricted release criteria.

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm ²)
Bicron w/ A100 Probe	60 sec (alpha)	2	Direct Alpha Surveys (Total Alpha Activity)	55
Bicron w/ B50 Probe	60 sec. (beta)	250	Direct Beta Surveys (Total Beta Activity)	610
NE Electra w/ DP6 Probe	60 sec (alpha) 60 sec. (beta)	2 700	Direct Alpha Surveys (Total Activity) Direct Beta Surveys (Total Activity)	60 455
SAC-4	60 sec (alpha)	1	Removable Alpha Swipes	18
LB-5100W	60 sec * (alpha) 60 sec (beta)	0.5 4	Simultaneous Removable Alpha and Beta Swipes	20* (alpha) 35 (beta)
BC-4	60 sec (beta)	200	Removable Beta Swipes	205

- * This 60 second count time can be increased to assure that the MDA is a fraction of the unrestricted release criteria for gross alpha contamination

Has facility structural data been reviewed?

Structural data is not applicable to this CRSP since the building structure is not being modified

What suspect materials have been identified?

Plutonium, Americium, Uranium and Thorium have been identified as radioisotopes that may be present in Buildings 965, 968 and 980. These radioisotopes are present at RFETS outside of these buildings in the 980 complex. The area in Building 980 that contained a Radiological Buffer Area and Contamination Area contained isotopes of plutonium and americium. One area in Building 980 was found to contain natural thorium.

STEP 4

What is the scope of this final survey?

The floors, walls, ceilings and fixed equipment inside Buildings 965, 968, and 980 will be surveyed. Because of the radioactive material present above the unrestricted release criteria on the exterior and roof surfaces of Building 980, no additional surveys will be performed on these exterior panels. The roofs of Buildings 965 and 968 will be removed and handled as radioactive material. No additional surveys will be completed on these panels. The Building 968 and 965 exterior walls will be surveyed.

What is the sample population of interest?

The interior surfaces of the floors, walls, ceiling and fixed equipment located within the interior of Buildings 965, 968 and 980 and exterior walls of Buildings 965 and 968 are the population of interest.

What kind of radiological hazard is being evaluated?

Radioactive material present on the surface that is fixed and/or removable needs to be evaluated. Gross alpha and gross beta measurements will be taken to evaluate the radiological hazard.

Are there any constraints on data collection?

Data collection is performed in accordance with the requirements of

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination

Draft MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual

The survey methods utilized are in conformance with the following RFETS procedures:

- 4-K62-ROI-03 01 *Performance of Surface Contamination Surveys*
- 4-S23-ROI-03 02 *Radiological Requirements for Unrestricted Release*
- 4-Q97-REP-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*
- 1-P73-HSP-18 10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

What sample measurement locations (densities) are necessary to get the desired certainty?

All areas of the building cluster do not have the same potential for radioactive material being present and, therefore, do not require the same level of survey coverage to achieve an appropriate level of confidence that building surfaces satisfy established unrestricted release criteria. The CRSP is designed so that areas with higher potential for contamination receive a higher degree of survey effort. This will ensure that the CRSP is both effective and efficient.

The following area classifications with their associated survey frequencies are based on guidance from

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination

Draft MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual

Four area classifications were used to design the Building 980 Cluster CRSP. These classifications are defined as follows:

Class 1 Impacted (Affected) Areas. are areas that have potential contamination (based on building operating history) or known contamination (based on past or preliminary characterization survey data). This would normally include areas where radioactive materials were used and stored and where records indicate spills or other unusual occurrences could have resulted in the spread of contamination. The survey frequency will be a minimum of one fixed survey measurement and one removable survey measurement per square meter. In addition, an alpha/beta scan survey of 100% of the applicable surface areas, including fixed equipment, is required.

Class 2 Impacted (Affected) Areas. are areas that have or had a potential for radioactive contamination or known contamination, but are not expected to exceed the applicable contamination limits. The survey frequency will be a minimum of one fixed survey measurement and one removable survey measurement at intervals as determined utilizing MARSSIM statistical calculations. In addition, a scan survey for alpha and beta of 10 to 100% of the applicable surface areas, including fixed equipment, will be performed as directed by Radiological Engineering Personnel.

