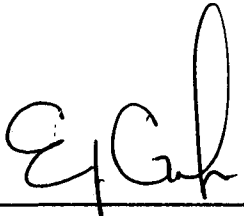



Rancho Seco
Final Status Survey Summary Report
January 25, 2017
IOSB Loading Dock Class 2
Survey Unit F8300082

Prepared By:  Date: 2.1.17

FSS Engineer

Reviewed By:  Date: 2.1.17

Lead FSS Engineer

Approved By:  Date: 2/21/17

Manager, Rancho Seco Assets

FINAL STATUS SURVEY F8300082

Survey Unit:

F8300082, Interim Onsite Storage Building (IOSB) Loading Dock Class 2

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: Based upon the scanning results of the Truck Bay elevated areas were identified on the floor around and including the loading dock. Certain spots in the area exceeded the $DCGL_w$ but not the $DCGL_{EMC}$. This area required remediation. The Truck bay was divided into a small Class 1 Survey Unit, buffered by a Class 2 Survey Unit. The remainder of the Bay was designated as a Class 3 Survey Unit. This report addresses the Class 2 survey 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 determined by professional judgment in accordance with MARSSIM guidance and approximately 100% 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 F8300082

Table 1, Survey Unit Design Parameters

Evaluation Input Values		Comments
Survey Package:	F830	Loading Dock Class 2
Survey Unit:	008	
Class	2	
SU Area (m ²)	19.9	
Evaluator:	JR	
DCGL _w :	43,000	Gross Activity DCGL
Area Factor	NA	Class 2
Design DCGL _{emc} (dpm/100cm ²):	NA	Class 2
DCGL _{emc} :	NA	Class 2
LBGR:	21,500	Default = 50% DCGL
Sigma:	466	Truck Bay Scoping
Type I error:	0.05	
Type II error:	0.05	
Predominant Nuclide	Cs-137	
Sample Area (m ²)	N/A	
Total Instrument Efficiency:	0.132	
Total Area Scanned (m ²):	15.2	
Scan Coverage (%)	76%	Class 2
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:	46.1	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift >3
N-Value:	11	
N-Value+20%:	14	

Survey Results:

A total of 15 direct measurements were made in F8300082. 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.

FINAL STATUS SURVEY F8300082

Table 2, Static Measurement Results

Number	Sample #	Beta (cpm)	Beta (dpm)
1	F8300082C00001	379	2,871
2	F8300082C00002	383	2,902
3	F8300082C00003	373	2,826
4	F8300082C00004	380	2,879
5	F8300082C00005	389	2,947
6	F8300082C00006	349	2,644
7	F8300082C00007	405	3,068
8	F8300082C00008	410	3,106
9	F8300082C00009	366	2,773
10	F8300082C00010	390	2,955
11	F8300082C00011	376	2,848
12	F8300082C00012	337	2,553
13	F8300082C00013	327	2,477
14	F8300082C00014	299	2,265
15	F8300082C00015	394	2,985

Table 3 contains the statistical summary of the static measurement data for the Loading Dock Class 2.

Table 3, Beta Summary Statistics

<i>Beta Static Loading Dock Class 2</i>	
Mean	2,807
Median	2,871
Standard Deviation	231
Minimum	2,265
Maximum	3,106
Count	15

Survey Unit Data Assessment:

The survey design was based upon professional judgement and resulted in 15 static measurements. Following the guidance in MARSSIM Section 4.6, these values are compared directly to the DCGL_w.

The comparison and the results are presented in **Table 4**. The sample mean and median values were less than the DCGL.

FINAL STATUS SURVEY F8300082

Table 4, Data Assessment Results

Static Data Values		Comments
Number of Samples:	15	
Median:	2,871	
Mean:	2,807	
Static Data Standard Deviation:	231	
Maximum:	3,106	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	15	
Critical Value:	11	
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} :	NA	
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 2 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, no individual measurement exceeded the DCGL. No potential areas of elevated activity were detected.

Conclusion:

The FSS of this survey unit was properly designed as a Class 2 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.

