

Rancho Seco
Final Status Survey Summary Report
April 7, 2008
Barrel Farm Soil
Survey Unit F8430011

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8430011, Barrel Farm Soil

Survey Unit Description:

Operating History: The area was used for the temporary storage of packaged radioactive material as well as the segregation and consolidation of waste packages. Operating records and the HSA document several leaks/spills with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

Site Characterization: Soil samples were collected and analyzed for the presence of plant-derived radionuclides. Cs-137 was the primary nuclide of plant origin detected with a mean activity level of 0.750 pCi/g and a maximum value of 4.250 pCi/g. Based on the classification procedure (DSIP-0020) and low levels of Cs-137 reported, the area was determined to be a Class 1 land area.

HSA Events: HSA Report pg. 64.

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 determined using a random-start, fixed grid pattern and 1313 m² were scanned for approximately 100% 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:	F843	Barrel Farm Soil
Survey Unit:	0011	Open Land Area
Class:	1	LTP Table 5-4
SU Area (m²):	1313	
Evaluator:	Erin L. Brown	
DCGL Cs137 surrogate (pCi/g):	51.2	
Area Factor:	1.2	Class 1
Design DCGLemc (pCi/g):	64	Class 1 Conservatively based on (area factor)(51.2)
LBGR (pCi/g):	25.6	Adjusted
Design Sigma (pCi/g):	1.46	DTBD-06-001, Table 5-4D
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m²):	93.8	Class 1
Total Area Scanned (m²):	1313	
Scan Coverage (%):	100%	Class 1
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	17.5	
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:	9.7	Class 1

Survey Results:

A total of 16 direct measurements were made in F8430011. 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. 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:		6.34E-02	
Median:		5.71E-02	
Standard Deviation:		2.12E-02	
Range:	5.05E-02 to 1.39E-01		
F8430011S0001SS	5.05E-02	< 5.05E-02	
F8430011S0002SS	5.09E-02	< 5.09E-02	
F8430011S0003SS	5.44E-02	< 5.44E-02	
F8430011S0004SS	5.75E-02	< 5.75E-02	
F8430011S0005SS	5.19E-02	< 5.19E-02	
F8430011S0006SS	5.31E-02	< 5.31E-02	
F8430011S0007SS	5.59E-02	< 5.59E-02	
F8430011S0008SS	6.20E-02	< 6.20E-02	
F8430011S0009SS	6.40E-02	< 6.40E-02	
F8430011S0010SS	7.63E-02	1.39E-01	5.33E-02
F8430011S0011SS	6.71E-02	< 6.71E-02	
F8430011S0012SS	5.41E-02	< 5.41E-02	
F8430011S0013SS	6.41E-02	< 6.41E-02	
F8430011S0014SS	5.93E-02	< 5.93E-02	
F8430011S0015SS	7.31E-02	< 7.31E-02	
F8430011S0016SS	5.66E-02	< 5.66E-02	

Survey Unit Data Assessment:

The survey design required 16 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 less than the design standard deviation so no additional samples were required.

Table 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	16	
Median (pCi/g):	5.71E-02	
Mean (pCi/g):	6.34E-02	
Standard Deviation (pCi/g):	2.12E-02	
Maximum (pCi/g):	1.39E-01	
Sign Test Final N Value:	16	
S+ Value:	16	
Critical Value:	11	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{mc}:	Yes	Class 1
Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
The survey unit passes all conditions?	Yes	

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 (i.e. the survey unit average activity is less than the DCGL and the EMC criterion has been met), the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 1 land 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. No potential areas of elevated activity were detected.

Conclusion:

The FSS of this survey unit was properly designed as a Class 1 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.

