



Team Product Document

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Distribution			Abstract		
*	Name	Mail Addr.		This document provides the results for concrete sampling in Building 4024 conducted in 2003. The results are used to predict which concrete needs to be removed with radiological controls and buried as radioactive waste and which can be done without radiological controls and buried in a Class 1 landfill. The criteria for determining this are the Derived Concentration Guideline Limits (DCGLs) which are volumetric release limits for soil. Any volume of concrete containing higher levels than the DCGLs for soil release will require contamination control methods during removal.	
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1.0 Executive Summary

In June of 2003 concrete core samples were taken in Building 4024 to help determine the safest and most cost effective method for demolishing the building. Cores were taken in 21 locations in the reactor test cell, decon gallery and operating gallery areas. Deep cores were taken in the East and West reactor cells and 1" thick discs for analysis were sliced off at 1", 16" and 30" depths. Shallow, 1" cores were taken in the areas outside the test cells.

These discs were analyzed by gamma spectroscopy and two of the highest activity samples (# 54 and 57, see Table 1) were sent offsite for tritium, iron-55 and nickel-63 analysis at Eberline Services Laboratory along with 4 other concrete and bedrock samples.

The 1" depth samples ranged from no detectable activity (NDA) in the areas outside the cells to a maximum of 105 pCi/g europium-152 and 9.4pCi/g cobalt-60 in the areas inside the cells. No europium-154, tritium, iron-55 or nickel-63 was detected in any of the samples analyzed at Eberline Services.

All 16" and 30" depth samples analyzed were NDA with the exception of one location, core # 21, which indicated 3.7 pCi/g of Eu-152 at the 16" depth. The 16" depth sample of core number 1 was counted for a long duration to lower the minimum detectable activity (MDA). This count indicated 0.4 pCi/g Eu-152 and NDA Co-60. This analysis was done to determine how far below MDA for a standard count time (~ 0.7 pCi/g for Eu-152 and ~ 0.2 pCi/g for Co-60) one of the 16" samples actually was.

This document summarizes the results of the sampling and the conclusions drawn from the results.

2.0 Scope

In 1978, concrete cores were taken in the East and West cells of Building 4024 to quantify the extent of activation products formed within the concrete and rebar during the SNAP reactor experiments in the 1960s. A partial Decontamination and Decommissioning (D&D) of facility equipment was subsequently performed (References 1 and 2). This involved only the removal of facility equipment and process systems. The reactor cell concrete and aluminum liner were left intact.

In 1992, further D&D was being considered, and the proposed unrestricted use release limits required isotopic analysis of the concrete. Additional core samples were removed and analyzed by gamma spectroscopy. No samples were taken above 8 feet on the walls or on the ceiling. Also no samples were taken outside of the two reactor cells. The 1992 data was not used in the current analysis; however, samples were taken in 2003 adjacent to the most activated locations from the 1992 sample effort and were used to confirm decay equations (see Tables 2 and 3).

Definitive sampling was completed in 2003 to predict how much of the building structure would require engineering controls to prevent workplace hazards and environmental releases of radioactivity if the building was demolished by rubbleization. This sampling endeavor included all surfaces of the two reactor cells and the basement areas outside the cells.

3.0 Sampling Methodology

General areas to be sampled were pre-selected by the Radiation Safety Engineer based on locations most likely to have become activated during reactor operations. The work crew was provided with an Engineering Work Request (EWR) procedure (Ref. 3) which included a map of the general sample locations (Figure 2). The Radiation Safety Technician utilized a gamma detector to pinpoint the highest surface measurement at each location and marked each spot for concrete coring. Each location distance was measured from location 0, 0 in a two dimensional grid coordinate system and subsequently logged.

Table 1 is the core tracking log produced by the work crew.

A three-inch diameter concrete core saw was used to remove a core at each location to a depth of three feet. Three one-inch thick discs were sawed off of each core at 1, 15 and 30 inches depth and carefully labeled and bagged (Figure 1).