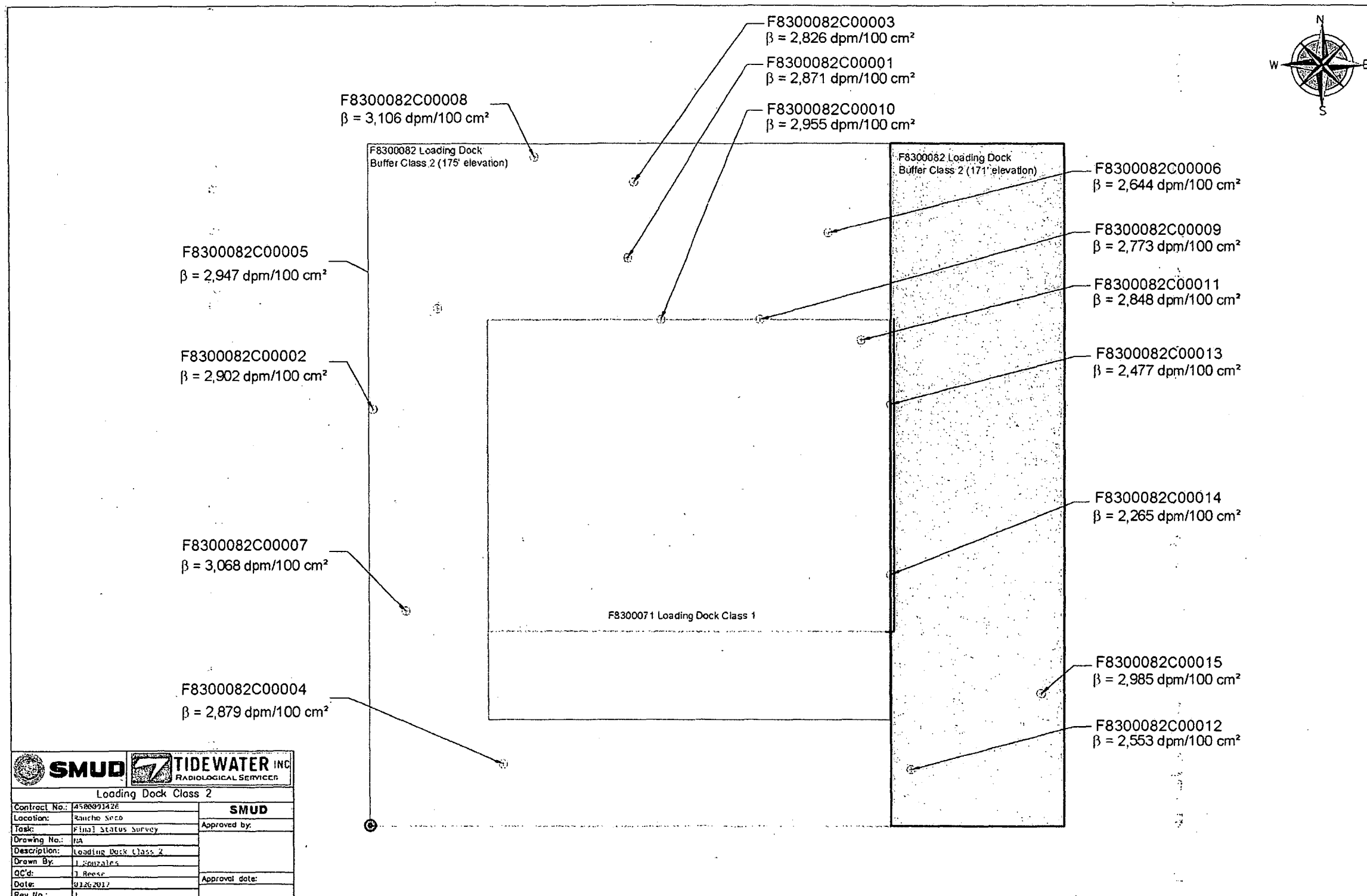
It is concluded that survey unit F8300082 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

January 30, 2017

Survey Unit F8300082



Attachment 2

Instrumentation

January 30, 2017

Survey Unit F8300082

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 – 520 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 – 75 dpm/100 cm ²	42.8%	166716/170380 11/3/16

