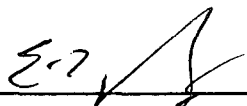


Rancho Seco
Final Status Survey Summary Report
February 12, 2009
Western IA (Barrel Farm west)
Survey Unit F8000072

Prepared By: Dan A. Tallman  Date: February 12, 2009
FSS Engineer

Reviewed By:  Date: 2-17-09
Lead FSS Engineer

Approved By:  Date: 3-3-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000072, Western IA (Barrel Farm west)

Survey Unit Description:

Operating History: This area is located on the west side of the Industrial Area to the north of the retention basins and south of the IOSB. Specifically, ~ 700 square meters west of the historic location of the barrel omitted from survey coverage in F8000071 and F8000121. 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. Radioactive material may have been temporarily stored in this area.

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 35 m² were scanned for approximately 5% 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	Western IA (Barrel Farm west)
Survey Unit:	0072	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m²):	696	
Evaluator:	D.A. Tallman	
DCGL Cs137 surrogate (pCi/g):	51.2	
Area Factor:	N/A	Class 3
Design DCGL_{mc} (pCi/g):	N/A	Class 3
LBGR (pCi/g):	25.6	Default = 50% DCGL
Design Sigma (pCi/g):	0.034	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):	35	
Scan Coverage (%):	5%	Class 3
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	752.9	
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 14 direct measurements were made in F8000072. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. One of the scan measurements indicated areas of elevated activity. The observed scan range was 8482-11076 cpm. 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:		6.87E-02	
Median:		6.74E-02	
Standard Deviation:		9.42E-03	
Range:	5.57E-02 to 8.56E-02		
F8000072S0001SS	8.56E-02	< 8.56E-02	
F8000072S0002SS	7.04E-02	< 7.04E-02	
F8000072S0003SS	5.76E-02	< 5.76E-02	
F8000072S0004SS	7.98E-02	< 7.98E-02	
F8000072S0005SS	7.66E-02	< 7.66E-02	
F8000072S0006SS	6.50E-02	< 6.50E-02	
F8000072S0007SS	6.62E-02	< 6.62E-02	
F8000072S0008SS	6.46E-02	< 6.46E-02	
F8000072S0009SS	6.22E-02	< 6.22E-02	
F8000072S0010SS	5.63E-02	< 5.63E-02	
F8000072S0011SS	6.86E-02	< 6.86E-02	
F8000072S0012SS	8.07E-02	< 8.07E-02	
F8000072S0013SS	7.20E-02	< 7.20E-02	
F8000072S0014SS	5.57E-02	< 5.57E-02	

Survey Unit Data Assessment:

The survey design required 14 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):	14	Class 3
Median (pCi/g):	6.74E-02	
Mean (pCi/g):	6.87E-02	
Standard Deviation (pCi/g):	9.42E-03	
Maximum (pCi/g):	8.56E-02	
Sign Test Final N Value:	14	
S+ Value:	14	
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	
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:

One investigation (scan grid # 02) was required for the scan measurements and the results are reported in Attachment 3.

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 3 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. One potential area of elevated activity was detected and evaluated as shown in Attachment 3.

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. One investigation was 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.

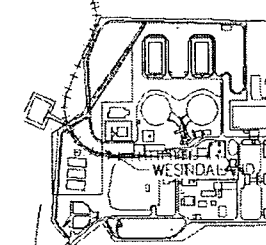
It is concluded that survey unit F8000072 meets the release criteria of 10CFR20.1402.