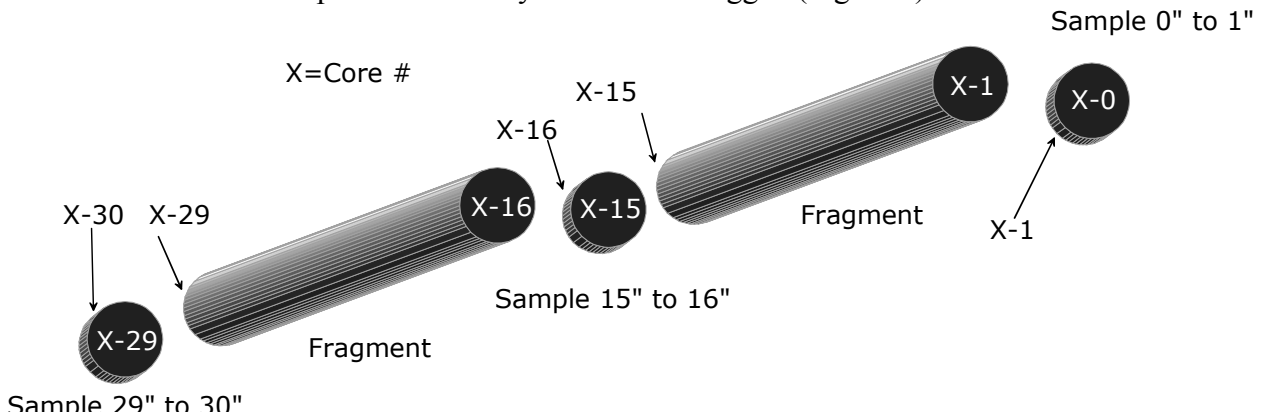


Figure 1: Concrete Core and Discs

At selected locations, where possible, samples were taken of the soil or bedrock after coring through the wall at the sampling location. All discs and soil/bedrock were transferred to the gamma spectroscopy laboratory for analysis. Six disc and soil/bedrock samples with the highest radioactivity were sent to an outside laboratory, Eberline Services, for tritium (H-3), iron-55 (Fe-55) and nickel-63 (Ni-63) analysis.

4.0 Sample Results

Two gamma-emitting isotopes, cobalt-60 (Co-60) and europium-152 (Eu-152), were detectable in the sample lot. The activity varied depending on location and depth. The samples were counted for 2000 seconds, which achieved MDAs of less than 10% of the soil DCGLs for Co-60, Eu-152 and Eu-154 (Reference 4)

It became apparent that the majority of the 15 to 16” and 29” to 30” depth samples would be less than minimum detectable activity with a 2000 second count time. To verify this, several of the 15 to 16” depth samples that had the highest activity at 0 to 1” depth were counted for 7,000 seconds. Except for cores 1 and 21 (0.4 and 3.7 pCi/g Eu-152 respectively), all were less than MDA.

At the highest activity 1” depth location, the soil/bedrock behind the core was counted for 50,000 seconds. It indicated no detectable activity so no further samples of bedrock behind the cores required analysis.

The activity of 1 inch depth cores ranged from no detectable activity to 105 pCi/g Eu-152 and 9.4 pCi/g Co-60. It would take 61.5 years for the 105 pCi/g of Eu-152 to decay to just below its Derived Concentration Guide Limit (DCGL) (release limit for soil) of 4.51 pCi/g. By that time, the Co-60 would have decayed to 0.15% of its DCGL (1.94 pCi/g) (Reference 4).

Tables 2 and 3 list the results of gamma spectroscopy for Co-60 and Eu-152. No Eu-154, H-3, Fe-55 or Ni-63 was detected in any of the samples analyzed.