Class 3 Impacted (Unaffected) Areas. are all areas not classified as Class 1 or Class 2 Impacted or Non-Impacted. These areas are not expected to contain residual contamination above the applicable limits, based on knowledge of building history and previous survey information. However, insufficient documentation is present to exclude the area from survey requirements. The survey frequency will be a minimum of one fixed survey measurement and one removable survey measurement per 50 square meters or 30 points, whichever is greater. In addition, an alpha/beta scan survey of 10% of the applicable surface areas, including fixed equipment, is required.

Non-Impacted Areas. are all areas not classified as Class 1, Class 2 or Class 3 Impacted. These areas are areas where there is no reasonable potential for residual contamination, based on knowledge of building history and/or previous survey information. Sufficient information is present to be assured that no residual contamination is present above the applicable contamination limits.

These four classifications of areas will be applied to the following areas of Buildings 965, 968 and 980:

- 1 Total Floor Area plus Total Wall Area
- 2 Total Floor Area plus the Wall Area up to a Height of 6 feet
- 3 Wall Area From a Height of 6 feet to the Ceiling
- 4 Ceilings
- 5 Fixed Equipment
- 6 Exterior walls of Buildings 968 and 965 (Building 980 exterior walls, as well as a portion of the exterior walls of Building 965 and 968, and the roof panels of the three facilities contain fixed radioactive contamination above the unrestricted release limit and will not be released in an unrestricted manner)

To what radiological hazards could the worker be exposed?

For the interior of Buildings 965, 968 and 980, minimal radiological hazards exist since the Reconnaissance Level Characterization Surveys show that no radioactive material is present above the unrestricted release criteria.

For the exterior of Buildings 965, 968 and 980, a radiological hazard does exist since the Reconnaissance Level Characterization Surveys show that radioactive material is present above the unrestricted release criteria

STEP 5

What is the basis for the decision in Step 2?

The unrestricted release criteria outlined in Appendix A is the basis for deciding whether the structures and components of Buildings 965, 968 and 980 can be released in an unrestricted manner

The survey frequency required to allow an unrestricted release is based on guidance from

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination

Draft MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual

Are there any regulatory and statistical drivers for sampling frequency?

The survey frequency required to allow an unrestricted release is based on guidance from

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination

Draft MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual

1-P73-HSP-18 10, Radioactive Material Transfer and Unrestricted Release of Property and Waste

What are the required instrumentation sensitivities?

The following instrumentation will be used to perform all radiological surveys. The Minimum Detectable Activities (MDA) of the instruments used to perform the surveys required in this CRSP will be a fraction of the unrestricted release criteria outlined in Appendix A. A goal will be to have the MDA of an instrument at or below 50% of the unrestricted release criteria

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm ²)
Bicron w/ A100 Probe	60 sec (alpha)	2	Direct Alpha Surveys (Total Alpha Activity)	55
Bicron w/ B50 Probe	60 sec (beta)	250	Direct Beta Surveys (Total Beta Activity)	610
NE Electra w/ DP6 Probe	60 sec (alpha) 60 sec (beta)	2 700	Direct Alpha Surveys (Total Activity) Direct Beta Surveys (Total Activity)	60 455
SAC-4	60 sec (alpha)	1	Removable Alpha Swipes	18
LB-5100W	60 sec.* (alpha) 60 sec (beta)	0.5 4	Simultaneous Removable Alpha and Beta Swipes	20* (alpha) 35 (beta)
BC-4	60 sec (beta)	200	Removable Beta Swipes	205

* This 60 second count time can be increased to assure that the MDA is a fraction of the unrestricted release criteria for gross alpha contamination

What action levels are applicable to the decision or parameter of interest?

The unrestricted release criteria is outlined in Appendix A

Define the decisions using "if...then" statements.

