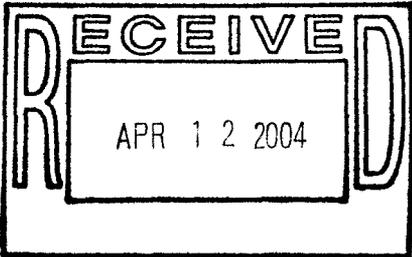


**Building 771/774 Closure Project  
Characterization Plan For  
Areas Greater than Six  
Feet Below Final Grade**

**Final  
11/14/03**



ADMIN RECORD

1/2

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## 1.0 INTRODUCTION

This Characterization Plan identifies the characterization and verification approach for portions of Building 771/774 that contain fixed areas of contamination. As stated in the 771 Closure Project Decommissioning Operations Plan Modification 5 (DOP), the objective of this characterization plan is to ensure that the nature and extent of contamination is adequately defined and that the material that will be left in place is consistent with the framework for contaminated soil. The areas that have not been decontaminated to the unrestricted release criteria and will remain in place after backfilling will be characterized in accordance with this project-specific characterization package prepared in accordance with the Decontamination and Decommissioning Characterization Protocol and the Industrial Area Sampling and Analysis Plan. The slab and structure within 0 to 6 feet of the final proposed grade will be decontaminated to the unrestricted release criteria and 0 to 3.5 feet will be removed during demolition. The Building 771/774 slab and structure below 6 feet of the final proposed grade will be decontaminated to ensure that it will not exceed 7 nCi/g (over depth of volume) and/or 100 nCi/g (surface). The described characterization methods are based on the Data Quality Objectives of the Industrial Area Sampling and Analysis Plan (IASAP)(DOE 2001a).

## 2.0 EXISTING CHARACTERIZATION INFORMATION

The contaminant of concern in Building 771/774 is weapons-grade plutonium, which consists primarily of Pu-239/240 and Am-241 (which is present as a result of ingrowth from the decay of Pu-241). These three isotopes represent over 98% of the total activity per gram of WGP. Other incidental radionuclides were utilized for various processes in Building 771 and 774, including enriched and depleted uranium, and mixed fission products (MFP). However, a review of the *in-situ* gamma-spectroscopy data did not indicate the presence of the associated radioisotopes on structural surfaces (refer to Attachment A).

The locations of the existing random *in-situ* data were selected per the requirements of RSP-09.09, Radiological Characterization of Low Specific Activity Waste by Field Sampling and Analysis. This procedure describes a method to calculate conservative estimates of material activity concentration based on random sampling and calculation of the upper confidence limit (UCL<sub>95</sub>) of the mean concentration. The statistical evaluation also assumes a lognormal distribution with the intention of biasing results high to provide a high degree of confidence that no transportation or waste acceptance criteria is exceeded. However, because many areas exceeding the specified limits have been identified through this sampling effort, no statistical evaluations of the existing data set will be performed. However, a statistical evaluation will be performed for verification sample data, as described in Section 5.0.

Each characterization unit represented one room or area with similar process histories and contamination potential. Building 771 was divided into seven areas and fifteen random measurements were collected in each unit (with the exception of the Room 182, from which five samples were collected due to previously-existing work interferences). Additional biased *in-situ* measurements were collected in Room 148 and in Building 774.

Ninety (90) paint samples were collected on the second floor of Building 771 as part of the Reconnaissance Level Characterization (RLC) effort. Fifteen (15) paint samples were collected in Room 241 of Building 774 were also collected during RLC. Additional biased ZnS measurements were collected in non-process areas of Building 771 as part of Phase 2 of the UBC characterization effort. Additional paint and *in-situ* measurements were collected in the Building 771/776 tunnel as part of the hydrolazing waste characterization effort. A summary of the type of data collected is presented in Table 1.

