

Rancho Seco
Final Status Survey Summary Report
November 5, 2007
Hazardous Materials Warehouse Pad
Survey Unit F5010032

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F5010032, Hazardous Materials Warehouse Pad

Survey Unit Description:

Operating History: The structure which existed on the pad prior to demolition was used for the staging, shipment and receipt of material, including radioactive material. The HSA documented the presence of radioactive material prepared for shipment within the area.

Site Characterization: Direct measurements were made which confirmed the presence of plant-derived radionuclides. Cs-137 was the primary nuclide of plant origin detected with a mean gross activity level of 1,913 dpm/100 cm² and a maximum value of 2,642 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the area was determined to be a Class 3 area.

HSA Events: none

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 49.5 m² were scanned for approximately 18% coverage. Samples of removable contamination were collected at each direct measurement location. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

Operating History:

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F501	Hazardous Materials Warehouse Pad
Survey Unit:	0032	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m²):	268	
Evaluator:	DA Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGL_{emc} (dpm/100 cm ²):	N/A	Class 3
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	397	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	N/A	Class 3
Scan Area (m²):	49.5	
Scan Coverage (%):	18%	Class 3
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	54.1	
Relative Shift Used:	3	Uses 3.0 if Relative Shift is >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Design Min Samples N:	14	Class 3
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 14 direct measurements were made in F5010032. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Scan activity ranged from 4577 to 5655 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm ²)
F5010032-C0001BD	2339
F5010032-C0002BD	2469
F5010032-C0003BD	2552
F5010032-C0004BD	2469
F5010032-C0005BD	2547
F5010032-C0006BD	2594
F5010032-C0007BD	2614
F5010032-C0008BD	2537
F5010032-C0009BD	2334
F5010032-C0010BD	2583
F5010032-C0011BD	2666
F5010032-C0012BD	2381
F5010032-C0013BD	2521
F5010032-C0014BD	2438
Mean:	2503
Median:	2529
Standard Deviation:	102
Range:	2334 - 2666

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F5010032C0001SM	-2.24
F5010032C0002SM	-0.95
F5010032C0003SM	-4.82
F5010032C0004SM	-4.82
F5010032C0005SM	-0.95
F5010032C0006SM	-3.53
F5010032C0007SM	-4.82
F5010032C0008SM	-4.82
F5010032C0009SM	-2.24
F5010032C0010SM	-2.24
F5010032C0011SM	0.34
F5010032C0012SM	-4.82
F5010032C0013SM	-4.82
F5010032C0014SM	-3.53
Mean:	-3.16
Median:	-3.53
Standard Deviation:	1.79
Range:	-4.82 to 0.34

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 4. 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 4. Data Assessment Results

Survey Results Parameter	Value	Comment
Material Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Ambient Background Used (dpm/100 cm ²):	N/A	
Actual Direct Measurements (N):	14	
Median (dpm/100 cm ²):	2529	
Mean (dpm/100 cm ²):	2503	
Direct Measurement Standard Deviation (dpm/100 cm ²):	102	
Total Standard Deviation (dpm/100 cm ²):	102	Based on samples and backgrounds:
Maximum (dpm/100 cm ²):	2666	Background Subtract Not Applied
Material Type:	N/A	
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_{mc}:	N/A	Class 3
Total Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	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 3 structure 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 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. No direct measurements exceeded the DCGL of 43000 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of 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.