If the structures and components of Buildings 965, 968 and 980 contain no radioactive material above the unrestricted release criteria, then those components may be released in an unrestricted manner

If the structures and components of Buildings 965, 968 and 980 contain radioactive material above the unrestricted release criteria, then those components will be decontaminated or removed

If decontaminated structures and components of Buildings 965, 968 and 980 contain radioactive material above the unrestricted release criteria, then those components will not be released in an unrestricted manner

If removed materials (structures and components) are radioactively contaminated, then those removed materials will not be released in an unrestricted manner

STEP 6

What sample size is necessary for the analysis being completed?

The sample size is defined for different areas in Buildings 965, 968 and 980 as outlined in the following table and discussed below

Area Description	Classification
Interior of the east end of Building 980 (floors and walls) (These areas are located in the Radiological Buffer Area and/or the Contamination Area within Building 980) Thorium area in the east end of Building 980	Class 1 Impacted (Affected)
Exterior walls of Buildings 968 and 965 Remaining floors, interior walls and fixed equipment < 2 meters up, in Building 980	Class 1 Impacted (Affected) Class 2 Impacted (Affected)
Interior walls and fixed equipment above 2 meters in Building 980 Floors, interior walls, and fixed equipment in Buildings 965 and 968	Class 3 Impacted (Unaffected)
Ceilings of 965, 968, and 980	Non-Impacted

The floors, walls, and fixed equipment will be surveyed for fixed and removable, gross alpha and gross beta contamination as indicated in the survey instructions provided in Appendix C, in accordance with the following.

What number of samples/measurements will provide the desired certainty?

Building 980 was used as a warehouse and to store construction equipment which was not in use. Because equipment which was used in plutonium buildings were stored in Building 980, the storage areas are considered to have a potential for plutonium contamination, therefore, the west end in B980, below 2 meters, is considered to be a Class 2 area. The initial characterization of storage areas identified no radioactive contamination.

The east end of Building 980 was converted into a decontamination room for the solar pond vacuum trucks. The east end of Building 980 was set up as a radioactive contamination area during the truck decontamination process. Due to potential radioactive material being present above the unrestricted release level, the east end of Building 980 is considered an Impacted area with a survey population to meet Class 1 requirements. Based on the fact that no radioactive contamination above the Appendix A limits was detected on the floors or walls of the area (over 500 measurements), the ceiling of this area, remains classified as Non-impacted. This is the same classification as the remaining ceiling areas in B980 and the ceilings in B965 and 968.

The west end of Building 980 is considered an Impacted area with a survey population of Class 2 on the floor and walls up to 2 meters. The survey population above 2 meters (excluding the ceiling) is to meet Class 3 requirements. The west end ceiling is considered Non-impacted since no contamination was found on the floor and walls during characterization surveys.

During In-process characterization surveys internal to Building 980 a high alpha contamination (fixed) area was identified. The alpha contamination was verified to be Thorium and the survey density will therefore be increased to Impacted Class 1. The size of the area shall be large enough to encompass the area of interest. The thorium activity is expected since tungsten welding rods with natural thorium were routinely sharpened on a grinder in this area.

Building 968 like Building 980, was used as a warehouse. Used small hand tools were stored on shelving in the building, however, building 968 was primarily used to stage new parts. An addition to the south end of the building was used as a vehicle maintenance area. Because Building 968 did not contain a contamination area and because an extensive baseline survey (over 500 fixed and removable measurements) as well as extensive free release surveys on the shelving did not reveal any contamination present, the survey population of Building 968 is different than Building 980. The entire interior (except ceiling), of Building 968 will be surveyed as a Class 3 Impacted area. No distinction is drawn above and below 2 meters due to the extensive number of surveys showing no radioactive material above unrestricted release levels. The Building 968 ceiling is considered a non-impacted area.

Building 965 was used for minor vehicle maintenance and as a carpenter shop. The building was later used as a breakroom for the security force. The potential for radioactive contamination is considered very low. The building's interior survey population is considered as an Impacted Class 3. No distinction is drawn above and below 2 meters because of the small area being surveyed.