A total of 297 biased and random data points have been collected. Thirty-three (33) of the *in-situ* data points, were collected on structural walls and ceilings. None of these structural wall/ceiling data points exceeded 100 nCi/g at the surface and/or 7 nCi/g averaged over the wall/ceiling depth. Based on the *in-situ* gamma spectroscopy data, the average volumetric activity is approximately 9 nCi/g for the slab and 0.03 nCi/g for the wall/ceiling surfaces, indicating that greater than 99% of the remaining activity exists in the slab.

Floor and wall shots in Old Tank 40 (B774) did indicate contamination in excess of 100 nCi/g at the surface. Therefore, remediation will be required on the walls as well as the slab of Old Tank 40.

A summary map of the results for the first floor of Building 771 and Building 774 is presented in Figure 1. No summary map is presented for the second floor of Building 771, given that all surface paint sample results were less than 1 nCi/g.

### 3.0 POST-REMEDATION SCANNING (> 6' BELOW FINAL GRADE)

Following the decontamination of the slab, a 100% scan of the slab surfaces will be performed with a qualitative field instrument to verify that all areas in excess of 100 nCi/g have been remediated. Any area flagged as potentially greater than 100 nCi/g will either be remediated or verified to be less than 100 nCi/g with a quantitative instrument (i.e., *in-situ* gamma-spectroscopy or laboratory sample analysis method).

### 4.0 VERIFICATION SAMPLING (> 6' BELOW FINAL GRADE)

Following completion of remediation activities and the collection of biased post-remediation data, an additional verification sampling effort will be performed on slab surfaces that will remain *in-situ* 6' below final grade. The objective is to verify with 95% confidence that the average slab activity is less than 100 nCi/g (surficial) and 7 nCi/g (volumetric), and to provide an estimate of the average remaining slab activity. In addition, the data will be evaluated for the presence of other incidental radioisotopes, including Radium-226 and Uranium-235. The locations of the random sample locations will be selected per a simple non-parametric statistical method (Sign Test) described in Section 8.3 of the MARSSIM manual (refer to Attachment B). Building 771 will be divided into three units, and 774 into one unit (refer to Table 3). The number of samples required will be based on standard deviation estimates derived from existing data, and verified to be adequate based on actual standard deviations.

## 5.0 NON-RADIOLOGICAL CONTAMINANTS

The non-radiological contaminants of concern, including beryllium (Be), asbestos (ACM), poly-chlorinated bi-phenyls (PCBs), RCRA contaminants, including lead (Pb), will be evaluated per existing site requirements for demolition. A discussion of each contaminant and path forward is provided below.

Beryllium will be evaluated per the requirements of the PDSP. Asbestos shall be removed and controlled per the requirements of Colorado Department of Public Health and Environment Regulation No. 8, Part B, and OSHA 29 CFR 1926.1101. PCB-based paints shall remain in place and the control measures outlined in the Risk-Based Approach memorandum (8EPR-F) shall be implemented during demolition. RCRA contaminants, including any RCRA closures, shall be evaluated per the requirements of the B771 DOP. Lead analysis of paint from the process areas of the 771/774 complex has revealed lead levels above regulatory limits in only one out of 61 samples taken, and the elevated level was only found in the stack exhaust tunnel (on an orange-colored sealant). Additional sampling will be performed in the exhaust tunnel in order to determine the path forward.

## 6.0 REPORTS

Upon completion of verification sampling, a final report shall be generated that includes the information described below.

- An overview map delineating decontaminated areas and post-remediation sample results
- The individual verification sample results and statistical evaluation (by survey unit)
- The average remaining activity (by survey unit)
- The conclusion for each survey unit

## 7.0 MAPS

The final grade maps are presented in Figure 2.

## 8.0 REFERENCES

DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

MAN-127-PDSP, Pre-Demolition Survey Plan for D&D Facilities, Revision 0, Golden, Colorado, April 23, 2001.

PRO-1564-RSP-09.09, Radiological Characterization of Low Specific Activity Waste by Field Sampling and Analysis, Revision 0, Golden, Colorado, 9/26/02.