

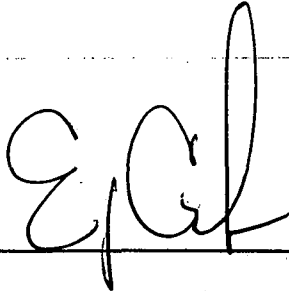
Rancho Seco

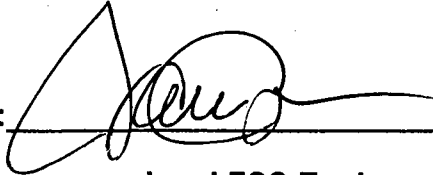
Final Status Survey Summary Report

October 21, 2016

IOSB Storage Cell C-1

Survey Unit F8300223

Prepared By:  Date: 11-8-16  
FSS Engineer

Reviewed By:  Date: 11-8-16  
Lead FSS Engineer

Approved By:  Date: 11/14/16  
Manager, Rancho Seco Assets

## FINAL STATUS SURVEY F8300223

### Survey Unit:

F8300223, Interim Onsite Storage Building (IOSB) Storage Cell C-1

### 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 interior surfaces of the storage cell, to confirm the absence or presence of plant-derived radionuclides. Static measurements showed a mean gross beta activity level of 2,042/100 cm<sup>2</sup> and a maximum value of 2,506 dpm/100 cm<sup>2</sup>. Based on the levels of gross beta 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 approximately 33% of the area scanned. The instrumentation used for the survey along with the MDC values are listed in **Table 2-1 Attachment 2**.

**FINAL STATUS SURVEY F8300223**

**Table 1, Survey Unit Design Parameters**

<b>Evaluation Input Values</b>		<b>Comments</b>
Survey Package:	<b>F830</b>	Storage Cell C-1
Survey Unit:	<b>022</b>	
Class	<b>3</b>	
SU Area (m <sup>2</sup> )	<b>23.1</b>	
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:	198	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:	0.129	
Total Area Scanned (m <sup>2</sup> ):	7.51	
Scan Coverage (%)	33%	Class 3
Material Type:	N/A	Choosing 'N/A' sets material background to "0"
<b>Calculated Values</b>		<b>Comments</b>
Z <sub>1-α</sub> :	1.645	
Z <sub>1-β</sub> :	1.645	
Sign p:	0.99865	
Calculated Relative Shift:	108.5	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift >3
N-Value:	11	
N-Value+20%:	14	

## FINAL STATUS SURVEY F8300223

### Survey Results:

A total of 15 direct measurements were made in F8300223. 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	F8300223X00001	218	1,690
2	F8300223X00002	246	1,907
3	F8300223X00003	268	2,078
4	F8300223X00004	243	1,884
5	F8300223X00005	252	1,953
6	F8300223X00006	244	1,891
7	F8300223X00007	247	1,915
8	F8300223X00008	258	2,000
9	F8300223X00009	244	1,891
10	F8300223X00010	253	1,961
11	F8300223X00011	205	1,589
12	F8300223X00012	244	1,891
13	F8300223X00013	223	1,729
14	F8300223X00014	236	1,829
15	F8300223X00015	235	1,822

**Table 3** contains the statistical summary of the static measurement data for the Storage Cell C-1.

**Table 3, Beta Summary Statistics**

<i>Beta Statics Cell C-1</i>	
Mean	1,869
Median	1,891
Standard Deviation	124
Minimum	1,589
Maximum	2,078
Count	15

**FINAL STATUS SURVEY F8300223**

**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**

<b>Static Data Values</b>		<b>Comments</b>
Number of Samples:	15	
Median:	1,891	
Mean:	1,869	
Static Data Standard Deviation:	124	
Maximum:	2,078	
<b>Sign Test Results</b>		<b>Comments</b>
Adjusted N Value:	14	
S+ Value:	15	
Critical Value:	10	
<b>Criteria Satisfaction</b>		<b>Comments</b>
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	
<b>Final Status</b>		<b>Comments</b>
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 lower than the characterization data used for survey design. No potential areas of elevated activity were detected.