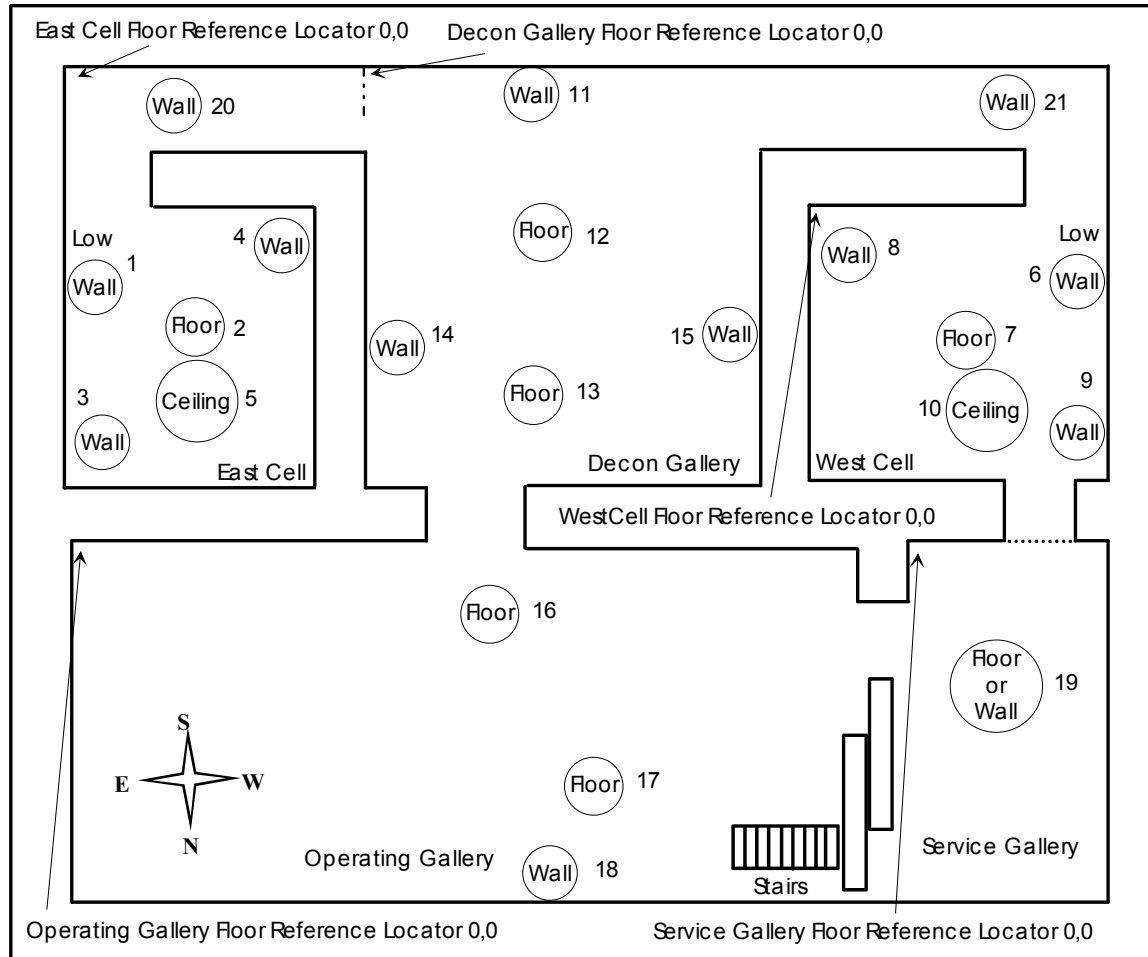


Figure 2: Map of General Core Locations (numbers indicate core numbers)

Table 1: Core Tracking Log

U = Up (from floor) N=North W=West R=Right LOC = grid locator

Core #	Location	Sample #	Ending Depth Inches	Tracking Numbers	LOC A ft	LOC B ft	Date	Sample Sliced By	Comments
1	East Cell, East Wall-1992	024-03-0001	1	0-1	7' 9" R	5' 1" U	6/19/2003	Rocky Serena	
1	East Cell, East Wall-1992	024-03-0002	16	15.0-16	7' 9" R	5' 1" U	6/19/2003	Rocky Serena	
1	East Cell, East Wall-1992	024-03-0003	30	29-30.0	7' 9" R	5' 1" U	6/19/2003	Rocky Serena	
1	Behind East Cell, East Wall-1992	024-03-0004	38	37-38.0	7' 9" R	5' 1" U	6/19/2003	Rocky Serena	Bedrock/Soil
2	East Cell, Floor	024-03-0005	1	0-1	14' 1" N	9' 1" W	6/19/2003	Rocky Serena	
2	East Cell, Floor	024-03-0006	16	15.0-16	14' 1"N	9' 1"W	6/19/2003	Rocky Serena	
2	East Cell, Floor	024-03-0007	30	29-30.0	14' 1"N	9' 1"W	6/19/2003	Rocky Serena	
2	Under East Cell, Floor	024-03-0008	92	91-92.0	14' 1"N	9' 1"W	6/19/2003	Rocky Serena	Bedrock/Soil
3	East Cell, North Wall - High	024-03-0009	1	0-1	2' 3" R	11' 5" U	6/19/2003	Rocky Serena	
3	East Cell, North Wall - High	024-03-0010	16	15.0-16	2' 3" R	11' 5" U	6/19/2003	Rocky Serena	
3	East Cell, North Wall - High	024-03-0011	29.5	28.5-29.5	2' 3" R	11' 5" U	6/19/2003	Rocky Serena	
4	East Cell, South Wall - High	024-03-0012	1	0-1	12' 7" R	7' 11" U	6/19/2003	Rocky Serena	
4	East Cell, South Wall - High	024-03-0013	16	15.0-16	12' 7" R	7' 11" U	6/19/2003	Rocky Serena	

