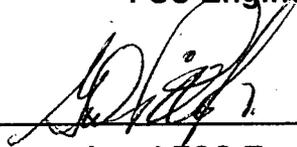
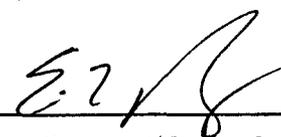


**Rancho Seco**  
**Final Status Survey Summary Report**  
**May 29, 2008**  
**0' Elevation Auxiliary Steam Support**  
**Survey Unit F8132131**

Prepared By:  Date: 5-29-2008  
FSS Engineer

Reviewed By:  Date: 5/30/08  
Lead FSS Engineer

Approved By:  Date: 7-29-08  
Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8132131, 0' Elevation Auxiliary Steam Support

### Survey Unit Description:

**Operating History:** The 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. One report documented contamination of the auxiliary building roof. The roof was later replaced.

**Site Characterization:** Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. 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 cm<sup>2</sup> and a maximum value of 5,720,000 dpm/100 cm<sup>2</sup>. Direct measurements on the -29' elevation showed a mean gross activity level of 544,756 dpm/100 cm<sup>2</sup> and a maximum value of 11,370,000 dpm/100 cm<sup>2</sup>. Direct measurements on the -20' elevation showed a mean gross activity level of 247,831 dpm/100 cm<sup>2</sup> and a maximum value of 10,080,000 dpm/100 cm<sup>2</sup>. Direct measurements on the grade elevation showed a mean gross activity level of 373,758 dpm/100 cm<sup>2</sup> and a maximum value of 5,800,000 dpm/100 cm<sup>2</sup>. Direct measurements on the +20' elevation showed a mean gross activity level of 85,408 dpm/100 cm<sup>2</sup> and a maximum value of 1,900,000 dpm/100 cm<sup>2</sup>. Direct measurements on the +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm<sup>2</sup> and a maximum value of 24,781 dpm/100 cm<sup>2</sup>. Direct measurements on the building exterior, including the mezzanine roof, showed a mean gross activity level of 1,897 dpm/100 cm<sup>2</sup> and a maximum value of 2,990 dpm/100 cm<sup>2</sup>. (The roof had been replaced prior to the classification survey.) Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of the auxiliary building was determined to be a Class 1, 2 area and the exterior was a Class 2,3.

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 105 m<sup>2</sup> were scanned for approximately 34% 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**

<b>Survey Design Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Survey Area:</b>	F813	0' Elevation Auxiliary
<b>Survey Unit:</b>	2131	Steam Support
<b>Class:</b>	2	Structure Surface
<b>SU Area (m<sup>2</sup>):</b>	310.7	LTP Table 5-4
<b>Evaluator:</b>	Gary Frank	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	43000	Gross Activity DCGL
<b>Area Factor:</b>	N/A	Class 2
<b>Design DCGL<sub>emc</sub></b> (dpm/100 cm <sup>2</sup> ):	N/A	Class 2
<b>LBGR (dpm/100 cm<sup>2</sup>):</b>	21500	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	342	
<b>Type I Error:</b>	0.05	
<b>Type II Error:</b>	0.05	
<b>Predominant Nuclide:</b>	Cs-137	
<b>Sample Area (m<sup>2</sup>):</b>	22.2	Class 2
<b>Scan Area (m<sup>2</sup>):</b>	105	
<b>Scan Coverage (%):</b>	34%	Class 2
<b>Z<sub>1-α</sub> :</b>	1.645	
<b>Z<sub>1-β</sub> :</b>	1.645	
<b>Sign P:</b>	0.99865	
<b>Calculated Relative Shift:</b>	62.8	
<b>Relative Shift Used:</b>	3	Uses 3.0 if Relative Shift is >3
<b>N-Value:</b>	11	
<b>Design N-Value + 20%:</b>	14	NUREG-1575 Table 5-5
<b>Design Min Samples N:</b>	14	Class 2
<b>Grid Spacing L:</b>	4.7	Class 2

### Survey Results:

A total of 14 direct measurements were made in F8132131. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. Two of the gamma particle scan measurements indicated areas of elevated activity. Beta scan activity ranged from 1929 to 5847 dpm/100 cm<sup>2</sup>, 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 <sup>2</sup> )
F8132131-C0001BD	1966
F8132131-C0002BD	1733
F8132131-C0003BD	1598
F8132131-C0004BD	1172
F8132131-C0005BD	1172
F8132131-C0006BD	1836
F8132131-C0007BD	1634
F8132131-C0008BD	996
F8132131-C0009BD	1733
F8132131-C0010BD	1816
F8132131-C0011BD	1743
F8132131-C0012BD	1764
F8132131-C0013BD	1468
F8132131-C0014BD	1727
Mean:	1597
Median:	1730
Standard Deviation:	289
Range:	996 - 1966

