



Rancho Seco
Final Status Survey Summary Report
November 7, 2016
IOSB Storage Cell B-3
Survey Unit F8300213

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FINAL STATUS SURVEY F8300213

Survey Unit:

F8300213, Interim Onsite Storage Building (IOSB) Storage Cell B-3

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 1,959 dpm/100 cm² and a maximum value of 2,239 dpm/100 cm². 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 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**.

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Table 1, Survey Unit Design Parameters

Evaluation Input Values		Comments
Survey Package:	F830	Storage Cell B-3
Survey Unit:	21	
Class	03	
SU Area (m ²)	23	
Evaluator:	JR	
DCGL _w :	43,000	Gross Activity DCGL
Area Factor	N/A	Class 3
Design DCGL _{emc} (dpm/100cm ²):	N/A	Class 3
DCGL _{emc} :	N/A	Class 3
LBGR:	21,500	Default = 50% DCGL
Sigma:	136	Scoping Survey Data
Type I error:	0.05	
Type II error:	0.05	
Predominant Nuclide	Cs-137	
Sample Area (m ²)	N/A	
Total Instrument Efficiency:	0.129	
Total Area Scanned (m ²):	7.51	
Scan Coverage (%)	33%	Class 3
Material Type:	N/A	Choosing 'N/A' sets material background to "0"
Calculated Values		Comments
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign p:	0.99865	
Calculated Relative Shift:	158.0	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift >3
N-Value:	11	
N-Value+20%:	14	

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Survey Results:

A total of 15 direct measurements were made in F8300213. 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	F8300213X00001	261	1,977
2	F8300213X00002	248	1,879
3	F8300213X00003	223	1,689
4	F8300213X00004	269	2,038
5	F8300213X00005	253	1,917
6	F8300213X00006	246	1,864
7	F8300213X00007	278	2,106
8	F8300213X00008	277	2,098
9	F8300213X00009	252	1,909
10	F8300213X00010	264	2,000
11	F8300213X00011	243	1,841
12	F8300213X00012	239	1,811
13	F8300213X00013	245	1,856
14	F8300213X00014	277	2,098
15	F8300213X00015	238	1,803

Table 3 contains the statistical summary of the static measurement data for the Storage Cell B-3.

Table 3, Beta Summary Statistics

<i>Beta Static B-3</i>	
Mean	1,926
Median	1,909
Standard Deviation	124
Minimum	1,689
Maximum	2,106
Count	15

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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:	1,909	
Mean:	1,926	
Static Data Standard Deviation:	124	
Maximum:	2,106	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	15	
Critical Value:	10	
Criteria Satisfaction		Comments
Sufficient samples collected:	Pass	
Maximum value <DCGL _w :	Pass	
Median value <DCGL _w :	Pass	
Mean value <DCGL _w :	Pass	
Maximum value <DCGL _{emc} :	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 less than the characterization data used for survey design which would result in a larger relative shift value. Since both values are in excess of 3 the difference in the variability does not affect the power of the survey. No potential areas of elevated activity were detected.

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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.

