


Rancho Seco

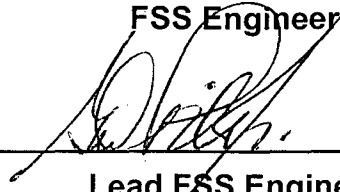
Final Status Survey Summary Report

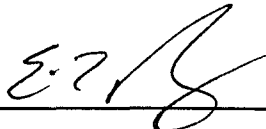
March 19, 2008

Industrial Area Central Yard - North and East of Maintenance Building

Survey Unit F8000101

Prepared By:  Date: 3-19-2008
FSS Engineer

Reviewed By:  Date: 3/26/08
Lead FSS Engineer

Approved By:  Date: 2-20-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000101, Industrial Area Central Yard - North and East of Maintenance Building

Survey Unit Description:

Operating History: This area covers the majority of Industrial Area soils exclusive of the building footprints and rail line in this area. Operating records and the HSA document no specific release of radioactivity in these survey areas however this area does border known contaminated areas. The HSA recorded no specific unplanned release events.

Site Characterization: Soil and sediment samples were collected and analyzed for the presence of plant-derived radionuclides. Cs-137 was the only detected nuclide of plant origin with a mean activity level of 0.062 pCi/g and a maximum value of 0.299 pCi/g. (Site background levels of Cs-137 have been determined to be approximately 0.312 pCi/g.) As described in section 2 of the LTP, the area was evaluated using DSIP-0020 and was designated as Class 3.

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. Direct measurement locations were randomly determined and 508 m² were scanned for approximately 32% coverage. Soil samples were collected at each direct measurement location and analyzed by HPGe detector. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F800	Industrial Area Central Yard - North and East of Maintenance Building
Survey Unit:	0101	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m²):	1587	
Evaluator:	Gary Frank	
DCGL Cs137 surrogate (pCi/g):	51.2	
Area Factor:	N/A	Class 3
Design DCGL_{me} (pCi/g):	N/A	Class 3
LBGR (pCi/g):	25.6	Default = 50% DCGL
Design Sigma (pCi/g):	0.01	DTBD-06-001, Table 5-4D
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m²):	N/A	Class 3
Total Area Scanned (m²):	508	
Scan Coverage (%):	32%	Class 3
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	2560	
Relative Shift Used:	3	Uses 3.0 if Rel Shift >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 15 direct measurements were made in F8000101. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity with all results less or equal to MDC. The MDC for Cs-137 is 0.357 pCi/g and for Co-60 0.316 pCi/g. Soil samples were counted to the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results
(all activity values in pCi/g)

Measurement ID	Cs137 MDA	Cs137 Activity	Uncertainty
Mean:		7.98E-01	
Median:		8.58E-01	
Standard Deviation:		2.19E-01	
Range:	4.73E-02 to 9.42E-01		
F8000101A0001GD	8.09E-01	< 8.09E-01	
F8000101A0002GD	8.14E-01	< 8.14E-01	
F8000101A0003GD	8.07E-01	< 8.07E-01	
F8000101A0004GD	8.97E-01	< 8.97E-01	
F8000101A0005GD	8.99E-01	< 8.99E-01	
F8000101A0006GD	8.38E-01	< 8.38E-01	
F8000101A0007GD	8.75E-01	< 8.75E-01	
F8000101A0008GD	8.73E-01	< 8.73E-01	
F8000101A0009GD	6.52E-01	< 6.52E-01	
F8000101A0010GD	8.71E-01	< 8.71E-01	
F8000101A0011GD	8.55E-01	< 8.55E-01	
F8000101A0012GD	8.58E-01	< 8.58E-01	
F8000101A0013GD	9.32E-01	< 9.32E-01	
F8000101A0014GD	9.42E-01	< 9.42E-01	
F8000101S0001SS	4.73E-02	< 4.73E-02	

Survey Unit Data Assessment:

The survey design required 15 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 3. 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 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	15	
Median (pCi/g):	8.58E-01	
Mean (pCi/g):	7.98E-01	
Standard Deviation (pCi/g):	2.19E-01	
Maximum (pCi/g):	9.42E-01	
Sign Test Final N Value:	15	
S+ Value:	15	
Critical Value:	10	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	Class 3
Standard Deviation <= Sigma:	Investigate	<0.5 DCGL
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
The survey unit passes all conditions?	Investigate	<0.5 DCGL - Survey Passes

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 land 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. 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 Table 5-4 of the LTP. 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 direct measurements were less than the DCGL. No investigations were required.