^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

Attachment 3
Investigation
January 25, 2017
Survey Unit F8300082

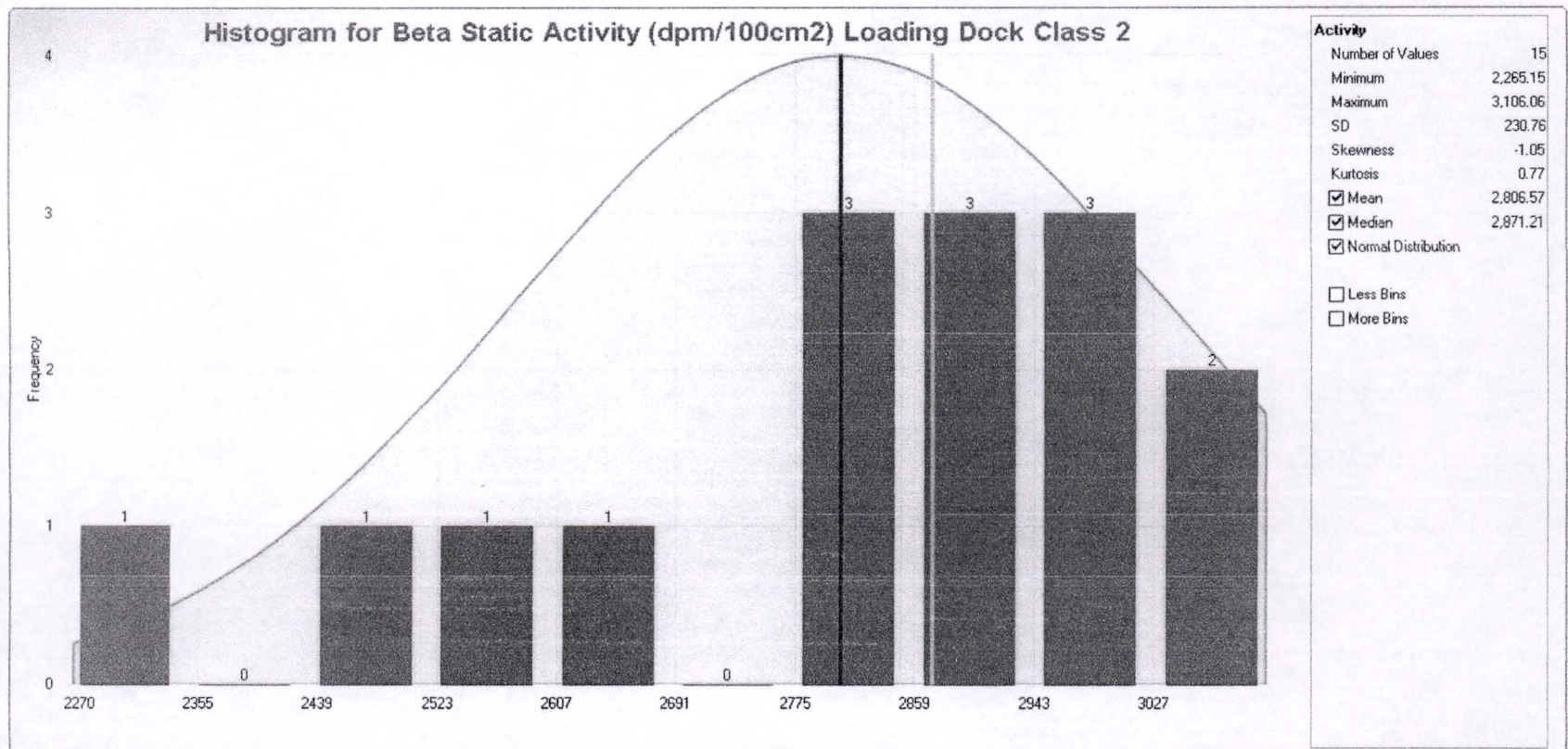
(none required)