Fixed radioactive contamination has been identified on the exterior of all three buildings (980, 968 and 965).

Because the exterior contamination on Building 980 (Reconnaissance Level Characterization) appeared to be uniform, project personnel made the decision to treat the exterior panels of the building as low-level radioactive waste. Additional surveys would only be required as the exterior panels were removed to check the overlapping seams for removable contamination.

Based on the contamination found on the exterior of Building 980 and the Reconnaissance Level Characterization of Buildings 968 and 965, the survey populations of Buildings 968 and 965 were increased to Impacted Class 1.

Fixed equipment surveys will be performed on a random basis to verify that no radioactive contamination is present above the Appendix A limits in the interior of Buildings 965, 968, and 980. A minimum of 30 biased measurements will be taken on fixed equipment in buildings 968, and 980. Only 10 biased measurements will be taken in building 965 due to the minimal equipment present as well as the relative small size of the building.

Initial classifications of areas may be downgraded during characterization and in-process surveying based on sound engineering judgement by Radiological Engineering, if desired.

Class 1 Impacted Areas Survey and Sampling Requirements

Floors Surveys:

- One fixed alpha and beta total surface activity measurement for each one square meter
- One alpha and beta removable activity measurement for each one square meter
- A 100% alpha and beta scan will be performed on accessible floor surfaces

Walls:

- One fixed alpha and beta total surface activity measurement for each one square meter.
- One alpha and beta removable activity measurement for each one square meter
- A 100% beta and alpha scan will be performed on accessible surfaces

Class 2 Affected Areas Survey and Sampling Requirements

Floors/Lower Walls below two meters:

- One fixed alpha and beta total surface activity measurement based on MARSSIM statistical calculations (See Appendix B)
- One alpha and beta removable activity measurement based on MARSSIM statistical calculations (see Appendix B)
- A 50% alpha and beta scan based on total survey surface area will be performed on selected biased locations

Class 3 Unaffected Areas Survey and Sampling Requirements

Floors/Walls:

- One fixed alpha and beta total surface activity measurements for each fifty square meters or thirty measurements whichever is greater
- One alpha and beta removable activity measurement for each fifty square meters or thirty measurements whichever is greater
- A 10% alpha and beta scan based on total survey surface area will be performed on selected biased locations

Non-Impacted Areas Survey and Sampling Requirements

- No surveys required

What is the expected range of the parameter of interest?

All parameter values are expected to be less than the unrestricted release criteria outlined in Appendix A

Define both types of decision errors, (false negative and false positive)?

False negative (Type 1) errors would occur when a detectors response is below the unrestricted release criteria when, in fact, radioactive material is present above the unrestricted release criteria

False positive (Type 2) errors would occur when a detectors response is above the unrestricted release criteria when, in fact, radioactive material is not present above the unrestricted release criteria

What are the potential consequences of an incorrect decision?

For false negative errors, area/material would be released in an unrestricted manner when it should not be released in an unrestricted manner

For false positive errors, area/material would not be released in an unrestricted manner when it should be released in an unrestricted manner

What are the limits on decision errors?

The following instrumentation will be used to perform all radiological surveys. The Minimum Detectable Activities (MDA) of the instruments used to perform the surveys required in this CRSP will be a fraction of the unrestricted release criteria outlined in Appendix A. A goal will be to have the MDA of an instrument at or below 50% of the unrestricted release criteria

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm ²)
Bicron w/ A100 Probe	60 sec (alpha)	2	Direct Alpha Surveys (Total Alpha Activity)	55
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SAC-4	60 sec (alpha)	1	Removable Alpha Swipes	18
LB-5100W	60 sec * (alpha) 60 sec (beta)	0.5 4	Simultaneous Removable Alpha and Beta Swipes	20* (alpha) 35 (beta)
BC-4	60 sec (beta)	200	Removable Beta Swipes	205

* This 60 second count time can be increased to assure that the MDA is a fraction of the unrestricted release criteria for gross alpha contamination

The use of these instruments with their associated MDAs below the unrestricted release criteria can assure that false negative and false positive errors are minimized

STEP 7

What method will be used to obtain the desired information?