The direct 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.

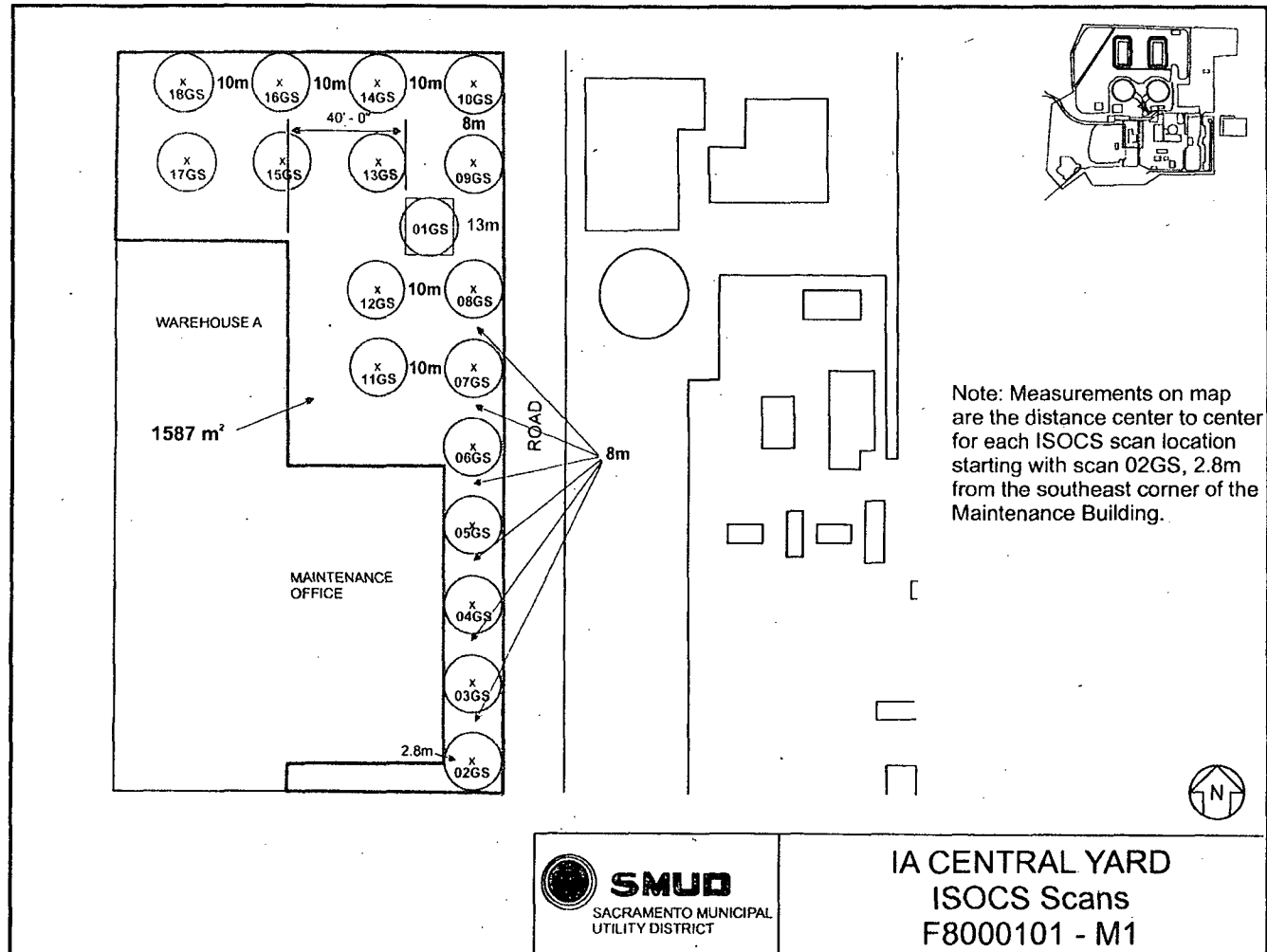
It is concluded that survey unit F8000101 meets the release criteria of 10CFR20.1402.

