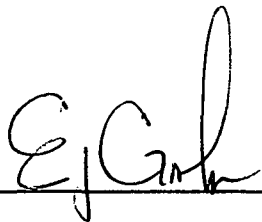


Rancho Seco  
Final Status Survey Summary Report  
December 27, 2016  
IOSB Cell Deck  
Survey Unit F8300093

Prepared By:  Date: 12.27.16  
FSS Engineer

Reviewed By:  Date: 12.27.16  
Lead FSS Engineer

Approved By:  Date: 1/30/2017  
Manager, Rancho Seco Assets

**Survey Unit:**

F8300093, Interim Onsite Storage Building (IOSB) Cell Deck

**Survey Unit Description:**

Operating History: Designed primarily to store packaged radioactive waste containers safely, protected from the elements, and maintain radiological dose as low as reasonably achievable (ALARA), each storage cell possibly stored media of many types, including filters, resins, contaminated chemicals, DAW, activated reactor components, contaminated plant components and other contaminated items.

Site Characterization: Static measurements were made of the walls and ceiling surfaces of the cell deck, to confirm the absence or presence of plant-derived radionuclides. Static measurements showed an average mean gross activity level of 2,079 dpm/100 cm<sup>2</sup> and a maximum value of 2,607 dpm/100 cm<sup>2</sup> for the walls and ceiling. Based on the levels of gross activity reported, the area was determined to be a Class 3 area..

**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**. Static measurement locations were randomly determined and 1% scan coverage. The instrumentation used for the survey along with the MDC values are listed in **Table 2-1 Attachment 2**.

FINAL STATUS SURVEY F8300093

Table 1, Survey Unit Design Parameters

Evaluation Input Values		Comments
Survey Package:	F830	Cell Deck
Survey Unit:	009	
Class	3	
SU Area (m <sup>2</sup> )	460	
Evaluator:	JR	
DCGL <sub>w</sub> :	43,000	Gross Activity DCGL
Area Factor	N/A	Class 3
Design DCGL <sub>emc</sub> (dpm/100cm <sup>2</sup> ):	N/A	Class 3
DCGL <sub>emc</sub> :	N/A	Class 3
LBGR:	21,500	Default = 50% DCGL
Sigma:	275	Scoping Survey Data
Type I error:	0.05	
Type II error:	0.05	
Predominant Nuclide	Cs-137	
Sample Area (m <sup>2</sup> )	N/A	
Total Instrument Efficiency:	0.132	
Total Area Scanned (m <sup>2</sup> ):	5.55	
Scan Coverage (%)	1%	Class 3
Material Type:	N/A	Choosing 'N/A' sets material background to "0"
Calculated Values		Comments
Z <sub>1-α</sub> :	1.645	
Z <sub>1-β</sub> :	1.645	
Sign p:	0.99865	
Calculated Relative Shift:	78.1	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift >3
N-Value:	11	
N-Value+20%:	14	

# FINAL STATUS SURVEY F8300093

## Survey Results:

A total of 15 direct measurements were made in F8300093. The results of the static measurements are shown in **Table 2**. All of the static measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Swipe data did not indicate elevated activity levels above the MDA.

**Table 2, Static Measurement Results**

Number	Sample #	Beta (cpm)	Beta (dpm)
1	F8300093X00001	238	1,803
2	F8300093X00002	310	2,348
3	F8300093X00003	205	1,553
4	F8300093X00004	295	2,235
5	F8300093X00005	270	2,045
6	F8300093X00006	288	2,182
7	F8300093X00007	307	2,326
8	F8300093X00008	284	2,152
9	F8300093X00009	250	1,894
10	F8300093X00010	258	1,955
11	F8300093X00011	269	2,038
12	F8300093X00012	211	1,598
13	F8300093X00013	247	1,871
14	F8300093X00014	254	1,924
15	F8300093X00015	235	1,780

**Table 3** contains the statistical summary of the static measurement data for the Cell Deck.

**Table 3, Beta Summary Statistics**

<i>Beta Static Cell Deck</i>	
Mean	1,980
Median	1,955
Standard Deviation	242
Minimum	1,553
Maximum	2,348
Count	15

**Survey Unit Data Assessment:**

The survey design required 14 static measurements for the Sign Test. A total of 15 static measurements were collected. 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.

**Table 4, Data Assessment Results**

Static Data Values		Comments
Number of Samples:	15	
Median:	1,955	
Mean:	1,980	
Static Data Standard Deviation:	242	
Maximum:	2,348	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	15	
Critical Value:	10	
Criteria Satisfaction		Comments
Sufficient samples collected:	Pass	
Maximum value <DCGL <sub>w</sub> :	Pass	
Median value <DCGL <sub>w</sub> :	Pass	
Mean value <DCGL <sub>w</sub> :	Pass	
Maximum value <DCGL <sub>emc</sub> :	N/A	
Sign test results:	Pass	
Final Status		Comments
The survey unit passes all conditions:	Pass	

**Survey Unit Investigations and Results:**

No investigations were required for either direct or scan measurements and no investigation results are reported.

**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 3 survey and the sample results are consistent with that classification. The variability of the survey results was greater than the characterization data used for survey design. However, based upon the adjustment of the relative shift, the calculated number of samples did not change. No potential areas of elevated activity were detected.