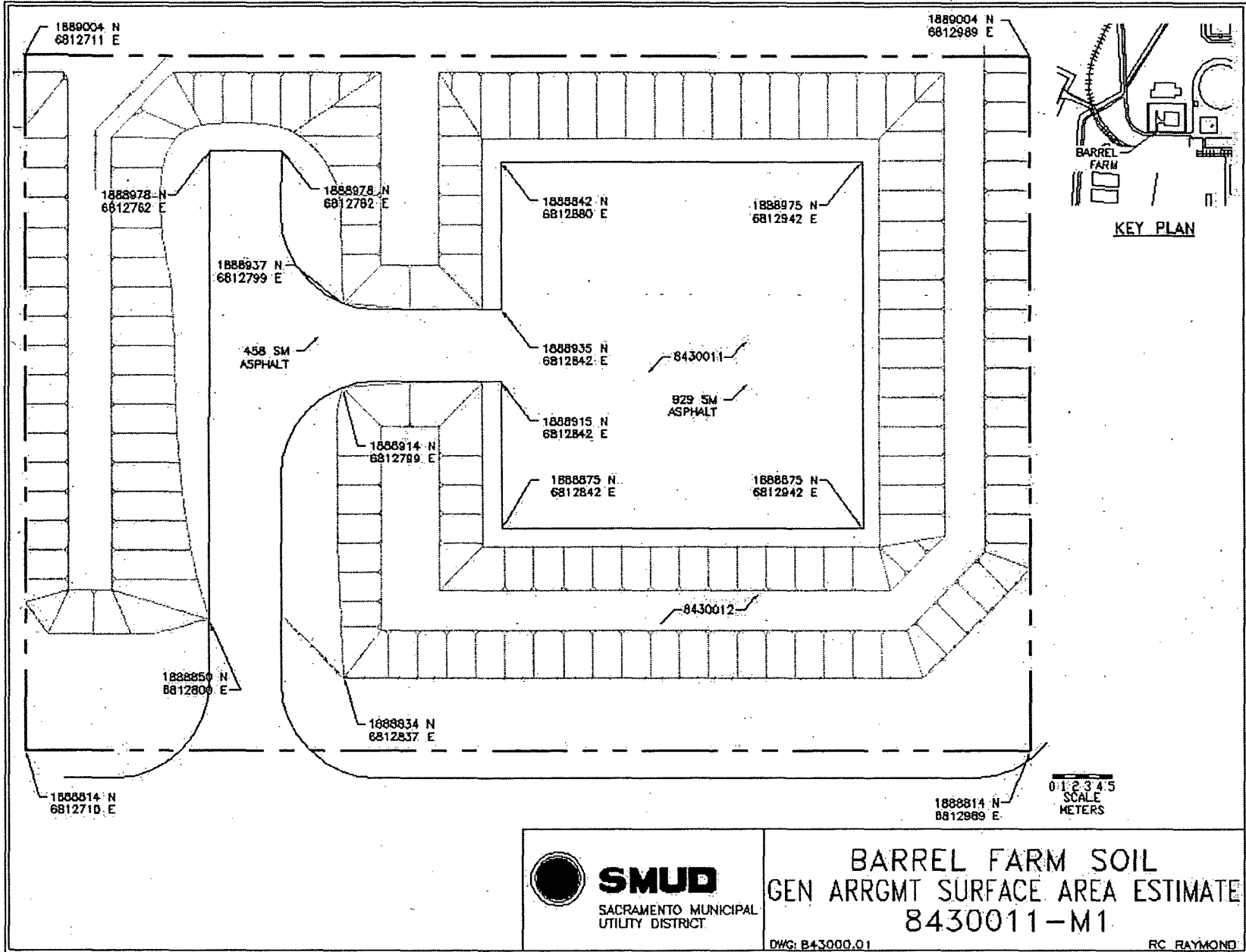
It is concluded that survey unit F8430011 meets the release criteria of 10CFR20.1402.