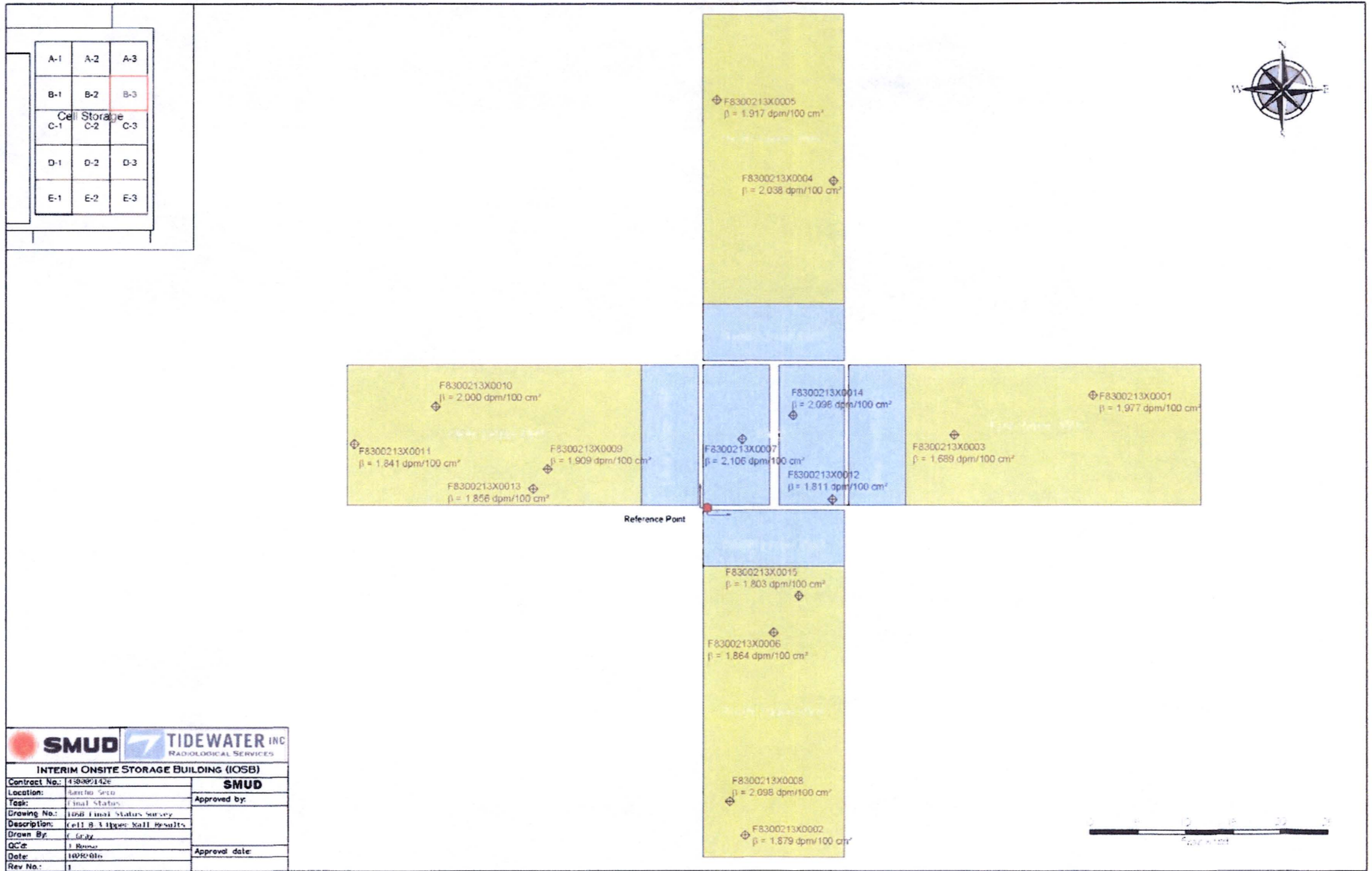
It is concluded that survey unit F8300213 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

November 7, 2016

Survey Unit F8300213



Attachment 2

Instrumentation

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Survey Unit F8300213

Table 2-1. Survey Unit Instrumentation

Measurement Type	Instrument Type	Minimum Detectable Activity ^a	Detector Efficiencies	Calibration Due Date ^b
Beta Static Measurement	Ludlum Model 2350-1	Beta – 531 dpm/100 cm ²	13.2%	317897/331972 2/10/17
	Ludlum Model 44-116 B Detector			
Swipe Measurements	Ludlum Model 2929 Ludlum Model 44-10-1	Beta – 79 dpm/100 cm ²	43.4%	182597/188736 5/13/17

^a 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).

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

cm² = square centimeters

cpm = counts per minute

dpm = disintegrations per minute

Static Measurement MDA

Variables

Beta Survey Type
PR331972 Detector Number
208 Background count rate (cpm)
1 Count Time (min)
0.132 Efficiency
100 Area of Detector (cm²)

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: Br Background Countrate
t Count Time (min)
E Efficiency
A Area of detector (cm²)

Static MDA 531 dpm/100 cm²

Attachment 3
Investigation
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(none required)

Attachment 4

Data Assessment

November 8, 2016

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