## FINAL STATUS SURVEY F8300093

### **Conclusion:**

The FSS of this survey unit was properly designed as a Class 3 survey based on the results of the scoping survey. The required number of direct measurements was made and the scan coverage met the requirement of Table 5-6 of the LTP. All of the static measurements were less than the DCGL. No investigations were required.

The static 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.

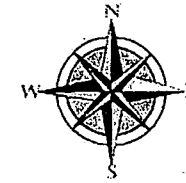
It is concluded that survey unit F8300093 meets the release criteria of 10CFR20.1402.

**Attachment 1**

**Maps**

**December 28, 2016**

**Survey Unit F8300093**



### Ceiling Cell Deck

F8300093X00003 ⊕  
 $\beta = 1,553 \text{ dpm}/100 \text{ cm}^2$

F8300093X00012 ⊕  
 $\beta = 1,598 \text{ dpm}/100 \text{ cm}^2$

West Cell Deck

F8300093X00004 ⊕  
 $\beta = 2,235 \text{ dpm}/100 \text{ cm}^2$

F8300093X00007 ⊕  
 $\beta = 2,326 \text{ dpm}/100 \text{ cm}^2$

### Floor Cell Deck

F8300093X00008 ⊕  
 $\beta = 2,152 \text{ dpm}/100 \text{ cm}^2$

East Cell Deck

F8300093X00006 ⊕  
 $\beta = 2,182 \text{ dpm}/100 \text{ cm}^2$

F8300093X00001 ⊕  
 $\beta = 1,803 \text{ dpm}/100 \text{ cm}^2$

F8300093X00009 ⊕  
 $\beta = 1,924 \text{ dpm}/100 \text{ cm}^2$

F8300093X00009 ⊕  
 $\beta = 1,894 \text{ dpm}/100 \text{ cm}^2$

F8300093X00010 ⊕  
 $\beta = 1,955 \text{ dpm}/100 \text{ cm}^2$

F8300093X00011 ⊕  
 $\beta = 2,038 \text{ dpm}/100 \text{ cm}^2$



F8300093X00005 ⊕  
 $\beta = 2,045 \text{ dpm}/100 \text{ cm}^2$

F8300093X00002 ⊕  
 $\beta = 2,348 \text{ dpm}/100 \text{ cm}^2$

F8300093X00013 ⊕  
 $\beta = 1,871 \text{ dpm}/100 \text{ cm}^2$

### South Cell Deck

F8300093X00015 ⊕  
 $\beta = 1,780 \text{ dpm}/100 \text{ cm}^2$

 <b>SMUD</b> <small>ENGINEERS / SCIENTISTS / PROGRAM MANAGERS</small>		 <b>TIDEWATER INC</b> <small>ENGINEERS / SCIENTISTS / PROGRAM MANAGERS</small>	
<b>CELL DECK</b>			
Contract No.:	4500091426	<b>SMUD</b>	
Location:	Rancho Seco	Approved by:	
Task:	Scoping Survey		
Drawing No.:	105B Scoping Survey		
Description:	DON NORTH WALL		
Drawn By:	C. Gray		
QC'd:	J. Reese	Approval date:	
Date:	12/28/06		
Rev No.:			



**Attachment 2**

**Instrumentation**

**December 27, 2016**

**Survey Unit F8300093**

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

Measurement Type	Instrument Type	Minimum Detectable Activity <sup>a</sup>	Detector Efficiencies	Calibration Due Date <sup>b</sup>
Beta Static Measurement	Ludlum Model 2350-1 Ludlum Model 44-116 B Detector	Beta – 543 dpm/100 cm <sup>2</sup>	132%	317897/331972 2/10/17
Swipe Measurements	Ludlum Model 2929 Ludlum Model 44-10-1	Beta – 79 dpm/100 cm <sup>2</sup>	43.4%	182597/188736 5/13/17

<sup>a</sup> Minimum detectable activities for the count rate instrumentation were calculated in accordance with NUREG-1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions" (U.S. NRC, 1997).

<sup>b</sup> Detectors are required to be calibrated once every 12 months. Calibration due date indicates the date by which the detector must be calibrated again.

cm<sup>2</sup> = square centimeters  
cpm = counts per minute  
dpm = disintegrations per minute

## Static Measurement MDA

### Variables

Beta Survey Type  
PR331972 Detector Number  
218 Background count rate (cpm)  
1 Count Time (min)  
0.132 Efficiency  
100 Area of Detector (cm<sup>2</sup>)

### Constants

60 sec/min  
2.54 cm/in

### Assumptions

Background count time and sample count time are equivalent

### Calculate Static MDA

Static MDA =  $3 + 4.65(B_r * t)^{0.5} / t * E * A / 100$  (NUREG 1507)

Where:  $B_r$  Background Countrate  
 $t$  Count Time (min)  
 $E$  Efficiency  
 $A$  Area of detector (cm<sup>2</sup>)

Static MDA 543 dpm/100 cm<sup>2</sup>

**Attachment 3**

**Investigation**

**December 27, 2016**

**Survey Unit F8300093**

**(none required)**

**Attachment 4**

**Data Assessment**

**December 27, 2016**

**Survey Unit F8300093**

