
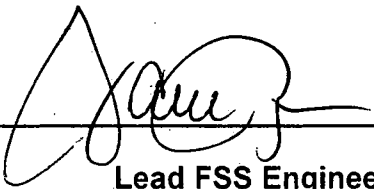


Rancho Seco
Final Status Survey Summary Report
January 30, 2017
IOSB Main Sump
Survey Unit F8300103

Prepared By:  Date: 1.30.17
FSS Engineer

Reviewed By:  Date: 1.30.17
Lead FSS Engineer

Approved By:  Date: 2/24/17
Manager, Rancho Seco Assets

FINAL STATUS SURVEY F8300103

Survey Unit:

F8300103, Interim Onsite Storage Building (IOSB) Main Sump

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 sump, to confirm the absence or presence of plant-derived radionuclides. Static measurements showed a mean gross activity level of 2,401 dpm/100 cm² and a maximum value of 3,056 dpm/100 cm². The statistics of the sump results combines walls, floor, and ceiling data. 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 14% of the area scanned by beta scanning. The instrumentation used for the survey along with the MDC values are listed in **Table 2-1 Attachment 2**.

FINAL STATUS SURVEY F8300103

Table 1, Survey Unit Design Parameters

Evaluation Input Values		Comments
Survey Package:	F830	Sumps
Survey Unit:	10	
Class	03	
SU Area (m ²)	80	
Evaluator:	JR	
DCGL _w :	43,000	Gross Activity DCGL
Area Factor	NA	Class 3
Design DCGL _{emc} (dpm/100cm ²):	NA	Class 3
DCGL _{emc} :	NA	Class 3
LBGR:	21,500	Default = 50% DCGL
Sigma:	466	Scoping Survey Data for Truck Bay
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):	11.1	
Scan Coverage (%)	14%	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	

Survey Results:

A total of 30 direct measurements were made in F8300103 with 15 each being collected in the upper and lower sumps. 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 F8300103

Table 2, Static Measurement Results

Number	Sample #	Beta (cpm)	Beta (dpm)
1	F8300103X00001	307	2,326
2	F8300103X00002	302	2,288
3	F8300103X00003	312	2,364
4	F8300103X00004	206	1,561
5	F8300103X00005	234	1,773
6	F8300103X00006	244	1,848
7	F8300103X00007	260	1,970
8	F8300103X00008	215	1,629
9	F8300103X00009	243	1,841
10	F8300103X00010	209	1,583
11	F8300103X00011	248	1,879
12	F8300103X00012	220	1,667
13	F8300103X00013	288	2,182
14	F8300103X00014	294	2,227
15	F8300103X00015	234	1,773
16	F8300103X00016	249	1,886
17	F8300103X00017	258	1,955
18	F8300103X00018	255	1,932
19	F8300103X00019	296	2,242
20	F8300103X00020	208	1,576
21	F8300103X00021	229	1,735
22	F8300103X00022	215	1,629
23	F8300103X00023	242	1,833
24	F8300103X00024	208	1,576
25	F8300103X00025	247	1,871
26	F8300103X00026	258	1,955
27	F8300103X00027	228	1,727
28	F8300103X00028	223	1,689
29	F8300103X00029	252	1,909
30	F8300103X00030	305	2,311

FINAL STATUS SURVEY F8300103

Table 3 contains the statistical summary of the static measurement data for the Outside Area Class 3.

Table 3, Beta Summary Statistics

<i>Beta Static Sumps</i>	
Mean	1,891
Median	1,860
Standard Deviation	249
Minimum	1,561
Maximum	2,364
Count	30

Survey Unit Data Assessment:

The survey design required 14 static measurements for the Sign Test. A total of 30 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:	30	
Median:	1,860	
Mean:	1,891	
Static Data Standard Deviation:	249	
Maximum:	2,364	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	30	
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} :	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.

FINAL STATUS SURVEY F8300103

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. 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 3 survey based on the results of the investigation 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.