The survey methods to be utilized are in conformance with the following RFETS procedures

- 4-K62-ROI-03 01 *Performance of Surface Contamination Surveys*
4-S23-ROI-03 02 *Radiological Requirements for Unrestricted Release*
4-Q97-REP-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*
1-P73-HSP-18 10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

What level of worker protection is required to perform survey and other work in the facility, structure or environs?

Standard industrial safety practices are utilized. Worker personnel protection clothing is identified in the Activity Hazard Analysis and RWP if required. Safety glasses, safety shoes, and leather gloves are required by the task AHA. No removable radioactive contamination has been identified or is suspected on the surfaces being surveyed. Therefore no radiological protection is required.

How will the survey design be optimized?

Measurement locations will be clearly identified to provide a method of referencing survey results to survey measurement locations. Gridding will be used for the floors and walls for areas with Affected/Impacted final classification only. Grids may be marked by paint, a chalk line, or labels at grid locations. In areas where gridding is not practical or cost effective, measurement locations will be marked with labels or similar method or delineated on a map as directed by Radiological Engineering.

Have data quantity and quality assurance requirements for sampling been reviewed and incorporated into the survey process?

Quality assurance is addressed in Section 8.0 of this CRSP. The survey reports are prepared and reviewed in accordance with RFETS procedures.

7.0 RESPONSIBILITIES

7.1 PROJECT MANAGER

The Project Manager is responsible for reviewing and approving the Building 980 Cluster Decommissioning Project CRSP and Report.

7.2 DECOMMISSIONING RADIOLOGICAL ENGINEER

The Decommissioning Radiological Engineer is responsible to:

- Evaluate the project structures and appropriately classify the areas for survey
- Develop overall technical aspects, planning, and scheduling for implementation of the Close-Out Radiological Survey
- Define the content and ensure preparation of the Building 980 Cluster Decommissioning Project Close-Out Radiological Survey Report (CRSR)
- Resolve issues regarding survey layout and gridding requirements
- Review surveys and sample analysis results for completeness, accuracy, and legibility

7.3 RADIOLOGICAL ENGINEER

The Radiological Engineer is responsible to

- Review and approve the Building 980 Cluster Decommissioning Project CRSP and Report
- Ensure that the Close-Out Radiological Survey is developed and consistent with RFETS requirements
- Review survey data for completeness, accuracy, and legibility. Ensure discrepancies in survey data are identified and corrected
- Assist with the preparation of the CRSR
- Preparation and approval of the Property Release Evaluation (PRE)
- Ensure that appropriate background levels are applied

7.4 RADIOLOGICAL CONTROL TECHNICIANS

The Radiological Control Technicians are responsible to

- Perform surveys in accordance with this plan, approved RFETS procedures, and direction provided by the Radiological Engineer
- Provide complete, accurate, and legible documentation for all surveys performed

8.0 QUALITY ASSURANCE (QA)

8.1 SURVEY DOCUMENTATION

Records of the survey will be maintained in a survey package. The survey package will be the primary method of controlling and tracking close-out radiological survey results. The records compiled in a survey package will include (if applicable)

- Completed Contamination Survey Results (Fixed and Removable)
- Completed PREs
- Survey Area Diagrams/Maps
- Printout Of Smear Survey Analysis
- Laboratory Analysis Results
- Data Analysis Summary
- Completed Chain Of Custody Forms

8.2 CHAIN OF CUSTODY (COC)

Samples will be managed to ensure that there is an accurate record of sample collection, transport, analysis, and disposal. This will insure that samples are neither lost nor tampered with and that the sample analyzed is traceable to a specific location in the field. COC documentation shall be completed for all samples submitted for laboratory analysis. The COC form will be included as part of the close-out radiological survey documentation.