**Table 3. Removable Surface Activity Results**

Measurement ID	Surface Beta Activity (dpm/100 cm <sup>2</sup> )
F8132131C0001SM	-2.24
F8132131C0002SM	-3.53
F8132131C0003SM	-3.53
F8132131C0004SM	-0.95
F8132131C0005SM	-0.95
F8132131C0006SM	-4.82
F8132131C0007SM	-3.53
F8132131C0008SM	-3.53
F8132131C0009SM	-0.95
F8132131C0010SM	-3.53
F8132131C0011SM	-4.82
F8132131C0012SM	-2.24
F8132131C0013SM	-4.82
F8132131C0014SM	-2.24
Mean:	-2.98
Median:	-3.53
Standard Deviation:	1.41
Range:	-4.82 to -0.95

**Survey Unit Data Assessment:**

The survey design required 14 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**

<b>Survey Results Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Material Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0
<b>Actual Direct Measurements (N):</b>	14	
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	1730	
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	1597	
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	289	
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	289	Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	1966	
<b>Material Type:</b>	N/A	Background Subtract Not Applied
<b>Sign Test Final N Value:</b>	14	
<b>S+ Value:</b>	14	
<b>Critical Value:</b>	10	
<b>Sufficient Samples Collected:</b>	Yes	
<b>Maximum Value &lt; DCGL:</b>	Yes	
<b>Median Value &lt; DCGL:</b>	Yes	
<b>Mean Value &lt; DCGL:</b>	Yes	
<b>Maximum Value &lt; DCGL<sub>emc</sub>:</b>	N/A	Class 2
<b>Total Standard Deviation &lt;= Sigma:</b>	Yes	
<b>Pass the Sign Test?</b>	Yes	
<b>Reject the Null Hypothesis?</b>	Yes	
<b>Does the Survey Unit Pass All Criteria?</b>	Yes	

### **Survey Unit Investigations and Results:**

Two investigations in grid 07 were required for the particle scan measurements and the results are reported in Attachment 3.

### **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, the ALARA criterion has been met.

### **Changes in Initial Survey Unit Assumptions:**

The survey unit was designed as a Class 2 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. Two potential areas of elevated activity were detected and evaluated as shown in Attachment 3.

### **Conclusion:**

The FSS of this survey unit was properly designed as a Class 2 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 cm<sup>2</sup> and none of the removable surface activity measurements exceeded 10% of the DCGL. Two investigations were required and resulted in a 1 square meter section in particle scan grid 7 to be elevated to Class 1 that will be evaluated under Survey Unit F8132133.

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 F8132131 meets the release criteria of 10CFR20.1402.

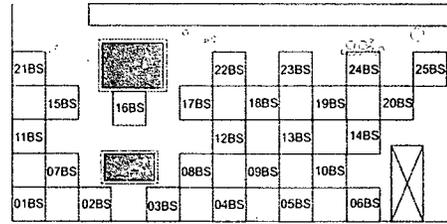
**Attachment 1**

**Maps**

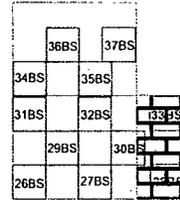
**May 29, 2008**

**Survey Unit F8132131**

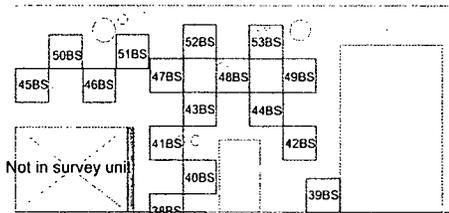
### F8132131 Auxiliary Building Exterior Beta Scan Measurements



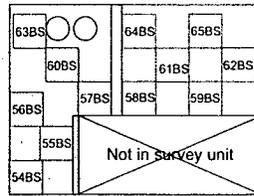
Looking Southeast  
742 ft<sup>2</sup>  
68.9 m<sup>2</sup>