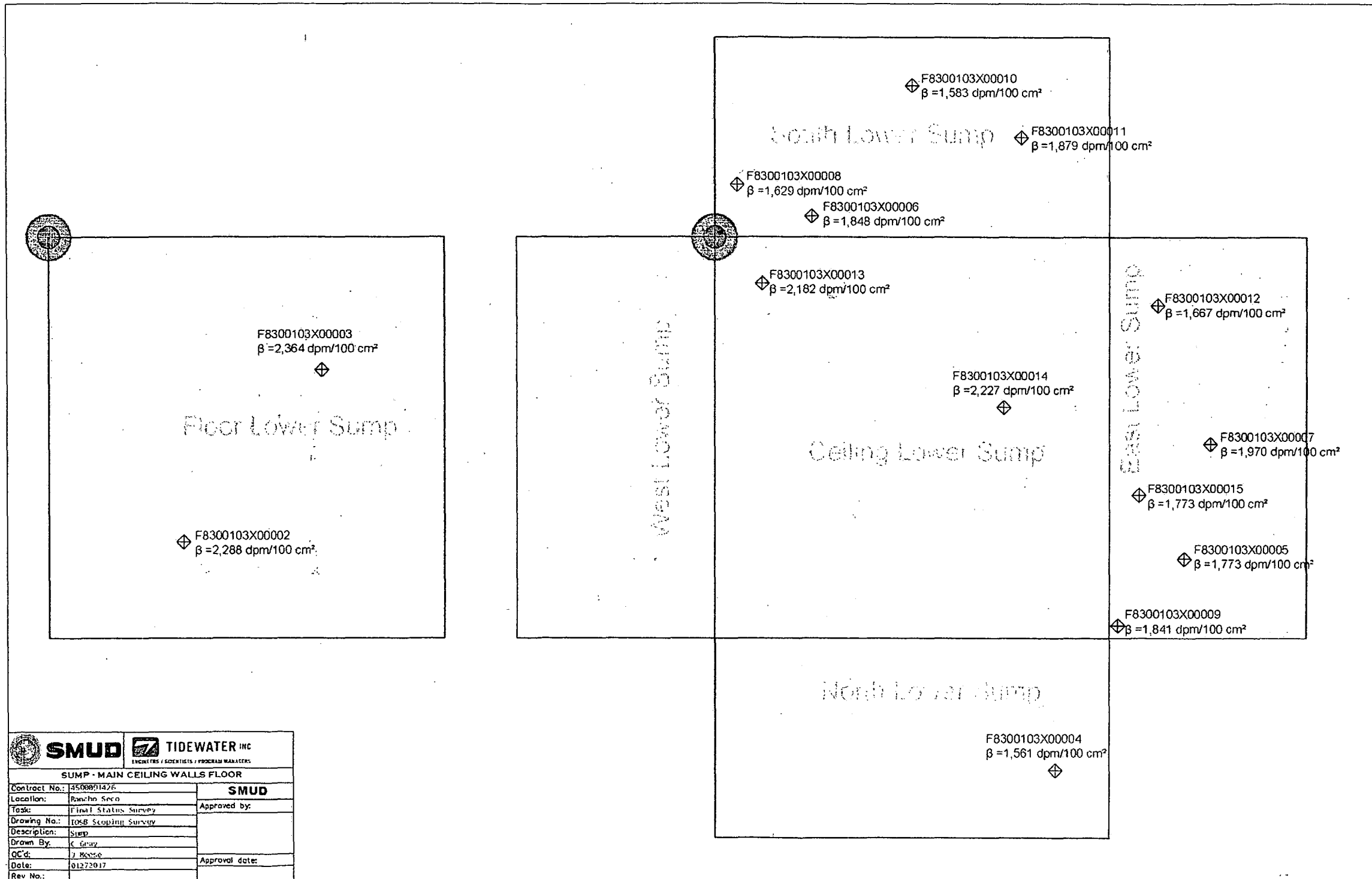
It is concluded that survey unit F83001043 meets the release criteria of 10CFR20.1402.