Core #	Location	Sample #	Ending Depth Inches	Tracking Numbers	LOC A ft	LOC B ft	Date	Sampled By	Comments
4	East Cell, South Wall - High	024-03-0014	30	29-30.0	12' 7" R	7' 11" U	6/19/2003	Rocky Serena	
5	East Cell, Ceiling	024-03-0015	1	0-1	15'8" N	5' 7" W	6/19/2003	Rocky Serena	
5	East Cell, Ceiling	024-03-0016	16	15.0-16	15'8" N	5' 7" W	6/19/2003	Rocky Serena	
5	East Cell, Ceiling	024-03-0017	30	29-30.0	15'8" N	5' 7" W	6/19/2003	Rocky Serena	
6	West Cell, West Wall-1992	024-03-0018	1	0-1	17' 7" R	4' 10" U	6/19/2003	Rocky Serena	
6	West Cell, West Wall-1992	024-03-0019	12	11-12.0	17' 7" R	4' 10" U	6/19/2003	Rocky Serena	
6	West Cell, West Wall-1992	024-03-0020	30	29-30.0	17' 7" R	4' 10" U	6/19/2003	Rocky Serena	
6	Behind West Cell, West Wall-1992	024-03-0021	38	37-38.0	17' 7" R	4' 10" U	6/19/2003	Rocky Serena	Bedrock/Soil
7	West Cell, Floor	024-03-0022	1	0-1	11' 8" N	9' 8" W	6/19/2003	Rocky Serena	
7	West Cell, Floor	024-03-0023	15	14-15.0	11' 8" N	9' 8" W	6/19/2003	Rocky Serena	
7	West Cell, Floor	024-03-0024	30	29-30.0	11' 8" N	9' 8" W	6/19/2003	Rocky Serena	
7	Under West Cell, Floor	024-03-0025	82	81-82.0	11' 8" N	9' 8" W	6/19/2003	Rocky Serena	Bedrock/Soil
8	West Cell, South Wall - High	024-03-0026	1	0-1	11' 10" R	12' 9" U	6/19/2003	Rocky Serena	
8	West Cell, South Wall - High	024-03-0027	16	15.0-16	11' 10" R	12' 9" U	6/19/2003	Rocky Serena	

Core #	Location	Sample #	Ending Depth Inches	Tracking Numbers	LOC A ft	LOC B ft	Date	Sampled By	Comments
8	West Cell, South Wall - High	024-03-0028	30	29-30.0	11' 10" R	12' 9" U	6/19/2003	Rocky Serena	
9	West Cell, North Wall - High	024-03-0029	1	0-1	12' 2" R	12' 9" U	6/19/2003	Rocky Serena	
9	West Cell, North Wall - High	024-03-0030	16	15.0-16	12' 2" R	12' 9" U	6/19/2003	Rocky Serena	
9	West Cell, North Wall - High	024-03-0031	30	29-30.0	12' 2" R	12' 9" U	6/19/2003	Rocky Serena	
10	West Cell, Ceiling Shield Plug	024-03-0032	1	0-1	11' 11"	12' 5"	6/19/2003	Rocky Serena	
10	West Cell, Ceiling Shield Plug	024-03-0033	15	14-15.0	11' 11"	12' 5"	6/19/2003	Rocky Serena	
10	West Cell, Ceiling Shield Plug	024-03-0034	29	28-29.0	11' 11"	12' 5"	6/19/2003	Rocky Serena	
11	Decon Gallery, South Wall	024-03-0035	1	0-1	12' 5"R	10' 4"U	6/19/2003	Rocky Serena	
11	Decon Gallery, South Wall	024-03-0036	16	15.0-16	12' 5"R	10' 4"U	6/19/2003	Rocky Serena	
11	Decon Gallery, South Wall	024-03-0037	27	26-27.0	12' 5"R	10' 4"U	6/19/2003	Rocky Serena	
12	Decon Gallery, Floor	024-03-0038	1	0-1	5' 7" N	11' 6" W	6/19/2003	Rocky Serena	
12	Decon Gallery, Floor	024-03-0039	16	15.0-16	5' 7" N	11' 6" W	6/19/2003	Rocky Serena	
12	Decon Gallery, Floor	024-03-0040	30	29-30.0	5' 7" N	11' 6" W	6/19/2003	Rocky Serena	
13	Decon Gallery, Floor	024-03-0041	1	0-1	23' 0" N	8' 0" W	6/19/2003	Rocky Serena	