Attachment 1

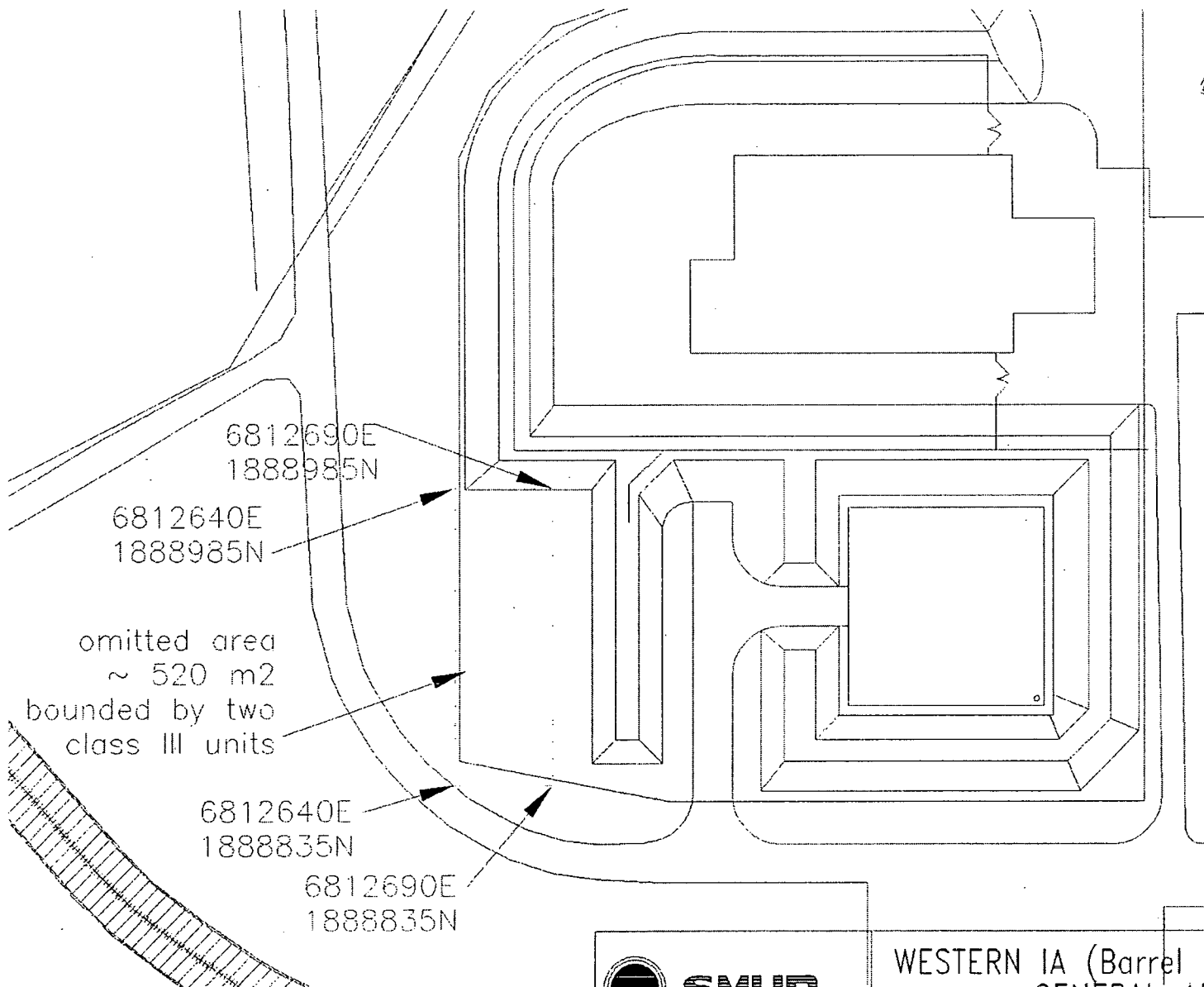
Maps

February 12, 2009

Survey Unit F8000072



KEY PLAN



