
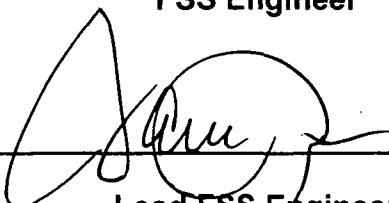


Rancho Seco
Final Status Survey Summary Report
February 1, 2017
IOSB Truck Bay
Survey Unit F8300053

Prepared By:  Date: 2.1.17
FSS Engineer

Reviewed By:  Date: 2.1.17
Lead FSS Engineer

Approved By:  Date: 2/23/17
Manager, Rancho Seco Assets

FINAL STATUS SURVEY F8300053

Survey Unit:

F8300053, Interim Onsite Storage Building (IOSB) Truck Bay

Survey Unit Description:

Operating History: The Truck Bay was designed as a location for loading and unloading of transport vehicles. There was a known area of contamination near the loading dock. This area was fully characterized during the scoping surveys.

Site Characterization: Static measurements were made on the floor, walls, and ceiling, to confirm the absence or presence of plant-derived radionuclides. Static measurements showed a mean gross beta activity level of 2,374 dpm/100 cm² and a maximum value of 3,517 dpm/100 cm². An area of known contamination is located at the loading dock area. This area was characterized to determine the extent and highest activity. The elevated area covers an approximately 7.5 m² around the loading dock. A small area (less than 1.0 m²) exceeded the DCGL_w with activity detected as high as 249,491 dpm/100 cm². The elevated area will be designated as a Class 1 area requiring remediation. A Class 2 area will buffer the elevated area from the remainder of the truck bay. The remainder of the truck bay is classified as a Class 3 survey area and is the subject of this report.

Survey Unit Design Information:

The Survey Unit Design Parameters are presented in **Table 1**. The survey unit and measurement locations are depicted on the maps in **Attachment 1**. Static measurement locations were randomly determined and approximately 11% 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	Truck Bay
Survey Unit:	05	
Class	03	
SU Area (m ²)	379	
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:	466	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:	0.132	
Total Area Scanned (m ²):	45.5	
Scan Coverage (%)	1.1%	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:	46.1	
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 F8300053. 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/100 cm ²)
1	F8300053C00001	222	1,721
2	F8300053C00002	225	1,744
3	F8300053C00003	238	1,845
4	F8300053C00004	279	2,163
5	F8300053C00005	268	2,078
6	F8300053C00006	221	1,713
7	F8300053C00007	238	1,845
8	F8300053C00008	256	1,984
9	F8300053C00009	264	2,047
10	F8300053C00010	219	1,698
11	F8300053C00011	332	2,515
12	F8300053C00012	361	2,735
13	F8300053C00013	446	3,379
14	F8300053C00014	449	3,402
15	F8300053C00015	360	2,727

Table 3 contains the statistical summary of the static measurement data for the Truck Bay.

Table 3, Beta Summary Statistics

<i>Beta Static Truck Bay</i>	
Mean	2,240
Median	2,047
Standard Deviation	582
Minimum	1,698
Maximum	3,402
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. The sample standard deviation was greater than the design standard deviation but both values of sigma resulted in a relative shift greater than three (3), no additional samples were required.

Table 4, Data Assessment Results

Static Data Values		Comments
Number of Samples:	15	
Median:	2,047	
Mean:	2,240	
Static Data Standard Deviation:	582	
Maximum:	3,402	
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 _{enc} :	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, this did not affect the relative shift

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as both were in excess of maximum amount and required adjustment to 3.0 No potential areas of elevated activity were detected.

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.