Core #	Location	Sample #	Ending Depth Inches	Tracking Numbers	LOC A ft	LOC B ft	Date	Sampled By	Comments
13	Decon Gallery, Floor	024-03-0042	15	14-15.0	23' 0" N	8' 0" W	6/19/2003	Rocky Serena	
13	Decon Gallery, Floor	024-03-0043	30	29-30.0	23' 0" N	8' 0" W	6/19/2003	Rocky Serena	
14	Decon Gallery, East Wall	024-03-0044	1	0-1	20' 2" R	12' 1" U	6/19/2003	Rocky Serena	
14	Decon Gallery, East Wall	024-03-0045	15	14-15.0	20' 2" R	12' 1" U	6/19/2003	Rocky Serena	
14	Decon Gallery, East Wall	024-03-0046	30	29-30.0	20' 2" R	12' 1" U	6/19/2003	Rocky Serena	
15	Decon Gallery, West Wall	024-03-0047	1	0-1	19' 3" R	10' 2" U	6/19/2003	Rocky Serena	
15	Decon Gallery, West Wall	024-03-0048	15	14-15.0	19' 3" R	10' 2" U	6/19/2003	Rocky Serena	
15	Decon Gallery, West Wall	024-03-0049	30	29-30.0	19' 3" R	10' 2" U	6/19/2003	Rocky Serena	
16	Operating Gallery Floor	024-03-0050	1	0-1	14' 10" N	8' 4" W	6/19/2003	Rocky Serena	
17	Operating Gallery Floor	024-03-0051	1	0-1	14' 7" N	14' 3" W	6/19/2003	Rocky Serena	
18	Operating Gallery, North Wall	024-03-0052	1	0-1	33' 2" R	4' 2" U	6/19/2003	Rocky Serena	
19	Service Gallery, Floor	024-03-0053	1	0-1	5' 10" N	3' 8" W	6/19/2003	Rocky Serena	
20	East Cell Hallway, South Wall	024-03-0054	1	0-1	7' 5" R	10' 1/2" U	6/19/2003	Rocky Serena	
20	East Cell Hallway, South Wall	024-03-0055	16	15.0-16	7' 5" R	10' 1/2" U	6/19/2003	Rocky Serena	

Core #	Location	Sample #	Ending Depth Inches	Tracking Numbers	LOC A ft	LOC B ft	Date	Sampled By	Comments
20	East Cell Hallway, South Wall	024-03-0056	27	26-27.0	7' 5"R	10' 1/2"U	6/19/2003	Rocky Serena	
21	West Cell Hallway, South Wall	024-03-0057	1	0-1	10' 7"R	14' 3"U	6/19/2003	Rocky Serena	
21	West Cell Hallway, South Wall	024-03-0058	16	15.0-16	10' 7"R	10' 7"U	6/19/2003	Rocky Serena	
21	West Cell Hallway, South Wall	024-03-0059	24.25	23.25-24.25	10' 7"R	10' 7"U	6/19/2003	Rocky Serena	
21	West Cell Hallway, South Wall	024-03-0060	24.25	23.25-24.25	10' 7" R	10' 7"U	6/19/2003	Rocky Serena	Soil Sample

5.0 Conclusion

These conclusions are based on comparing the results to the soil DCGLs. The results indicate that all of the areas outside of the two cells may be rubblized in the open air without worker safety or environmental release concerns. The first 15” depth of the structural surfaces in both of the cells should be removed with the building still standing with portable ventilation in use or using wet removal methods. This would include the walls, ceiling and floors in these areas. The rest of the cells may be demolished after the upper building is torn down. The shaded areas of Figure 3 represent the areas that should be removed with contamination control measures in place.