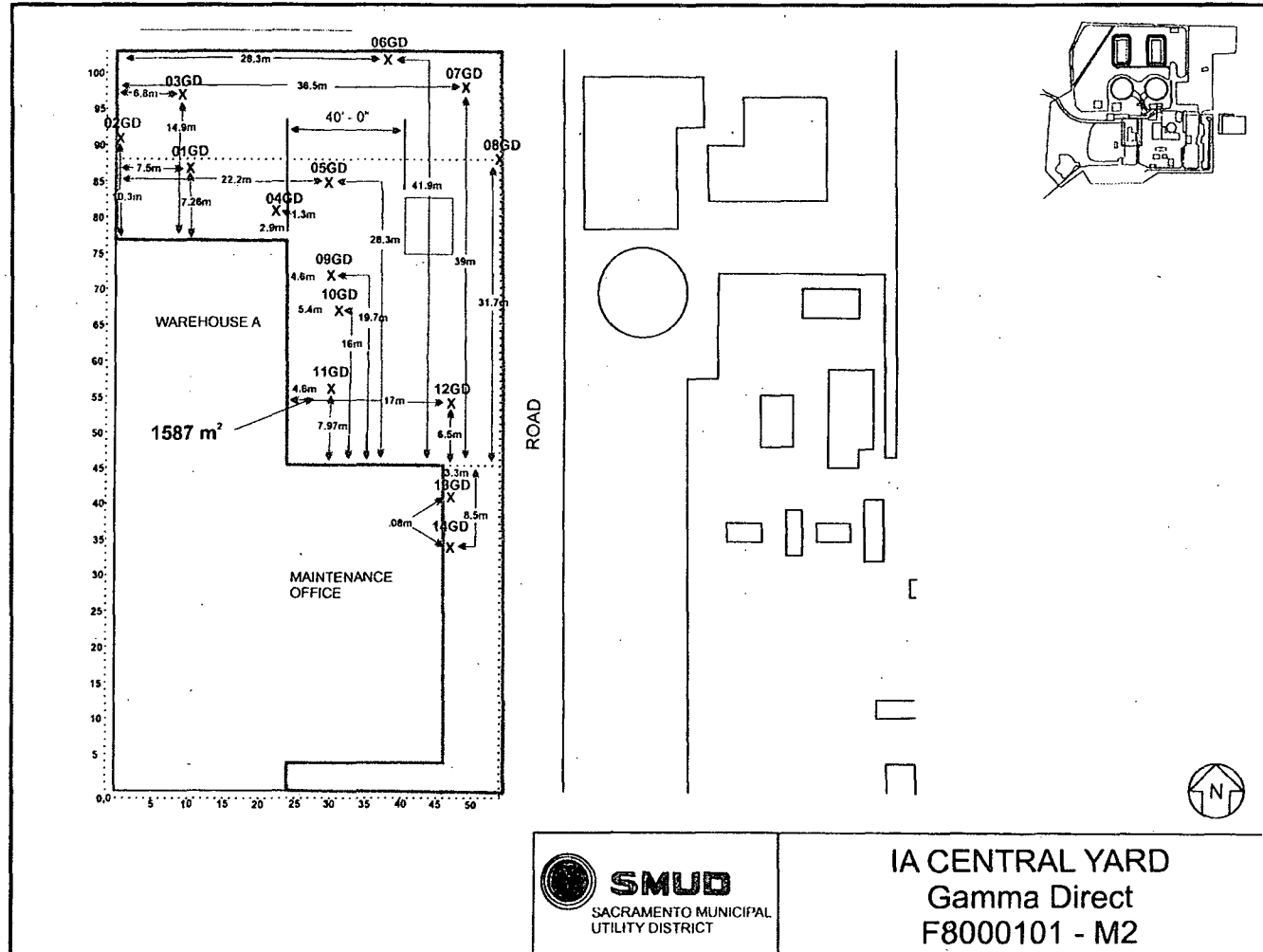
Attachment 1

Maps

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Survey Unit F8000101





Attachment 2

Instrumentation

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Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	05069128	Soil – 0.0473 pCi/g Cs-137
Inspector	N/A	08051294	Asphalt – 0.942 pCi/g Cs-137
ISOCS	N/A	1983920	Soil – 0.271 pCi/g Cs-137 Soil – 0.156 pCi/g Co-60 Asphalt – 0.357 pCi/g Cs-137

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS	Investigation Criteria - Scan	Soil – 26.3 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60 Asphalt – 26.3 pCi/g Cs-137
Inspector	Investigation Level – Direct	Asphalt – 26.3 pCi/g Cs-137
HPGe	Investigation Level	Soil – 26.3 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60
All	DCGL _w	51.2 Cs-137 12.6 Co-60
All	DCGL _{EMC}	N/A

Attachment 3

Investigation

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(none required)

Attachment 4

Data Assessment

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