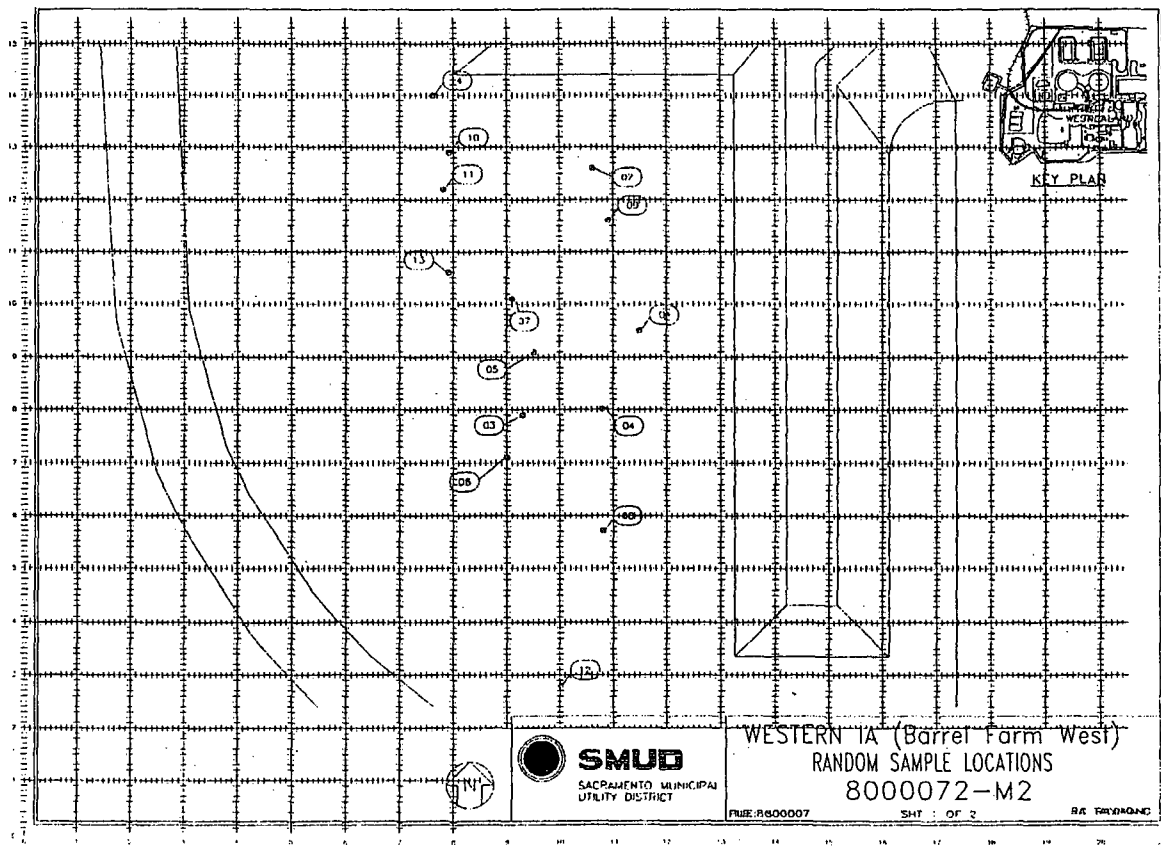
SMUD

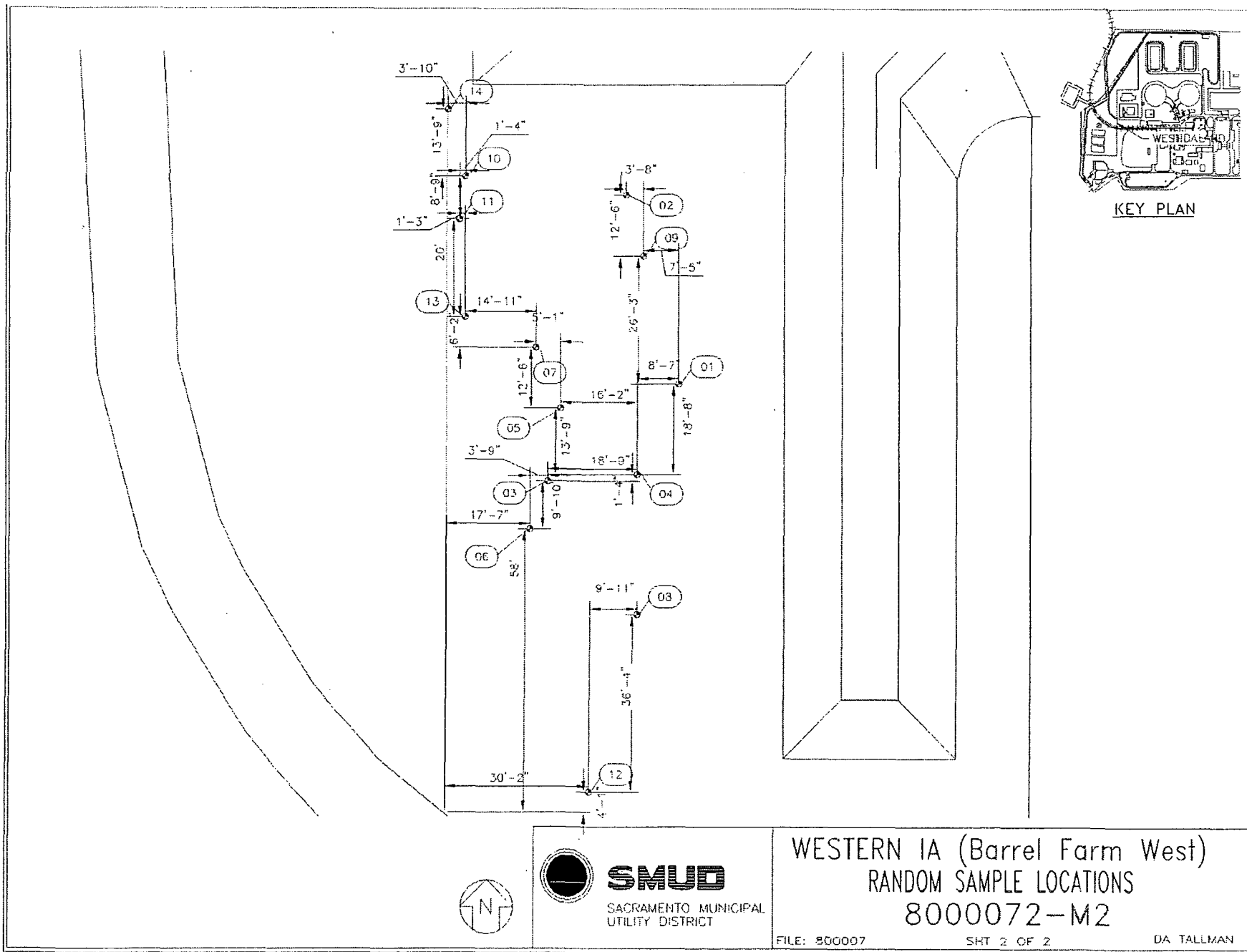
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

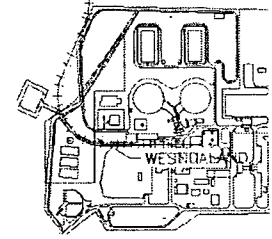
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GENERAL AREA
8000072-M1