4024 Basement Activated Concrete Removal

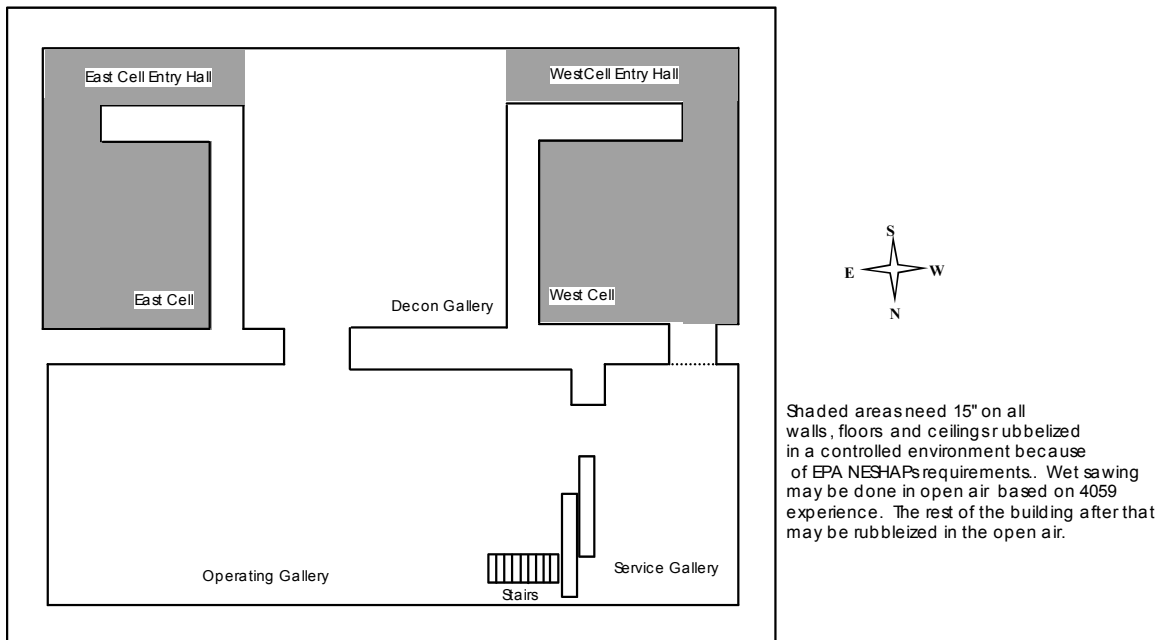


Figure 3: Concrete Removal Diagram

6.0 References

1. A. M. Stelle, Building T024 (SETF) Facilities Dismantling Plan, 7/26/1977
2. D. A. Speights, Radiological Survey Results—Release to Unrestricted Use, Building 024, SSFL, 11/28/1978
3. E. R. McGinnis, Rocketdyne Engineering Work Request # R9036358, 4024 Radiation Safety Instructions for Sampling, 3/14/2003
4. N001SRR140131, “Approved Site wide Release Criteria for Remediation of Radiological Facilities at the Santa Susana Field Laboratory”, February 18, 1999

Table 2: Cobalt-60 Results

Core	Location	Sample #	Ending Depth Inches	Isotope	Activity pCi/g	Error pCi/g	MDA pCi/g	Detect
1	East Cell, East Wall-1992	0'024030001A	1	Co-60	2.418E+00	2.581E-01	1.71E-01	
1	East Cell, East Wall-1992	0'024030001B	1	Co-60	2.460E+00	2.533E-01	1.31E-01	
1	East Cell, East Wall-1992	0'024030002A	16	Co-60	7.050E-02	N/A	1.41E-01	ND
1	East Cell, East Wall-1992	0'024030003A	30	Co-60	3.840E-02	N/A	7.68E-02	ND
1	East Cell, East Wall-1992	0'024030003B	30	Co-60	5.050E-02	N/A	1.01E-01	ND
1	Behind East Cell, East Wall-1992	0'024030004	38	Co-60	2.580E-02	N/A	5.16E-02	ND
1	Behind East Cell, East Wall-1992	0'024030004LC	38	Co-60	1.965E-03	N/A	3.93E-03	ND
1	East Cell, East Wall-1992	0'024030002B	16	Co-60	6.100E-02	N/A	1.22E-01	ND
1	East Cell, East Wall-1992	0'024030002C	16	Co-60	2.820E-02	6.147E-03	1.36E-02	
2	East Cell, Floor	0'024030005A	1	Co-60	2.135E+00	1.852E-01	1.19E-01	
2	East Cell, Floor	0'024030005B	1	Co-60	3.661E+00	3.204E-01	1.857E+01	ND
3	East Cell, North Wall-High	0'024030009A	1	Co-60	1.310E+00	1.821E-01	1.559E-01	
3	East Cell, North Wall-High	0'024030009B	1	Co-60	1.025E+00	1.781E-01	1.572E-01	
4	East Cell, South Wall-High	0'024030012A	1	Co-60	2.272E+00	2.491E+00	2.23E-01	
4	East Cell, South Wall-High	0'024030012B	1	Co-60	2.155E+00	2.405E+00	2.04E-01	
5	East Cell, Ceiling	0'024030015A	1	Co-60	1.069E+00	1.565E+00	1.58E-01	
5	East Cell, Ceiling	0'024030015B	1	Co-60	9.332E-01	1.489E-01	1.747E-01	
6	West Cell, West Wall-1992	0'024030018A	1	Co-60	2.792E+00	2.78E-01	1.88E-01	
6	West Cell, West Wall-1992	0'024030018B	1	Co-60	2.271E+00	0.02467	1.46E-01	