Looking South  
20 m<sup>2</sup>

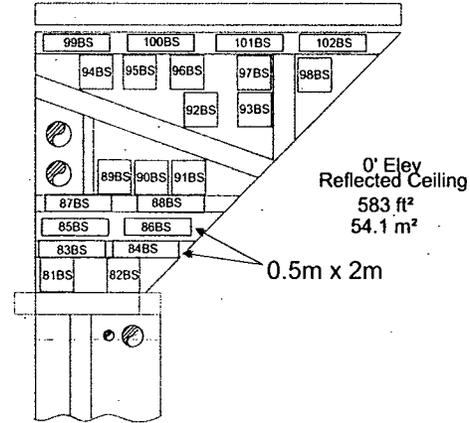


Looking West  
62.5 m<sup>2</sup>



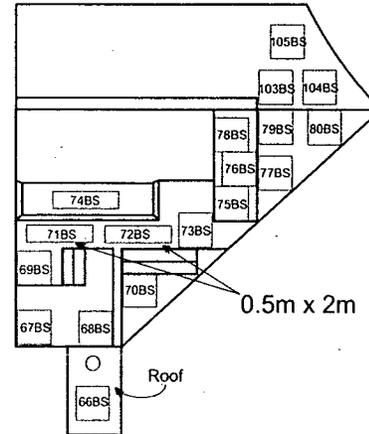
Looking East  
29.7 m<sup>2</sup>

North Face  
69 ft<sup>2</sup>  
6.4 m<sup>2</sup>



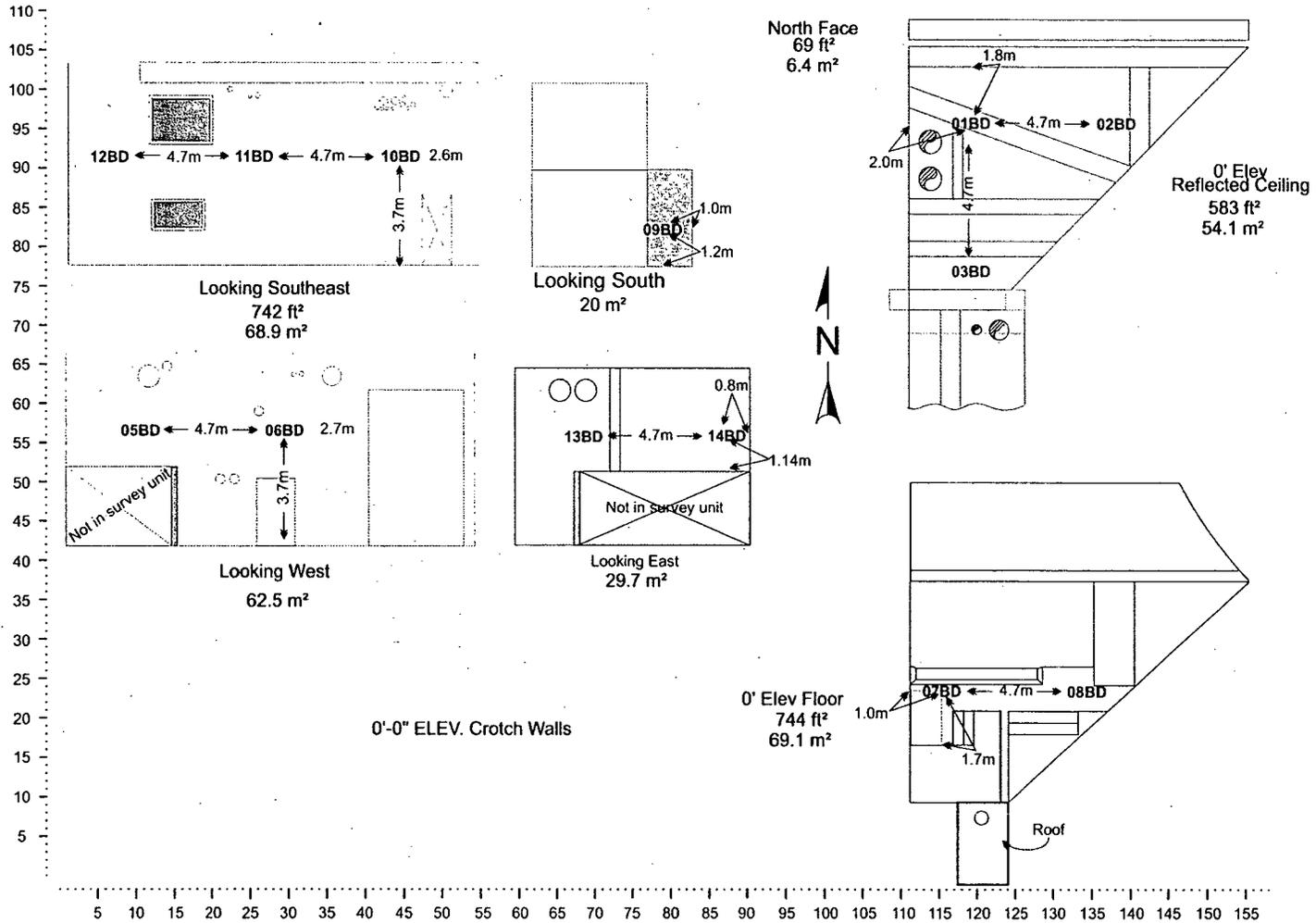
0' Elev Floor  
744 ft<sup>2</sup>  
69.1 m<sup>2</sup>