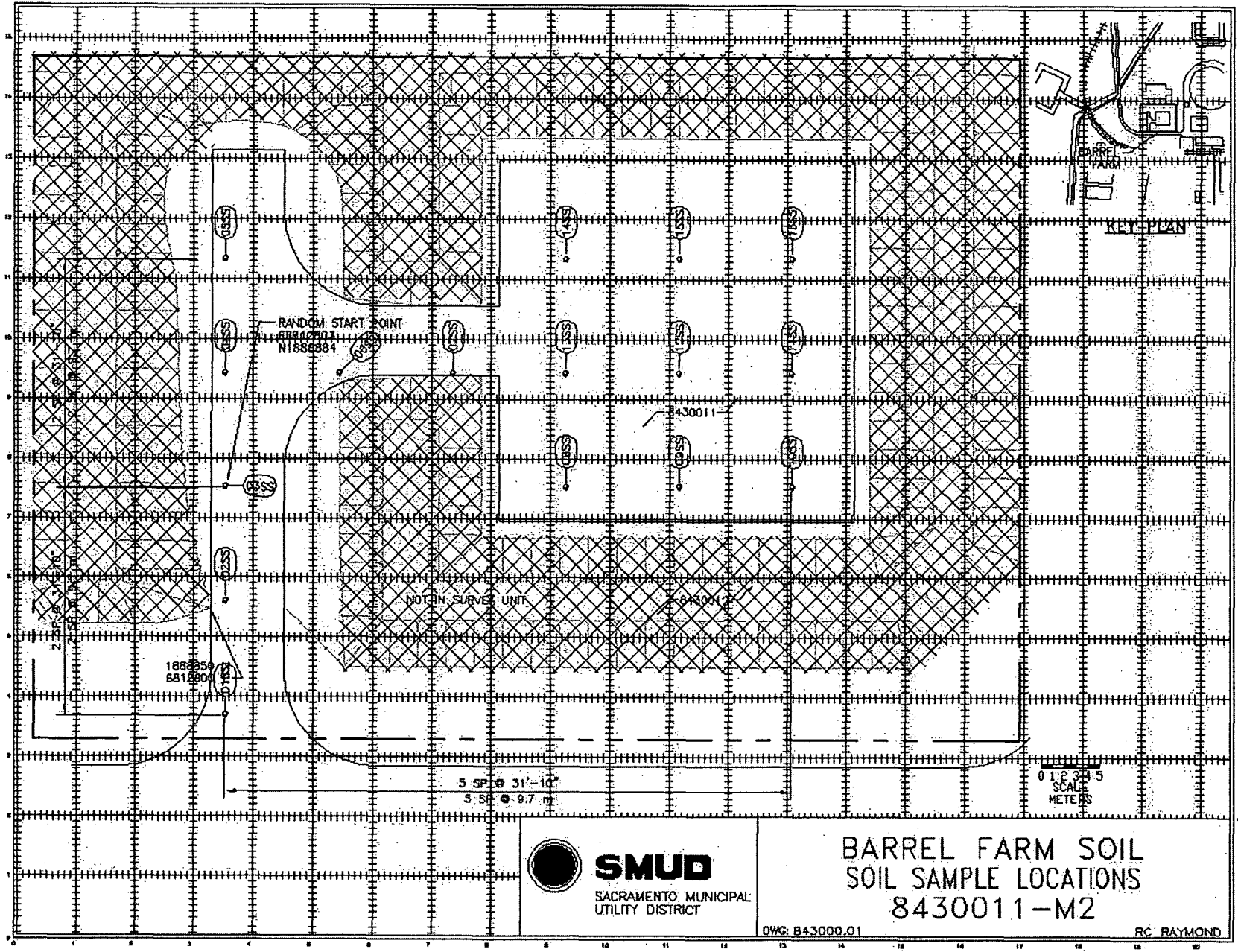
Attachment 1

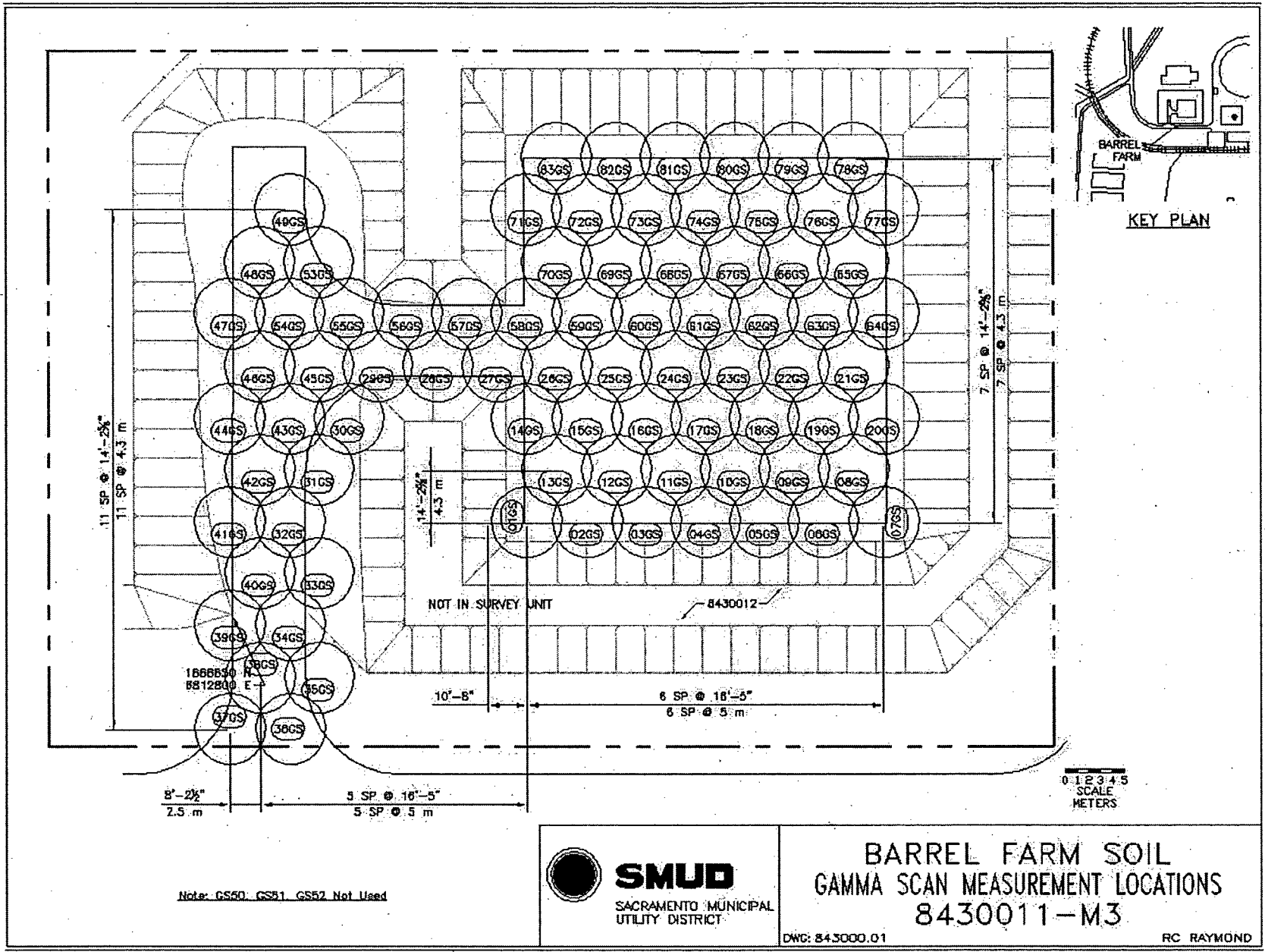
Maps

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Survey Unit F8430011







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 – 0.07 pCi/g Cs-137
ISOCS	N/A	2983947	Soil – 0.3 pCi/g Cs-137 Soil – 0.2 pCi/g Co-60

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS	Investigation Criteria - Scan	Soil – 20 pCi/g Cs-137 Soil – 5.7 pCi/g Co-60
All	DCGL _W	51.2 Cs-137 12.6 Co-60
All	DCGL _{EMC}	64pCi/g

Attachment 3
Investigation
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(none required)

Attachment 4

Data Assessment

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