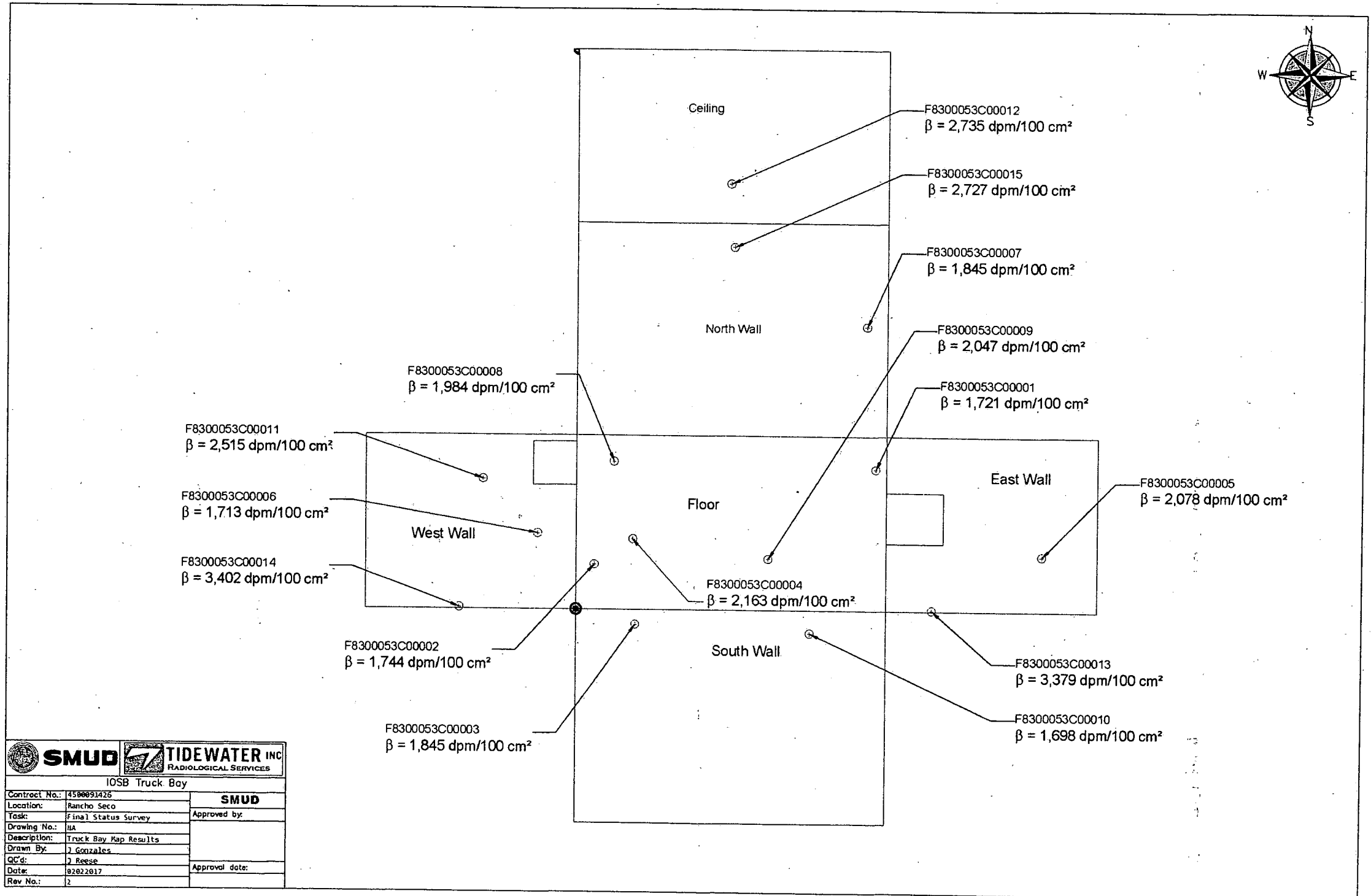
It is concluded that survey unit F8300053 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

February 2, 2017

Survey Unit F8300053



Attachment 2
Instrumentation
February 3, 2017
Survey Unit F8300053

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 – 510 dpm/100 cm ²	12.9%	317899/331973 2/10/17
	Ludlum Model 44-116 B Detector			
Beta Static Measurement	Ludlum Model 2350-1	Beta – 556 dpm/100 cm ²	13.2%	317897/331972 2/10/17
	Ludlum Model 44-116 B Detector			
Swipe Measurements	Ludlum Model 2929	Beta – 75 dpm/100 cm ²	43.4%	182597/188736 5/13/17
	Ludlum Model 44-10-1			
Swipe Measurements	Ludlum Model 2929	Beta – 77 dpm/100 cm ²	43.4%	182597/188736 5/13/17
	Ludlum Model 44-10-1			

^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

Beta Survey Type
PR331973 Detector Number
182 Background count rate (cpm)
1 Count Time (min)
0.129 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: B_r Background Countrate
 t Count Time (min)
 E Efficiency
 A Area of detector (cm²)

Static MDA 510 dpm/100 cm²

Beta Survey Type
PR331972 Detector Number
229 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)