6	Behind West Cell, West Wall-1992	0'024030021	38	Co-60	3.665E-02	N/A	7.33E-02	ND
7	West Cell, Floor	024030022A	1	Co-60	2.276E+00	2.500E-01	1.518E-01	
7	West Cell, Floor	024030022B	1	Co-60	1.740E+00	2.184E-01	1.87E-01	
8	West Cell, South Wall - High	024030026A	1	Co-60	9.121E+00	6.138E-01	1.568E-01	
8	West Cell, South Wall - High	024030026B	1	Co-60	9.392E+00	6.27E-01	3.04E+00	
8	West Cell, South Wall - High	024030027	16	Co-60	1.040E-01	N/A	2.08E-01	ND
9	West Cell, North Wall - High	024030029A	1	Co-60	5.018E+00	4.107E-01	2.503E-01	
9	West Cell, North Wall - High	024030029B	1	Co-60	4.996E+00	4.068E-01	2.255E-01	
9	West Cell, North Wall - High	024030030	16	Co-60	1.095E-01	N/A	2.190E-01	ND
10	West Cell, Ceiling Shield Plug	024030032A	1	Co-60	7.150E-02	N/A	1.43E-01	ND
11	Decon Gallery, South Wall	024030035A	1	Co-60	7.300E-02	N/A	1.46E-01	ND
12	Decon Gallery, Floor	024030038A	1	Co-60	7.550E-02	N/A	1.51E-01	ND
13	Decon Gallery, Floor	024030041	1	Co-60	7.000E-02	N/A	1.40E-01	ND
14	Decon Gallery, East Wall	024030044	1	Co-60	5.850E-02	N/A	1.17E-01	ND
15	Decon Gallery, West Wall	024030047	1	Co-60	7.750E-02	N/A	1.55E-01	ND
16	Operating Gallery Floor	024030050	1	Co-60	5.850E-02	N/A	1.17E-01	ND
17	Operating Gallery Floor	024030051	1	Co-60	8.250E-02	N/A	1.65E-01	ND
18	Operating Gallery, North Wall	024030052	1	Co-60	7.150E-02	N/A	1.43E-01	ND
19	Service Gallery, Floor	024030053	1	Co-60	7.250E-02	N/A	1.45E-01	ND
20	East Cell Hallway, South Wall	024030054A	1	Co-60	1.350E+00	2.055E-01	1.79E-01	
20	East Cell Hallway, South Wall	024030054B	1	Co-60	1.620E+00	2.28E-01	2.92E-01	
20	East Cell Hallway, South Wall	024030055	16	Co-60	6.950E-02	N/A	1.39E-01	ND
20	East Cell Hallway, South Wall	024030056	27	Co-60	3.905E-02	N/A	7.81E-02	ND
21	West Cell Hallway, South Wall	024030057A	1	Co-60	3.878E+00	3.36E-01	1.95E-01	
21	West Cell Hallway, South Wall	024030057B	1	Co-60	4.002E+00	3.413E-01	1.71E-01	
21	West Cell Hallway, South Wall	024030058	16	Co-60	1.025E-01	N/A	2.05E-01	ND
21	West Cell Hallway, South Wall	024030059	24	Co-60	8.200E-02	N/A	1.64E-01	ND
21	Behind West Cell Hallway, South Wall	024030060	30	Co-60	8.950E-03	N/A	1.79E-02	ND

