
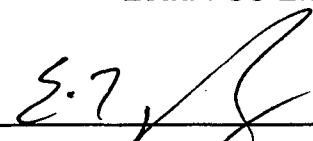


Rancho Seco
Final Status Survey Summary Report
(Rev. 1)
June 16, 2008
East DHR Pump Room (lowers)
Survey Unit F8130031

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130031, East DHR Pump Room (lowers)

Survey Unit Description:

Operating History: The Auxiliary Building, a reinforced concrete structure contained the RadWaste processing and supporting systems. The building contained six main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements on the -47' elevation showed a mean gross activity level of 320,071 dpm/100 cm² and a maximum value of 5,720,000 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the lower walls and floor of the East Decay Heat Pump Room of the auxiliary building was determined to be a Class 1 survey unit.

HSA Events: HSA Report pg. 63.

Survey Unit Design Information:

The Survey Unit Design Parameters are presented in Table 1 below. The survey unit and measurement locations are depicted on the maps in Attachment 1. Direct measurement locations were determined using a random-start, fixed grid pattern and 165.3 m² were scanned for 100% coverage. Samples of removable contamination were collected at each direct measurement location. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F813	East DHR Pump Room (lowers)
Survey Unit:	0031	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	165	
Evaluator:	D.A.Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	3.54	Class 1
Design DCGL_{emc} (dpm/100 cm²):	152220	Class 1
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	9976	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	7	Class 1
Scan Area (m²):	165.3	
Scan Coverage (%):	100%	Class 1
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.97725	
Calculated Relative Shift:	2.1	
Relative Shift Used:	2.1	Uses 3.0 if Relative Shift is >3
N-Value:	12	
Design N-Value + 20%:	15	NUREG-1575 Table 5-5
Design Min Samples N:	24	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 30 direct measurements were made in F8130031. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. Multiple scan measurements indicated areas of elevated activity. Scan activity ranged from 3216 to 1015490 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm ²)
F8130031-C0001BD	2137
F8130031-C0002BD	2682
F8130031-C0003BD	2054
F8130031-C0004BD	10738
F8130031-C0005BD	2137
F8130031-C0006BD	2080
F8130031-C0007BD	1758
F8130031-C0008BD	1587
F8130031-C0009BD	1764
F8130031-C0010BD	1733
F8130031-C0011BD	1899
F8130031-C0012BD	1867
F8130031-C0013BD	2215
F8130031-C0014BD	1924
F8130031-C0015BD	1509
F8130031-C0016BD	1489
F8130031-C0017BD	1395
F8130031-C0018BD	1489
F8130031-C0019BD	2044
F8130031-C0020BD	1717
F8130031-C0021BD	1810
F8130031-C0022BD	2931
F8130031-C0023BD	1364
F8130031-C0024BD	1452
F8130031-C0025BD	1463
F8130031-C0026BD	1411
F8130031-C0027BD	1338
F8130031-C0028BD	1432
F8130031-C0029BD	1344
F8130031-C0030BD	1613
Mean:	2079
Median:	1746
Standard Deviation:	1681
Range:	1338 - 10738

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8130031C0001SM	12.55
F8130031C0002SM	6.14
F8130031C0003SM	12.55
F8130031C0004SM	34.34
F8130031C0005SM	8.7
F8130031C0006SM	9.98
F8130031C0007SM	9.98
F8130031C0008SM	6.14
F8130031C0009SM	2.29
F8130031C0010SM	9.98
F8130031C0011SM	9.98
F8130031C0012SM	-0.27
F8130031C0013SM	9.98
F8130031C0014SM	4.86
F8130031C0015SM	3.58
F8130031C0016SM	-1.55
F8130031C0017SM	-1.55
F8130031C0018SM	1.01
F8130031C0019SM	1.01
F8130031C0020SM	3.58
F8130031C0021SM	2.29
F8130031C0022SM	7.42
F8130031C0023SM	1.01
F8130031C0024SM	1.01
F8130031C0025SM	3.58
F8130031C0026SM	3.58
F8130031C0027SM	2.29
F8130031C0028SM	1.01
F8130031C0029SM	2.29
F8130031C0030SM	2.29
Mean:	5.67
Median:	3.58
Standard Deviation:	6.81
Range:	-1.55 to 34.34

Survey Unit Data Assessment:

The survey design required 30 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 4. The sample mean and median values were less than the DCGL. The sample standard deviation was less than the design standard deviation so no additional samples were required.

Table 4. Data Assessment Results

Survey Results Parameter	Value	Comment	
Material Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0	
Ambient Background Used (dpm/100 cm ²):	N/A		
Actual Direct Measurements (N):	30		
Median (dpm/100 cm ²):	1746		
Mean (dpm/100 cm ²):	2079		
Direct Measurement Standard Deviation (dpm/100 cm ²):	1681		
Total Standard Deviation (dpm/100 cm ²):	1681		Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	10738		Background Subtract Not Applied
Material Type:	N/A		
Sign Test Final N Value:	30		Class 1
S+ Value:	30		
Critical Value:	20		
Sufficient Samples Collected:	Yes		
Maximum Value < DCGL:	Yes		
Median Value < DCGL:	Yes		
Mean Value < DCGL:	Yes		
Maximum Value < DCGL_{mc}:	Yes		
Total Standard Deviation <= Sigma:	Yes		
Pass the Sign Test?	Yes		
Reject the Null Hypothesis?	Yes		
Does the Survey Unit Pass All Criteria?	Yes		

Survey Unit Investigations and Results:

Twenty-Four (24) investigations were required for the scan measurements and the results are reported in Attachment 3. The EMC unity rule was not exceeded as shown in Table 3-1.