0'-0" ELEV. Crotch Walls

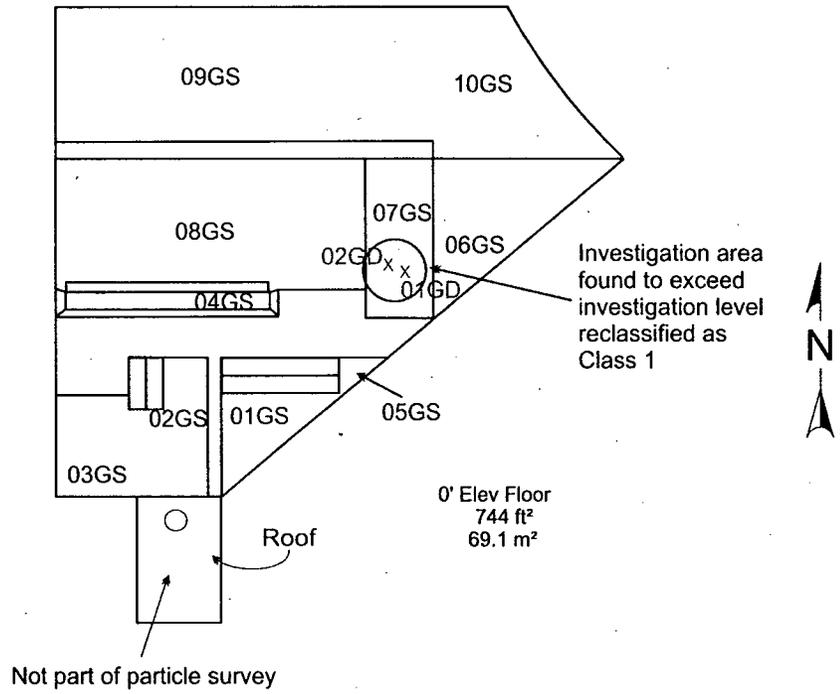


Scans on grids 28, 33 and 99 were not performed. Grids 28 and 33 could not be placed due to error in map measurements. Grid 99's location presented a problem obtaining correctly performed scan measurement. Sufficient area was scanned to meet the Classification requirement.

### F8132131 Auxiliary Building Exterior Direct Measurement/Sample Points



### F8132131 Auxiliary Building Exterior Gamma Particle Scan



**Attachment 2**

**Instrumentation**

**May 29, 2008**

**Survey Unit F8132131**

**Table 2-1. Survey Unit Instrumentation**

<b>Instrument Model; Serial No.</b>	<b>Detector Model; Serial No.</b>	<b>MDC Static (dpm/100 cm<sup>2</sup>)</b>	<b>MDC Scan (dpm/100 cm<sup>2</sup>)</b>
M2350; 203481	44-10; 171992	N/A	5.2 pCi/g
M2350; 175834	43-68B; 190482	433	1033
M2350; 203486	43-68B; 161400	433	1033
Tennelec; 0401171	N/A	6 dpm $\alpha$ , 12 dpm $\beta$	N/A

**Table 2-2. Investigation Criteria and DCGL**

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	43000
Investigation Criteria – Scan	43000
DCGL <sub>w</sub>	43000
DCGL <sub>EMC</sub>	N/A

**Attachment 3**

**Investigation**

**May 29, 2008**

**Survey Unit F8132131**

**Table 3-1 Survey Unit Investigation**

<i>Grid</i>	<i>Investigation Level (cpm)</i>	<i>Initial Value (cpm)</i>	<i>Investigation Result (dpm/100cm<sup>2</sup>)</i>	<i>Elevated Area (m<sup>2</sup>)</i>	<i>Area Factor</i>	<i>DCGL</i>	<i>Investigation Result (dpm/100cm<sup>2</sup>)</i>	<i>DCGL<sub>emc</sub> Unity Fraction</i>
07	8197	14410	285041	1m x 1m	N/A	N/A	1m x 1m area reclassified as Class 1 and surveyed under Survey Unit F8132133	
07	8197	11862	138938		N/A	N/A		
Survey Unit Remainder						DCGL = 43,000	SU Mean =	N/A
EMC Unity Sum								N/A

NOTE: The elevated measurements were found during the gamma particle scan utilizing a 2350-1 and 44-10 (2" x 2" NaI) detector. The area was bounded with the 44-10 and analyzed using the InSpector 1000. The results required the area around the two spots in Grid 7 reclassified as a Class 1. The area will be surveyed under Survey Unit F8132133.

**Attachment 4**

**Data Assessment**

**May 29, 2008**

**Survey Unit F8132131**