min	1.965E-03	3.930E-03
max	9.392E+00	2.190E-01
average	1.477E+00	1.259E-01

NA in error column indicates sample was < MDA (results entered as 0.5*MDA).

ND = Non-detect.

A = front side, B = backside. There were no significant differences between the two sides, so that method was abandoned.

LC = Long Count time.

1992 in the "Location" column indicates the sample was taken adjacent to one of the hotter 1992 samples.

Co-60 DCGL = 1.94 pCi/g (Reference 4). MAX MDA ~ 10% DGGL.

Table 3: Europium-152 Results

Core	Location	Sample #	Ending Depth		Activity pCi/g	Error pCi/g	MDA pCi/g	Detect
			Inches	Isotope				
1	East Cell, East Wall-1992	024030001A	1	Eu-152	3.451E+01	1.462E+00	7.26E-01	
1	East Cell, East Wall-1992	024030001B	1	Eu-152	3.231E+01	1.344E+00	5.11E-01	
1	East Cell, East Wall-1992	024030002A	16	Eu-152	1.165E-01	N/A	2.33E-01	ND
1	East Cell, East Wall-1992	024030003A	30	Eu-152	4.390E-02	N/A	8.78E-02	ND
1	East Cell, East Wall-1992	024030003B	30	Eu-152	4.955E-02	N/A	9.91E-02	ND
1	East Cell, East Wall-1992	024030003B	30	Eu-152	3.615E-02	N/A	7.23E-02	ND
1	Behind East Cell, East Wall-1992	024030004	38	Eu-152	5.700E-02	N/A	1.14E-01	ND
1	Behind East Cell, East Wall-1992	024030004LC	38	Eu-152	1.304E-01	N/A	5.80E-03	
1	East Cell, East Wall-1992	024030002B	16	Eu-152	1.075E-01	N/A	2.15E-01	ND
1	East Cell, East Wall-1992	024030002C	16	Eu-152	4.113E-01	2.318E-02	2.54E-02	
2	East Cell, Floor	024030005A	1	Eu-152	2.260E+01	9.18E-01	4.04E-01	
2	East Cell, Floor	024030005B	1	Eu-152	3.723E+01	1.51E+00	7.72E-01	
3	East Cell, North Wall-High	024030009A	1	Eu-152	1.688E+01	8.072E-01	4.751E-01	
3	East Cell, North Wall-High	024030009B	1	Eu-152	1.625E+01	7.862E-01	4.646E-01	
4	East Cell, South Wall-High	024030012A	1	Eu-152	3.023E+00	1.281E+00	6.11E-01	
4	East Cell, South Wall-High	024030012B	1	Eu-152	2.705E+00	1.169E+00	7.19E-01	
5	East Cell, Ceiling	024030015A	1	Eu-152	1.388E+01	6.857E-01	4.02E-01	
5	East Cell, Ceiling	024030015B	1	Eu-152	1.387E+01	6.942E-01	4.329E-01	
6	West Cell, West Wall-1992	024030018A	1	Eu-152	2.973E+01	1.260E+00	6.76E-01	
6	West Cell, West Wall-1992	024030018B	1	Eu-152	2.556E+01	1.113E+00	5.098E-01	
6	Behind West Cell, West Wall-1992	024030021	38	Eu-152	6.400E-02	N/A	1.28E-01	ND
7	West Cell, Floor	024030022A	1	Eu-152	2.194E+01	9.943E-01	5.455E-01	
7	West Cell, Floor	024030022B	1	Eu-152	1.834E+01	8.769E-01	5.36E-01	
8	West Cell, South Wall - High	024030026A	1	Eu-152	7.4510E+01	2.805E+00	9.249E-01	
8	West Cell, South Wall - High	024030026B	1	Eu-152	7.758E+01	2.91E+00	1.049E+00	
8	West Cell, South Wall - High	024030027	16	Eu-152	1.480E-01	N/A	2.960E-01	ND
9	West Cell, North Wall - High	024030029A	1	Eu-152	4.566E+01	1.830E+00	7.460E-01	
9	West Cell, North Wall - High	024030029B	1	Eu-152	4.535E+01	1.817E+00	7.620E-01	
9	West Cell, North Wall - High	024030030	16	Eu-152	1.665E-01	N/A	3.330E-01	ND
10	West Cell, Ceiling Shield Plug	024030032A	1	Eu-152	6.750E-02	N/A	1.35E-01	ND
11	Decon Gallery, South Wall	024030035A	1	Eu-152	1.080E-01	N/A	2.16E-01	ND
12	Decon Gallery, Floor	024030038A	1	Eu-152	1.040E-01	N/A	2.08E-01	ND
13	Decon Gallery Floor	024030041	1	Eu-152	1.035E-01	N/A	2.07E-01	ND
14	Decon Gallery, East Wall	024030044	1	Eu-152	9.750E-02	N/A	1.95E-01	ND
15	Decon Gallery, West Wall	024030047	1	Eu-152	1.025E-01	N/A	2.05E-01	ND
16	Operating Gallery Floor	024030050	1	Eu-152	8.400E-02	N/A	1.68E-01	ND
17	Operating Gallery Floor	024030051	1	Eu-152	8.050E-02	N/A	1.61E-01	ND
18	Operating Gallery, North Wall	024030052	1	Eu-152	8.350E-02	N/A	1.67E-01	ND
19	Service Gallery, Floor	024030053	1	Eu-152	8.800E-02	N/A	1.76E-01	ND
20	East Cell Hallway, South Wall	024030054A	1	Eu-152	6.229E+01	2.40E+00	1.11E+00	
20	East Cell Hallway, South Wall	024030054B	1	Eu-152	7.490E+01	2.81E+00	1.06E+00	
20	East Cell Hallway, South Wall	024030055	16	Eu-152	1.110E-01	N/A	2.22E-01	ND
20	East Cell Hallway, South Wall	024030056	27	Eu-152	8.150E-02	N/A	1.63E-01	ND
21	West Cell Hallway, South Wall	024030057A	1	Eu-152	9.452E+01	3.406E+00	1.09E+00	
21	West Cell Hallway, South Wall	024030057B	1	Eu-152	1.051E+02	3.750E+00	9.50E-01	
21	West Cell Hallway, South Wall	024030058	16	Eu-152	3.678E+00	3.076E-01	2.10E-01	
21	West Cell Hallway, South Wall	024030059	24	Eu-152	1.040E-01	N/A	2.08E-01	ND
21	Behind West Cell Hallway, South Wall	024030060	30	Eu-152	2.202E-01	1.290E-02	2.65E-02	2.65E-02

min	3.615E-02	5.800E-03
max	1.051E+02	3.330E-01
average	1.823E+01	1.746E-01

NA in error column indicates sample was < MDA (results entered as 0.5*MDA).

ND = Non-detect.

A = front side, B = backside. There were no significant differences between the two sides, so that method was abandoned.

LC = Long Count time.

1992 in the "Location" column indicates the sample was taken adjacent to one of the hotter 1992 samples.

Eu-152 DCGL = 4.51 pCi/g (Reference 4). MAX MDA < 10% DCGL.