During routine surveillance surveys utilizing the 44-10 NaI detector, discovery was made in grids 16, 29, and 32. The results of this discovery are detailed in Revision 1 to Attachment 3. The EMC unity rule was not exceeded as shown in Revision 1 to Table 3-1.

ALARA Statement:

As stated in Chapter 4 of the LTP, as long as the residual activity within the survey unit is less than the DCGL (i.e. the survey unit average activity is less than the DCGL and the EMC criterion has been met), the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 1 structure survey and the sample results are consistent with that classification. The variability of the survey results was less than the characterization data used for survey design. Potential areas of elevated activity were detected and evaluated as shown in Attachment 3 demonstrating the EMC criterion was met.

Conclusion:

The FSS of this survey unit was properly designed as a Class 1 survey based on Table 5-4 of the LTP. The required number of direct measurements was made and the scan coverage met the requirement of Table 5-6 of the LTP. No direct measurements exceeded the DCGL of 43000 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of the DCGL. The investigations required were performed and evaluated as shown in Attachment 3 demonstrating the EMC criterion was met.

The direct measurement data support rejection of the null hypothesis, providing high confidence that the survey unit satisfied the release criteria and that the data quality objectives were met.

It is concluded that survey unit F8130031 meets the release criteria of 10CFR20.1402.

Attachment 2 (Rev. 1)

Instrumentation

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Survey Unit F8130031

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 142514	43-98B; 148639	1400	2520
M2350; 149794	43-68/5B; 149103	433	1033
M2350; 142507	43-116-1B; 256008	491 ¹	739 ¹
M2350; 142507	43-116-1B; 256008	796	3258
M2350; 149794	43-116-1B; 256005	491 ¹	739 ¹
M2350; 149794	43-116-1B; 256005	796	3258
M2350; 203482	44-10; 211672	NA	18720
M2350; 203486	44-10; 171995		
Tennelec; 0401171	N/A	5.15 dpm α , 8.12 dpm β	N/A

¹ 43-116-1B – Juncture Scan - concrete

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	152220
Investigation Criteria – Scan	43000 ¹
DCGL _w	43000
DCGL _{EMC}	152220

¹ Scan Investigation Level set at DCGL_w

² Scan Investigation Level for routine 44-10 surveillance scan set at 20,000 cpm

Attachment 3

(Rev. 1)

Investigation

June 16, 2008

Survey Unit F8130031

Table 3-1 Survey Unit Investigation

Grid	Investigation Level (cpm)	Initial Value (cpm)	Investigation Result (cpm)	Elevated Area (m ²)	Area Factor	DCGL _{emc}	Investigation Result (dpm/100cm ²)	DCGL _{emc} Unity Fraction	
G08	5840	9367	9533 ¹	0.08	158	6796583	49450	0.007	
G11	1990 ²	2648	2648	0.75	194	833692	57217	0.066	
G12	1990 ²	2373	2373	0.99	15	646621	51275	0.076	
G17	5840	8419	7800 ¹	N/A	N/A	N/A	<DCGL	0.000	
G22	1990 ²	46997	459 ^{1,3}	N/A	N/A	N/A	<DCGL	0.000	
G23	5840	12425	13827 ¹	0.059	206	8848359	71724	0.008	
G28	1990 ²	3651	3651	0.99	15	646621	78889	0.119	
G29	5840	13611	14405 ¹	0.09	135	5823227	74722	0.012	
G30	5840	6740	5611 ¹	N/A	N/A	N/A	<DCGL	0.000	
G31	1990 ²	2334	2334	0.75	19.4	833692	50297	0.058	
G32	5840	44119	6278 ^{1,3}	N/A	N/A	N/A	<DCGL	0.000	
G33	1990 ²	2010	2010	0.99	15	646621	43431	0.064	
G53	5840	66837	2933 ^{1,3}	N/A	N/A	N/A	<DCGL	0.000	
G54	5840	7299	6282 ¹	N/A	N/A	N/A	<DCGL	0.000	
G55	5840	27465	6803 ^{1,3}	N/A	N/A	N/A	<DCGL	0.000	
G68	5840	7908	7106 ¹	N/A	N/A	N/A	<DCGL	0.000	
G119	5840	9470	17090 ¹	0.062	196	8424066	88650	0.010	
J08	1990 ²	3154	1833 ¹	N/A	N/A	N/A	<DCGL	0.000	
J09	1990 ²	2987	743 ¹	N/A	N/A	N/A	<DCGL	0.000	
J18	1990 ²	4663	119 ^{1,3}	N/A	N/A	N/A	<DCGL	0.000	
J19	1990 ²	3312	213 ¹	N/A	N/A	N/A	<DCGL	0.000	
J33	1990 ²	3808	4393 ¹	0.044	275	11832787	50886	0.004	
J34	1990 ²	4605	9187 ¹	0.052	233	10027797	106393	0.010	
G16GS	20000	39000	39000	0.0316	411.85	17709550	1,513,739	0.085	
G29GS	20000	36000	36000	0.0323	403	17329000	1,397,297	0.081	
G32GS	20000	74000	74000	0.0323	403	17329000	2,872,222	0.166	
During routine surveillance surveys using the 44-10 (NaI), discovery was made within grids 16, 29, & 32.									
Survey Unit Remainder					DCGL = 43,000		SU Mean = 2080		0.048
EMC Unity Sum								0.852	

¹ Scaler measurement, ² Revised from 1100 ccpm @ 0.42 scan rate coefficient, ³ Remediated and resurveyed