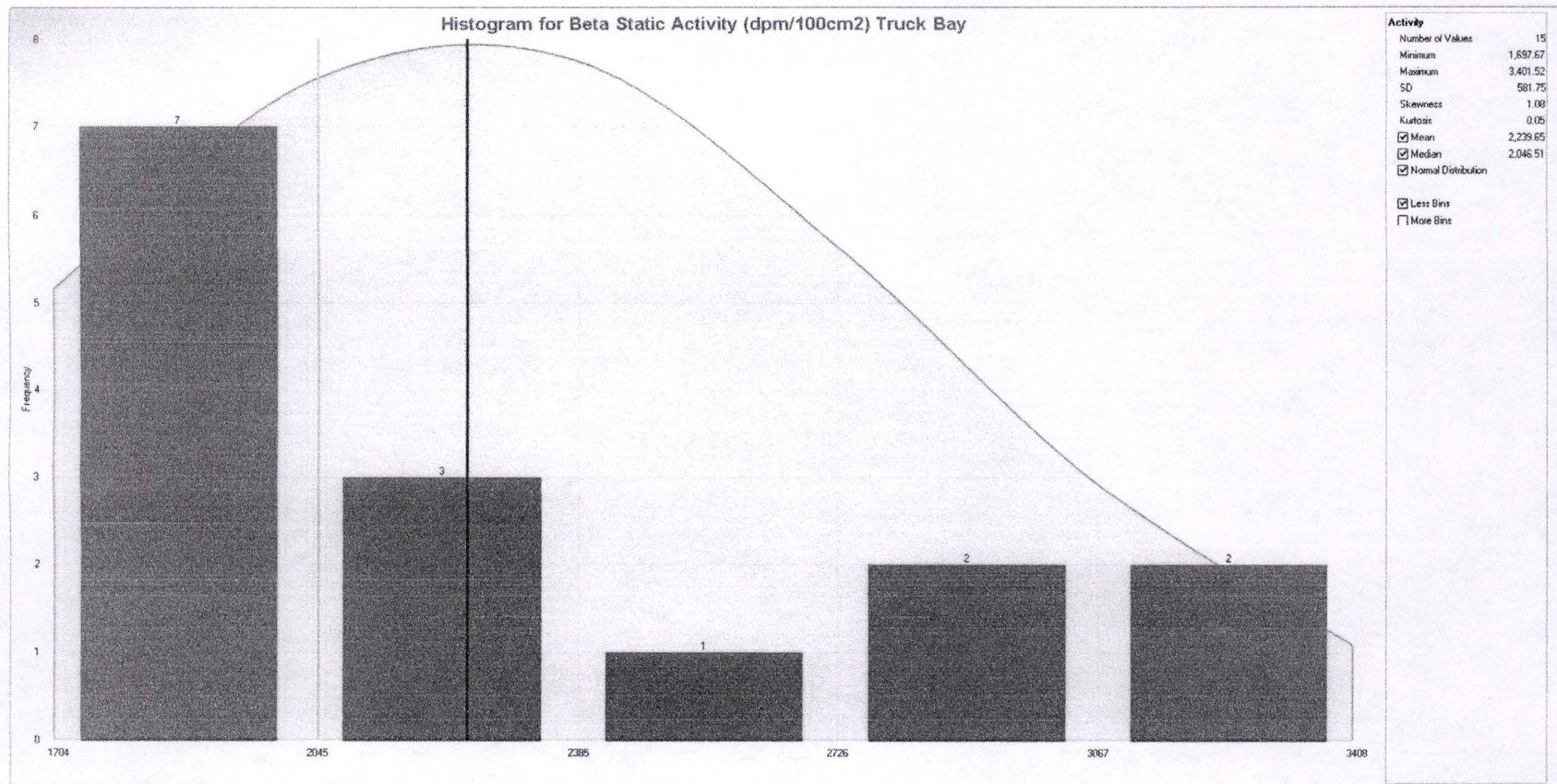
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A Area of detector (cm²)