8.3 ANALYTICAL LABORATORY QA/QUALITY CONTROL (QC)

All samples collected for special analysis will be analyzed by RFETS laboratories or an approved contracted laboratory. The analysis will be performed by trained individuals using appropriate equipment and procedures. The laboratory will have analytical capabilities for the radionuclides of interest (Plutonium, Americium, Uranium) and an established QA/QC program which assures the validity of the analytical results. The laboratory analytical methods will be capable of measuring levels below the established release criteria. All results will state the detection limit for the analysis.

9.0 REPORTING SURVEY FINDINGS

A Close-Out Radiological Survey Plan Report will be prepared at the conclusion of the project. The report will be prepared by the Decommissioning Radiological Engineer and the cognizant SSOC Radiological Engineer. A summary of the following measurement results and overall conclusions showing that the building surfaces meet the release criteria will be provided.

- Total Surface Beta-Gamma Activity
- Total Surface Alpha Activity
- Removable Surface Beta-Gamma Activity
- Removable Surface Alpha Activity

10.0 REFERENCES

NUREG/CR5849 - *Manual For Conducting Radiological Surveys In Support Of License Termination (Draft)*

MARSSIM - *Multi-Agency Radiation Survey And Site Investigation Manual (Draft)*.

Site Procedure 4-K62-ROI-03 01, *Performance Of Surface Contamination Surveys*

Site Procedure 4-S23-ROI-03 02, *Radiological Requirements For Unrestricted Release*

Site Procedure 4-Q97-REP-1003, *Radiological Evaluation For Unrestricted Release Of Property/Waste*

Site Procedure I-P73-HSP-18.10, *Radioactive Material Transfer And Unrestricted Release Of Property And Waste*

Reconnaissance Level Characterization Report For The Building 980 Trailer Removal Project, August 1997

Decommissioning Program Plan, Draft, July 1997

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden, CO

Appendix A
Summary Of Contamination Values
For Unrestricted Release

Summary Of Contamination Values For Unrestricted Release

RADIONUCLIDE (1)	Average Total (Fixed + Removable) Contamination dpm/100 cm² (2), (3), (4)	Maximum Total (Fixed + Removable) dpm/100 cm² (2),(4), (5)	Removable dpm/100 cm² (2), (4), (6)
Transuranics, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above (7)	5,000	15,000	1,000

NOTES

- (1) Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma emitting radionuclides should apply independently
- (2) As used in this table, disintegrations per minute (dpm) is defined as the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation
- (3) Measurements of average contamination should not be averaged over an area of more than 1 meter². For objects with a total surface area of less than 1 meter², the average should be derived for each object
- (4) The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mRad/hour and 1.0 mRad/hour, respectively at 1 cm
- (5) The maximum contamination level applies to an area of not more than 100 cm²
- (6) The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with a dry filter of soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-226, Ac-227, Th-228, Th-230, Pa-231, and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate the total residual surface contamination levels are within the limits for removable contamination
- (7) This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched

Appendix B
MARSSIM Statistical Methodology

MARSSIM Statistical Methodology

Number of Removable Transuranic Alpha Contamination Measurements Required

Assumptions

- 1 Assume contamination not present in background
- 2 DCGL = 20 dpm/100 cm²
- 3 LBGR = 18 dpm/100 cm² (90% of DCGL based on professional judgement)
- 4 $\sigma_s = 3$ dpm/100 cm² based on the following assumptions:
 - The MDA is 18 dpm/100 cm²
 - Building 980 had approx. 200 removable measurements performed with all values < MDA
 - The distribution of survey results is assumed to be 9 ± 3 dpm/100 cm² which is the mean $\pm \sigma$, therefore the mean $\pm 3 \sigma$ equals 18 dpm/100 cm²
- 5 $\alpha = B = 0.05$ (each set 95% confidence level)
- 6 N values taken from MARSSIM, Table 5.5
 $(DCGL - LBGR) / \sigma = (20 - 18) / 3 = 0.67$
The number of samples = $65 - (0.67(65-50)) = 55$ samples