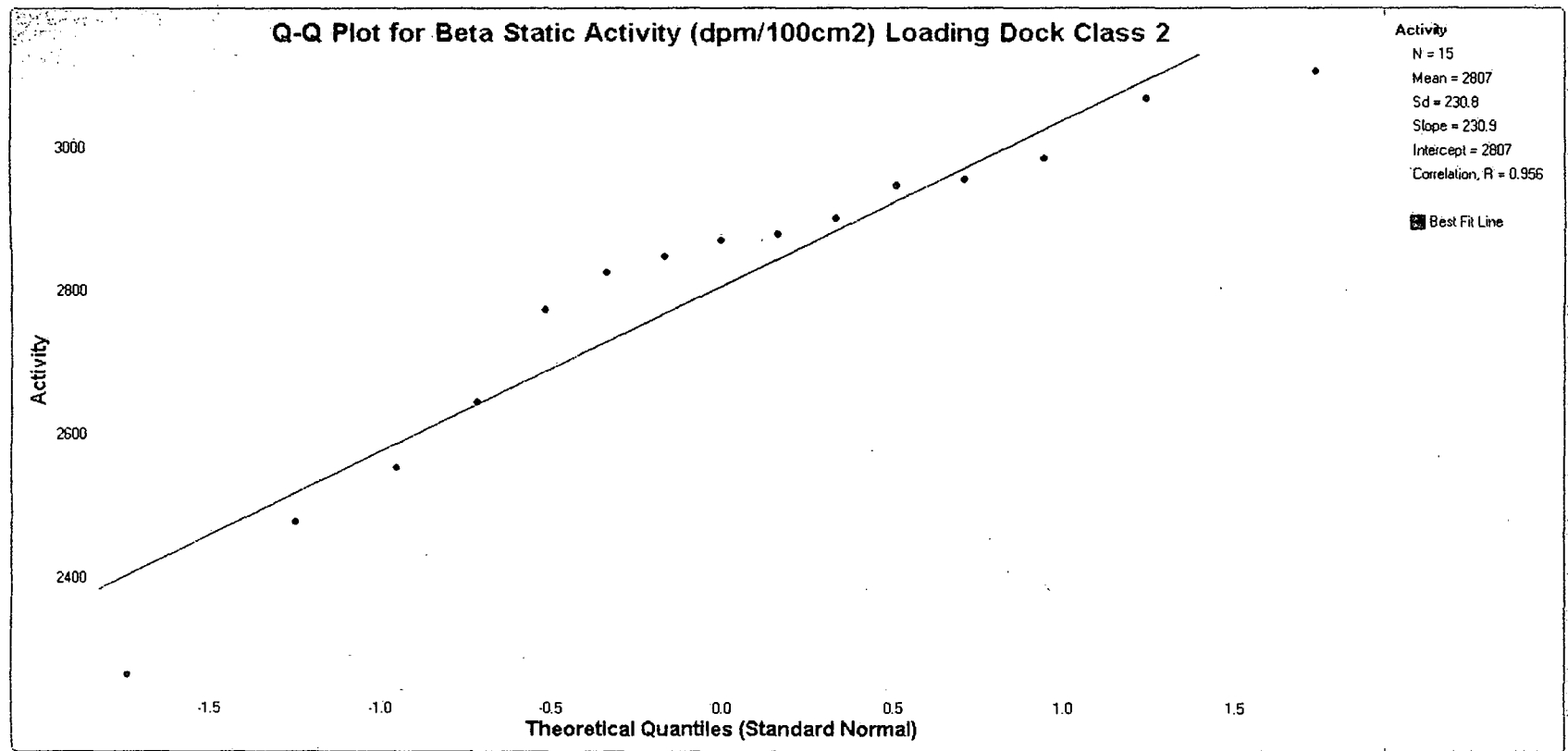
Attachment 4

Data Assessment

January 30, 2017

Survey Unit F8300082





Smear_Data_Calculation_Sheet_101316

IOSB Final Status Survey																										
	LC1	LC2	LC3	LC4	LC6	LC5		β CPM	β dpm	Date/Time of Count	Sample Comments															
1	F830	008	2	C	00001	SM	Load Dock Buffer	57	28	01/04/17	1140															
2	F830	008	2	C	00002	SM	Load Dock Buffer	50	12	01/04/17	1142															
3	F830	008	2	C	00003	SM	Load Dock Buffer	60	35	01/04/17	1143															
4	F830	008	2	C	00004	SM	Load Dock Buffer	54	21	01/04/17	1145															
5	F830	008	2	C	00005	SM	Load Dock Buffer	45	0	01/04/17	1146															
6	F830	008	2	C	00006	SM	Load Dock Buffer	54	21	01/04/17	1148															
7	F830	008	2	C	00007	SM	Load Dock Buffer	47	5	01/04/17	1150															
8	F830	008	2	C	00008	SM	Load Dock Buffer	46	3	01/04/17	1151															
9	F830	008	2	C	00009	SM	Load Dock Buffer	44	-2	01/04/17	1153															
10	F830	008	2	C	00010	SM	Load Dock Buffer	48	7	01/04/17	1155															
11	F830	008	2	C	00011	SM	Load Dock Buffer	48	7	01/04/17	1157															
12	F830	008	2	C	00012	SM	Load Dock Buffer	45	0	01/04/17	1159															
13	F830	008	2	C	00013	SM	Load Dock Buffer	49	10	01/04/17	1200															
14	F830	008	2	C	00014	SM	Load Dock Buffer	42	-6	01/04/17	1202															
15	F830	008	2	C	00015	SM	Load Dock Buffer	45	0	01/04/17	1204															
Comments: By signature below, the required source check and background checks were satisfactorily performed prior to use of the instrument identified below.																										
								Ludlum 2929 Benchtop Instrument																		
								2929 S/N: 182597																		
								43-10-1 S/N: 188736																		
								Cal Due Date: 5/13/2017																		
Tech A Sign/Date <i>Jc. Norris / 1-4-2017</i>																										
Tech B Sign/Date <i>PJA</i>																										
								<table border="1"> <thead> <tr> <th></th> <th>efficiency</th> <th>bkg rate</th> <th>bkg count time</th> <th>MUA</th> </tr> </thead> <tbody> <tr> <td>α</td> <td>0.364</td> <td>cpm</td> <td>1 min</td> <td>3.0 dpm per area</td> </tr> <tr> <td>β</td> <td>0.434</td> <td>44.8 cpm</td> <td>1 min</td> <td>74.7 dpm per area</td> </tr> </tbody> </table>					efficiency	bkg rate	bkg count time	MUA	α	0.364	cpm	1 min	3.0 dpm per area	β	0.434	44.8 cpm	1 min	74.7 dpm per area
	efficiency	bkg rate	bkg count time	MUA																						
α	0.364	cpm	1 min	3.0 dpm per area																						
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