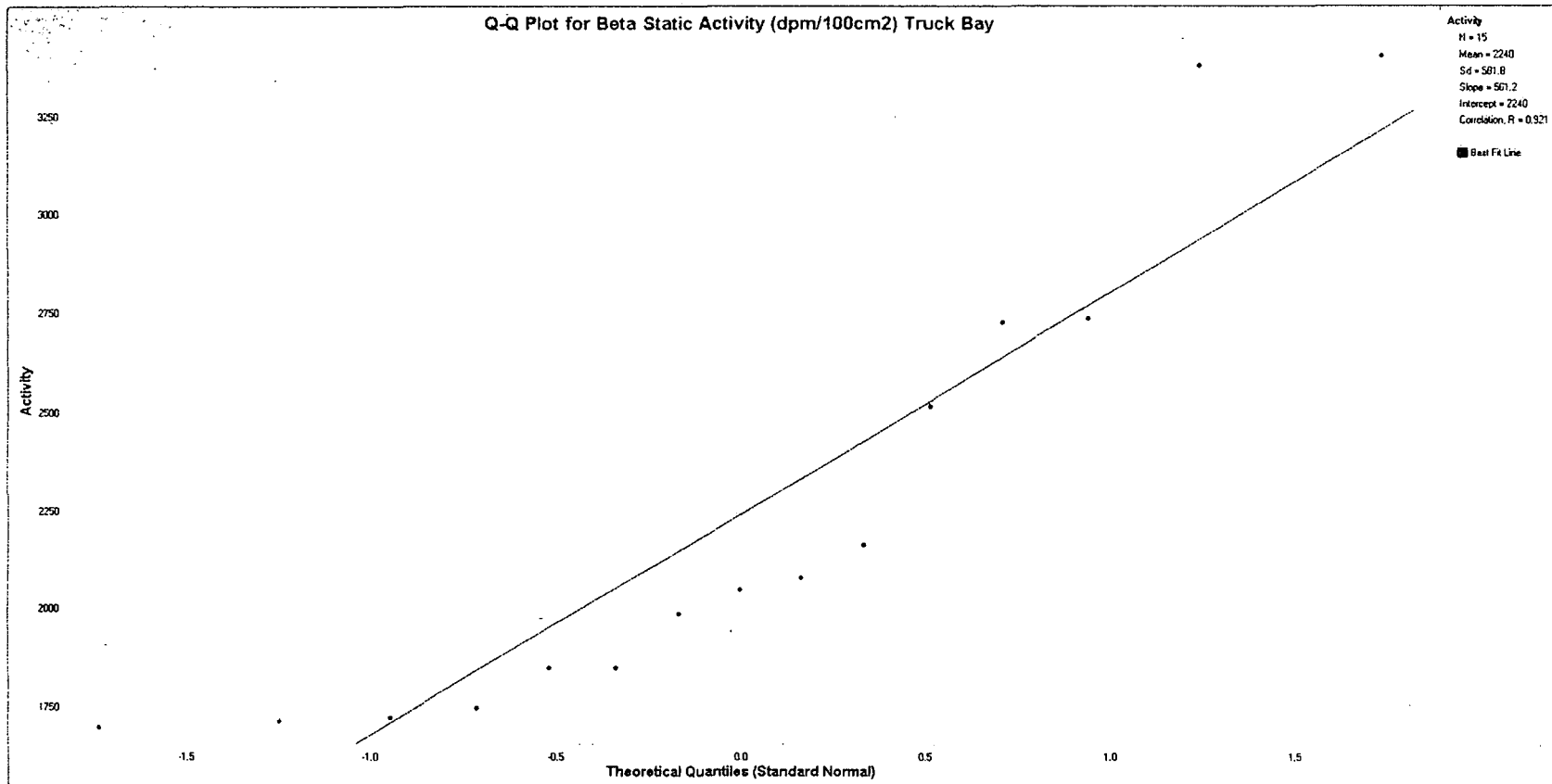
Static MDA 556 dpm/100 cm²

Attachment 3
Investigation
February 2, 2017
Survey Unit F8300053

(none required)

Attachment 4
Data Assessment
February 3, 2017
Survey Unit F8300053





Copy of Swipe Sheet truck bay SR.xlsx

IOSB Final Status Survey																										
	LC1	LC2	LC3	LC4	LC6	LC5		β CPM	β dpm	Date/Time of Count		Sample Comments														
1	F830	005	3	C	00001	SM	Truck Bay	63	35	01/04/17	1419															
2	F830	005	3	C	00002	SM	Truck Bay	51	8	01/04/17	1416															
3	F830	005	3	C	00003	SM	Truck Bay	63	35	09/21/16	0846															
4	F830	005	3	C	00004	SM	Truck Bay	47	-2	01/04/17	1418															
5	F830	005	3	C	00005	SM	Truck Bay	43	-11	09/21/16	0847															
6	F830	005	3	C	00006	SM	Truck Bay	42	-13	09/21/16	0848															
7	F830	005	3	C	00007	SM	Truck Bay	39	-20	09/21/16	0849															
8	F830	005	3	C	00008	SM	Truck Bay	49	3	01/04/17	1421															
9	F830	005	3	C	00009	SM	Truck Bay	41	-15	01/04/17	1422															
10	F830	005	3	C	00010	SM	Truck Bay	50	5	09/21/16	0850															
11	F830	005	3	C	00011	SM	Truck Bay	45	-6	09/21/16	0852															
12	F830	005	3	C	00012	SM	Truck Bay	41	-15	09/21/16	0853															
13	F830	005	3	C	00013	SM	Truck Bay	52	10	09/21/16	0855															
14	F830	005	3	C	00014	SM	Truck Bay	46	-4	09/21/16	0857															
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								2929 S/N: 182597																		
								43-10-1 S/N: 188736																		
								Cal Due Date: 5/13/2017																		
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Swipe Sheet truck bay

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