Number of Fixed Transuranic Alpha Contamination Measurements Required

Assumptions

- 1 Assume contamination not present in background
- 2 DCGL = 100 dpm/100 cm²
- 3 LBGR = 90 dpm/100 cm² (90% of DCGL based on professional judgement)
- 4 $\sigma_s = 10$ dpm/100 cm² based on the following assumptions:
 - The MDA is 60 dpm/100 cm²
 - Building 980 had approx. 200 removable measurements performed with all values < MDA
 - The distribution of survey results is assumed to be 30 ± 10 dpm/100 cm² which is the mean $\pm \sigma$; therefore the mean $\pm 3 \sigma$ equals 60 dpm/100 cm²
- 5 $\alpha = B = 0.05$ (each set 95% confidence level)
- 6 N values taken from MARSSIM, Table 5.5
 $(DCGL - LBGR) / \sigma = (100 - 90) / 10 = 1.0$
The number of samples = 29

Appendix C
Radiological Survey Instructions

Radiological Survey Instructions

Item/Area Description ¹	Radiological Survey ²		Scan ³ Survey	Special Instructions
	# of Alpha/Beta Swipes	# of Direct Alpha/Beta Measurements		
Building 965 floors, and interior walls	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	10%	Obtain measurements on accessible floor, interior wall surfaces
Building 965 exterior walls	A minimum of 1 measurement for each 1 m ²	A minimum of 1 measurement for each 1 m ²	100%	Obtain measurements on exterior wall surfaces
Building 965 fixed equipment	Obtain 10 biased measurements on fixed equipment throughout the building ⁵	Obtain 10 biased measurements on fixed equipment throughout the building ⁵	N/A	Obtain measurements on fixed equipment
Building 968 floors and interior walls	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	10%	Obtain measurements on accessible floor, and interior wall surfaces
Building 968 fixed equipment	Obtain 30 biased measurements on fixed equipment throughout the building	Obtain 30 biased measurements on fixed equipment throughout the building	N/A	Obtain measurements on fixed equipment
Building 968 exterior walls	A minimum of 1 measurement for each 1 m ²	A minimum of 1 measurement for each 1 m ²	100%	Obtain measurements on exterior wall surfaces
Building 980 East end - floors, and walls	A minimum of 1 measurement for each 1 m ²	A minimum of 1 measurement for each 1 m ²	100%	Obtain measurements on accessible interior floor, wall surfaces
Building 980 fixed equipment	Obtain 30 biased measurements on fixed equipment throughout the building	Obtain 30 biased measurements on fixed equipment throughout the building	N/A	Obtain measurements on fixed equipment.
Building 980 West end - floors, and interior walls <2m	Per Appendix B, Frequency Requirements A minimum of 55 measurements	Per Appendix B, Frequency Requirements A minimum of 55 measurements	50%	Obtain measurements on interior floor and wall surfaces
Building 980 West end interior walls >2m to ceiling	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	10%	Obtain measurements on accessible interior wall surfaces
Building 980 Thorium Area	A minimum of 1 measurement for each 1m ²	A minimum of 1 measurement for each 1m ²	100%	Obtain measurements on accessible floors, walls, and fixed equipment

Notes

¹ See attached map of building layout

² Surveys to be performed in accordance with 4-K62-ROI-03 01, *Performance of Surface Contamination Surveys* Other radiological references are 1-P73-HSP-18 10, *Radioactive Material Transfer and Unrestricted Release of Property and Waste*, 4-S23-ROI-03 02, *Radiological Requirements for Unrestricted Release*, and 4-N83-REP-1108, *Radioactive Material Management Area (RMMA) Determination*

³ Perform an alpha/beta scan survey of the accessible surfaces, including fixed equipment, as listed

⁴ In the event no contamination is detected on the floor or wall surfaces during characterization/final survey, radiological engineering may relax the sampling and scanning requirements to a less restrictive classification

⁵ Only 10 measurements are required because of minimal equipment in survey area

REVIEW AND APPROVAL

Prepared By _____

Date _____

Reviewed By _____

Date _____