FILE: 600007

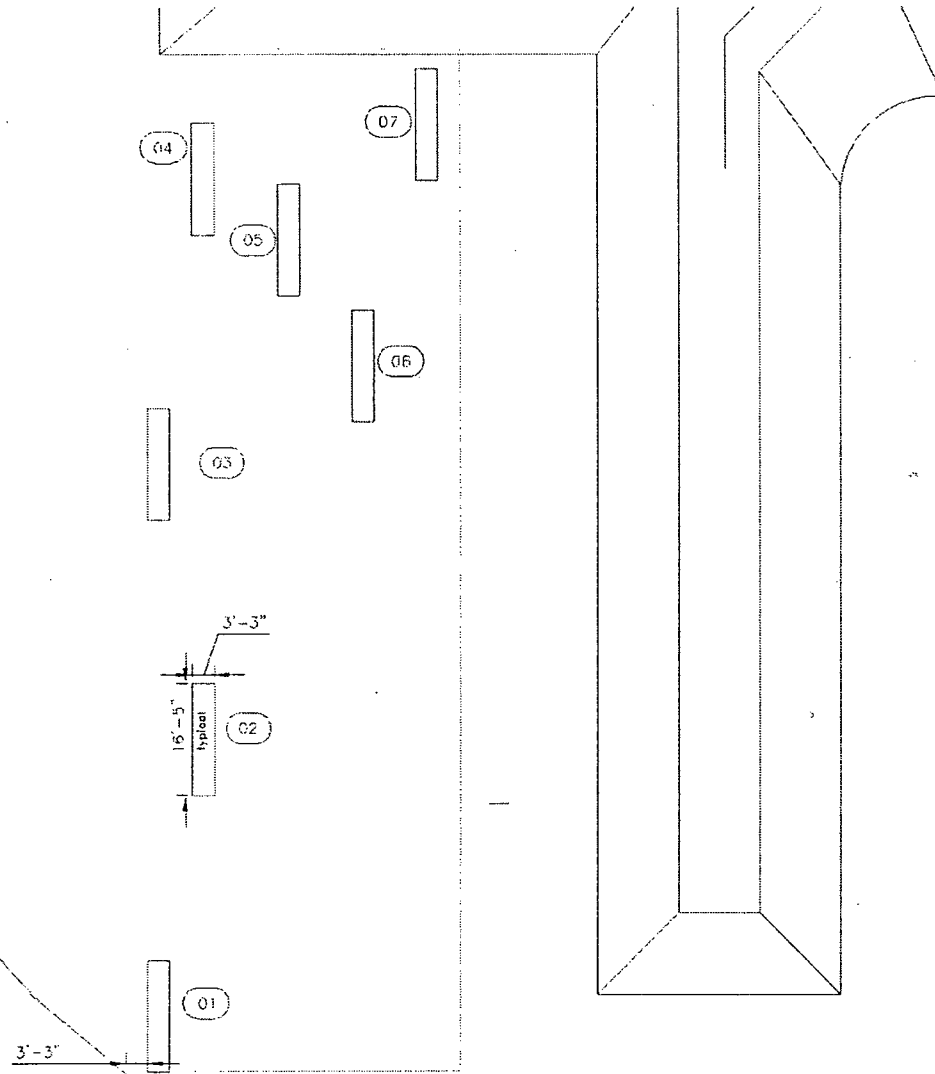
DA TALLMAN







KEY PLAN



SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

WESTERN IA (Barrel Farm West)
GAMMA SCAN GRID LOCATIONS
8000072-M3

FILE: 8000007

SHT 1 OF 1

DA TALLMAN

Attachment 2

Instrumentation

February 12, 2009

Survey Unit F8000072

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
2350-1	44-10	171374	5-6 pCi/g for distributed soil
HPGe	N/A	05069128	Soil – 0.086 pCi/g Cs-137 Soil – 0.07 pCi/g Co-60

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
HPGe	Investigation Criteria - Direct	Soil – 25.6 pCi/g Cs-137 _(surr.)
2350-1/44-10	Investigation Criteria - Scan	9750 cpm ¹
All	DCGL _w	51.2 Cs-137 12.6 Co-60

¹ 2350-1/44-10 Investigation Level calculated IAW DSIP-0510 (encl. 8.6)

Attachment 3

Investigation

February 12, 2009

Survey Unit F8000072

Table 3-1 Survey Unit Investigation

<i>Grid</i>	<i>Investigation Level (cpm)</i>	<i>Initial Value (cpm)</i>	<i>Investigation Result (pCi/g)</i>	<i>Elevated Area (m²)</i>	<i>Area Factor</i>	<i>DCGL_{emc}</i>	<i>Investigation Result (pCi/g)</i>	<i>DCGL_{emc} Unity Fraction</i>
02	9750	11076	MDA ¹	NA	NA	NA	MDA	NA
Survey Unit Remainder						DCGL = 51.2	SU Mean = 0.068	NA
¹ MDA values –Co60 ≤ 0.05 pCi/g, Cs137 ≤ 0.065 pCi/g								
EMC Unity Sum								NA

Attachment 4
Data Assessment
February 12, 2009
Survey Unit F8000072