Attachment 1

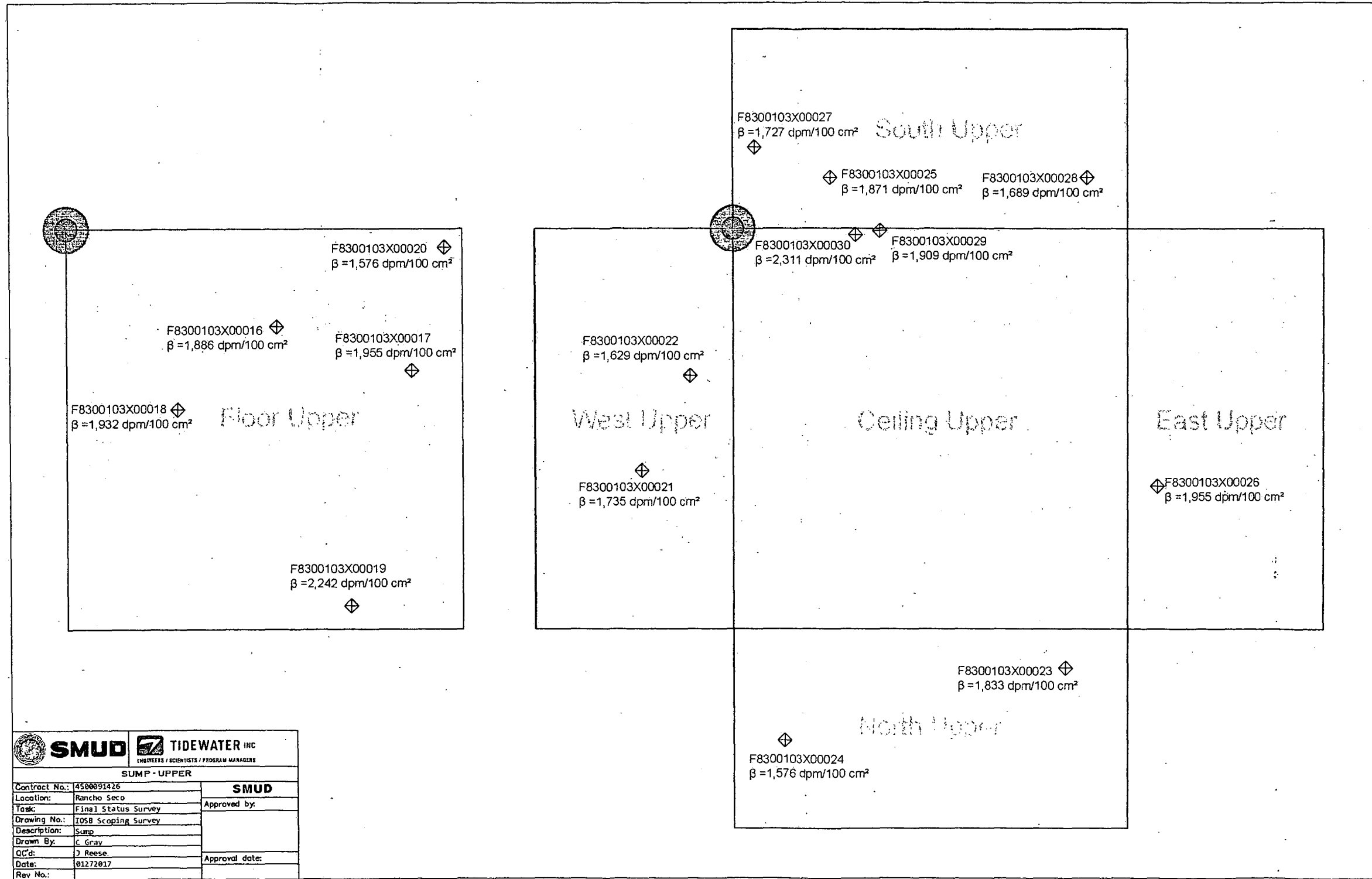
Maps

January 30, 2017

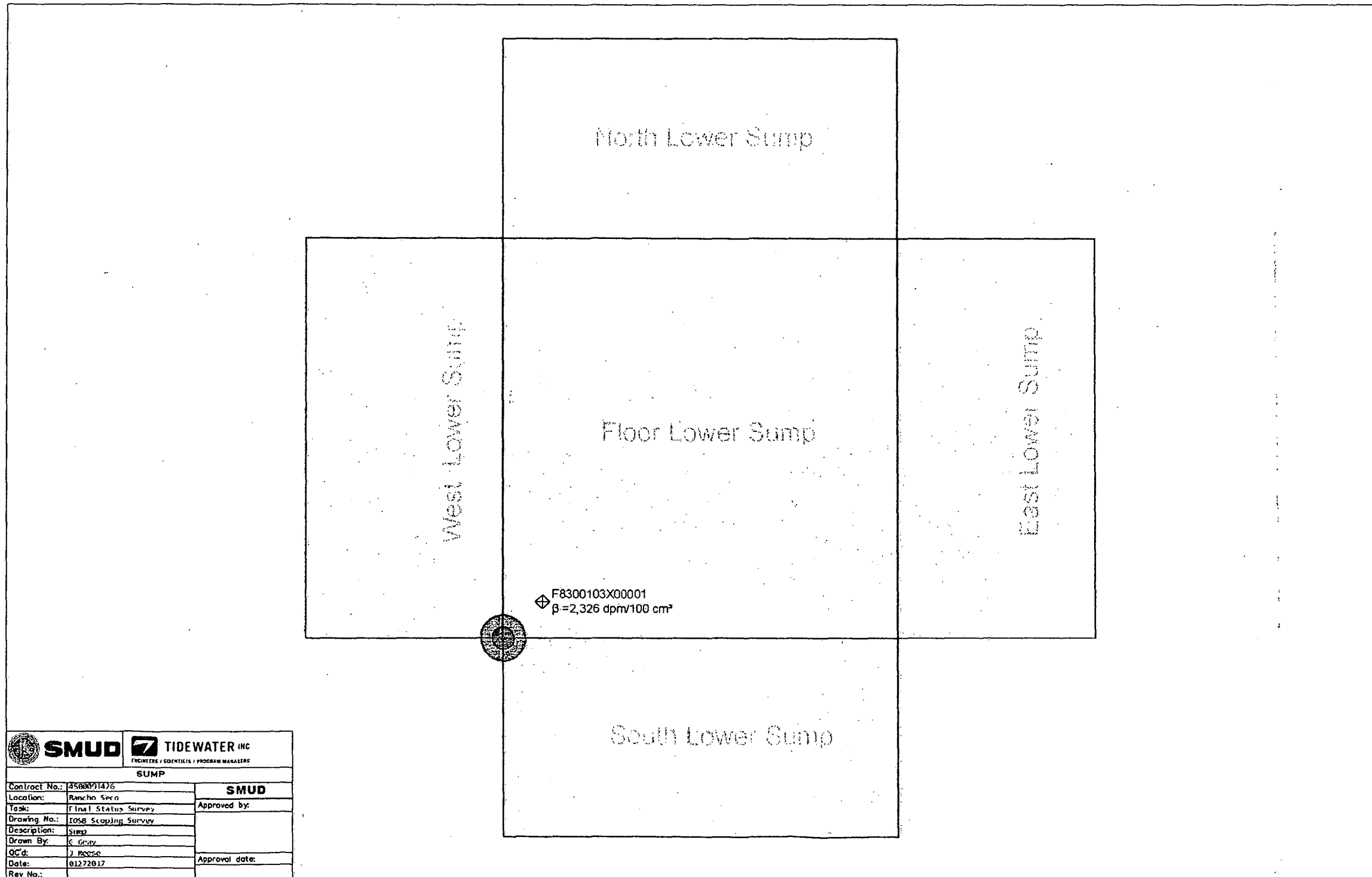
Survey Unit F8300103



SUMP - MAIN CEILING WALLS FLOOR	
Contract No.: 450001426	SMUD
Location: Rancho Seco	Approved by:
Task: Final Status Survey	
Drawing No.: 1058 Scoping Survey	
Description: Sump	
Drawn By: C. Gray	
QC'd: J. Reese	Approval date:
Date: 01272017	
Rev No.:	



ENGINEERS / SCIENTISTS / PROGRAM MANAGERS SUMP - UPPER	
Contract No.: 450091426	SMUD
Location: Rancho Seco	Approved by:
Task: Final Status Survey	
Drawing No.: IOSB Scoping Survey	
Description: Sump	
Drawn By: C. Gray	
QC'd: J. Reese	Approval date:
Date: 01/27/07	
Rev No.:	



Attachment 2

Instrumentation

December 12, 2016

Survey Unit F8300103

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 – 447 dpm/100 cm ²	13.2%	<u>317897/331972</u> 2/10/17
	Ludlum Model 44-116 B Detector			
Beta Static Measurement	Ludlum Model 2350-1	Beta – 504 dpm/100 cm ²	13.2%	<u>317897/331972</u> 2/10/17
	Ludlum Model 44-116 B Detector			
Swipe Measurements	Ludlum Model 2929	Beta – 74 dpm/100 cm ²	42.8%	<u>166716/170380</u> 11/3/16
	Ludlum Model 44-10-1			
Swipe Measurements	Ludlum Model 2929	Beta – 79 dpm/100 cm ²	42.8%	<u>166716/170380</u> 11/3/16
	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
PR331972 Detector Number
187 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: B_r Background Countrate
t Count Time (min)
E Efficiency
A Area of detector (cm²)

Static MDA 504 dpm/100 cm²

Beta Survey Type
PR331972 Detector Number
145 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: B_r Background Countrate
t Count Time (min)
E Efficiency
A Area of detector (cm²)

Static MDA 447 dpm/100 cm²

Attachment 3

Investigation

January 30, 2017

Survey Unit F8300103

(none required)

Attachment 4
Data Assessment
February 2, 2017
Survey Unit F8300103