## FINAL STATUS SURVEY F8300223

### **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.

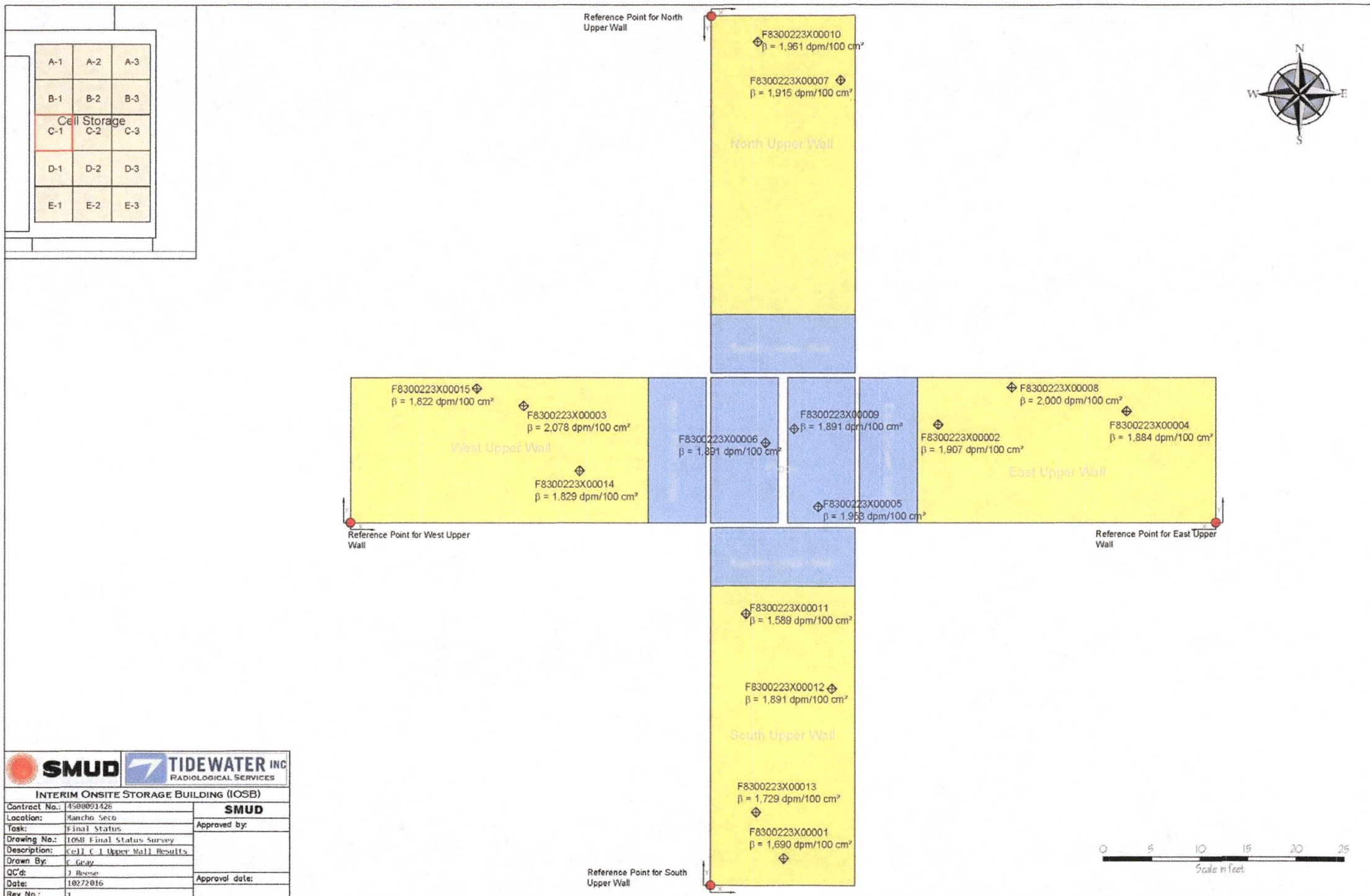
It is concluded that survey unit F8300223 meets the release criteria of 10CFR20.1402.

**Attachment 1**

**Maps**

**November 8, 2016**

**Survey Unit F8300223**



<b>SMUD</b>		<b>TIDEWATER INC</b> RADIOLOGICAL SERVICES	
<b>INTERIM ONSITE STORAGE BUILDING (IOSB)</b>			
Contract No.:	4588091426	<b>SMUD</b>	
Location:	Rancho Seco	Approved by:	
Task:	Final Status		
Drawing No.:	1058 Final Status Survey		
Description:	Cell C-1 Upper Wall Results		
Drawn By:	C. Gray		
QC'd:	J. Blevins	Approval date:	
Date:	10/27/06		
Rev No.:	1		



**Attachment 2**

**Instrumentation**

**September 23, 2016**

**Survey Unit F8300223**

**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 – 493 dpm/100 cm <sup>2</sup>	12.9%	317899/331973 2/10/17
Swipe Measurements	Ludlum Model 2929 Ludlum Model 44-10-1	Alpha – 3 dpm/100 cm <sup>2</sup> Beta – 80 dpm/100 cm <sup>2</sup>	36.9% 42.8%	166716/170380 11/3/16

<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  
331973 Detector Number  
170 Background count rate (cpm)  
1 Count Time (min)  
0.129 Efficiency  
Area of Detector  
100 (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 <sub>r</sub>	Background Countrate
	t	Count Time (min)
	E	Efficiency
	A	Area of detector (cm <sup>2</sup> )

Static MDA                      493 dpm/100 cm<sup>2</sup>

**Attachment 3**

**Investigation**

**September 23, 2016**

**Survey Unit F8300223**

**(none required)**

**Attachment 4**

**Data Assessment**

**September 23, 2016**

**Survey Unit F8300223**