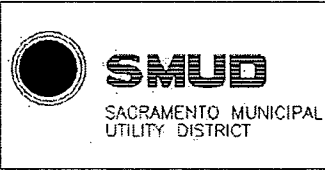
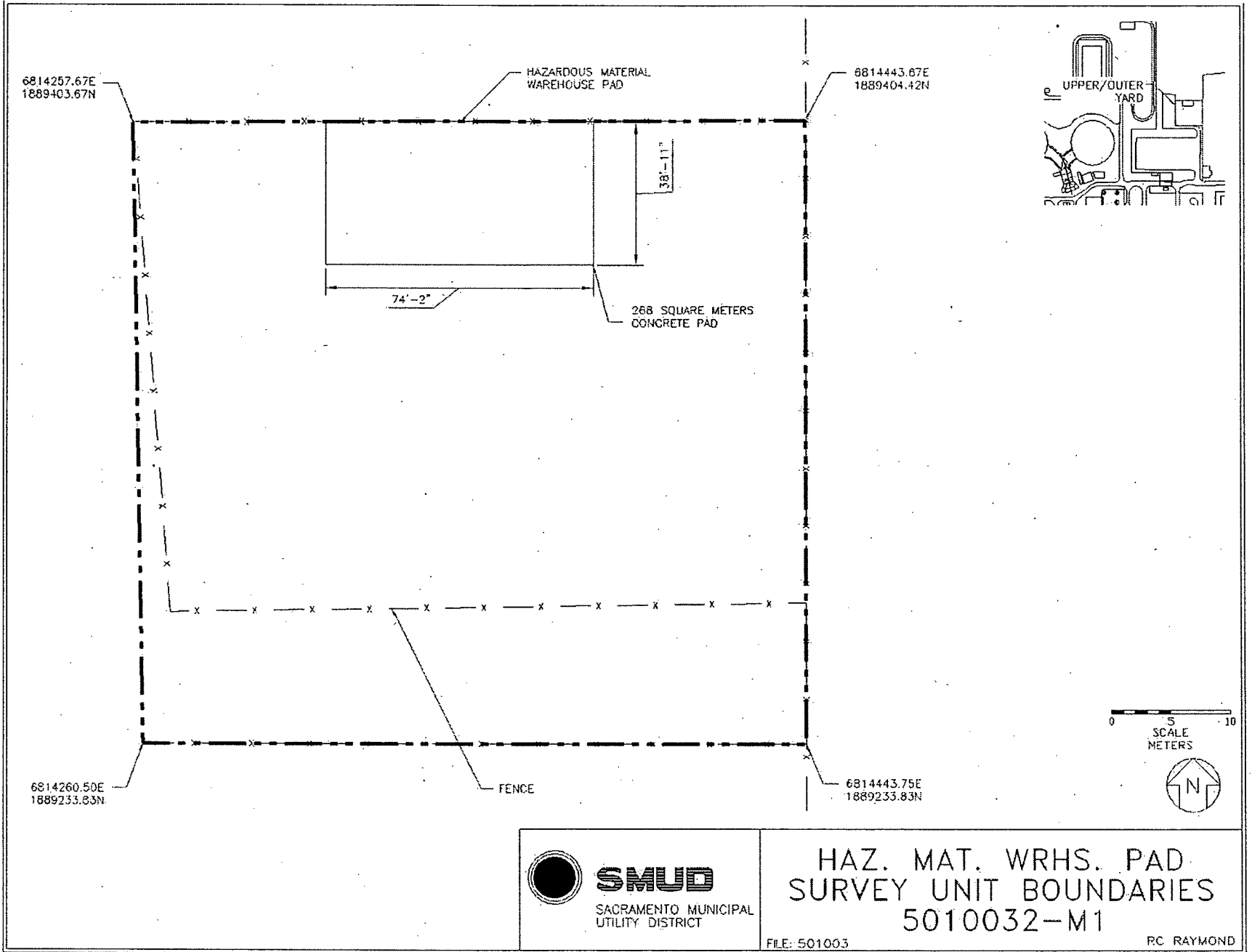
It is concluded that survey unit F5010032 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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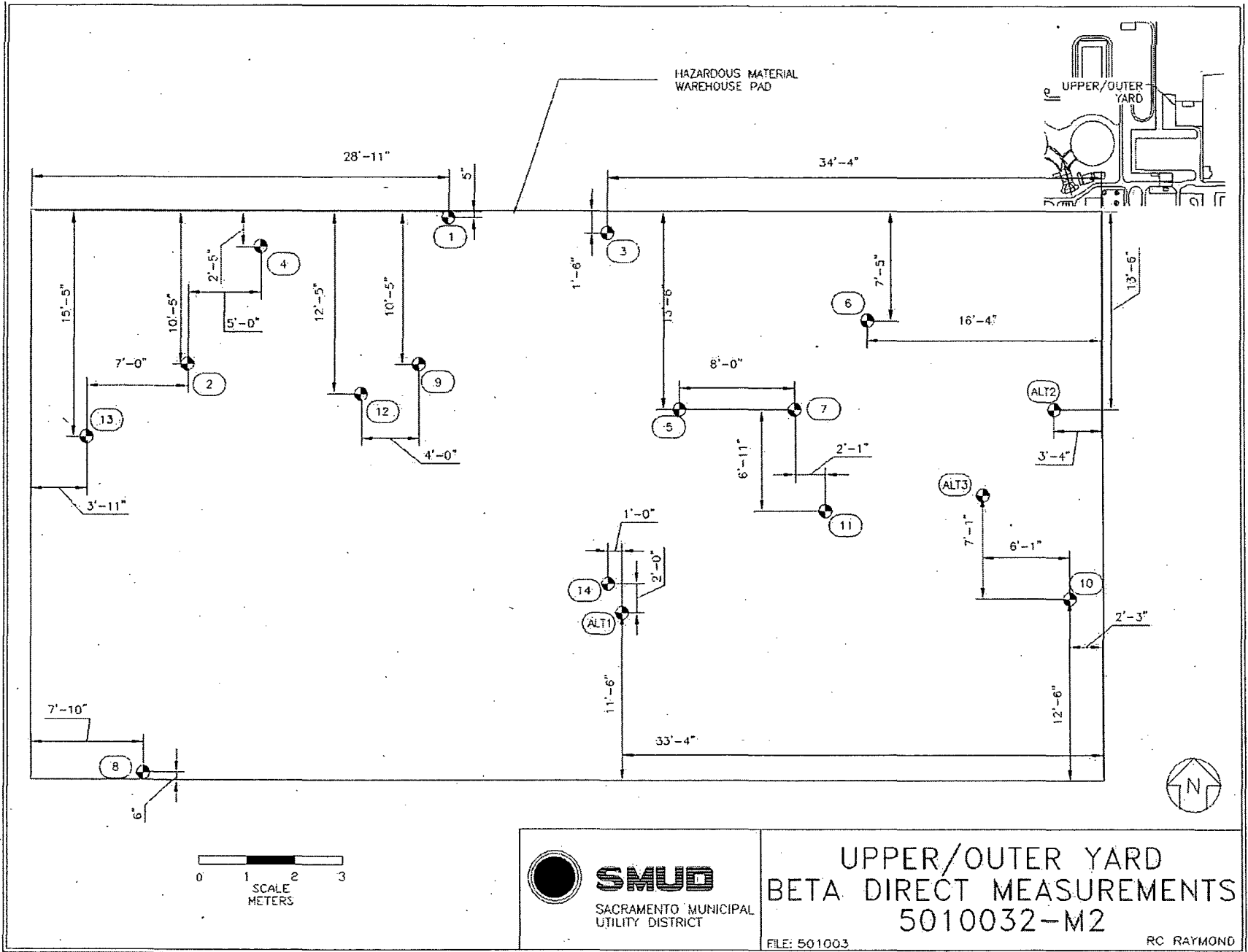
Survey Unit F5010032

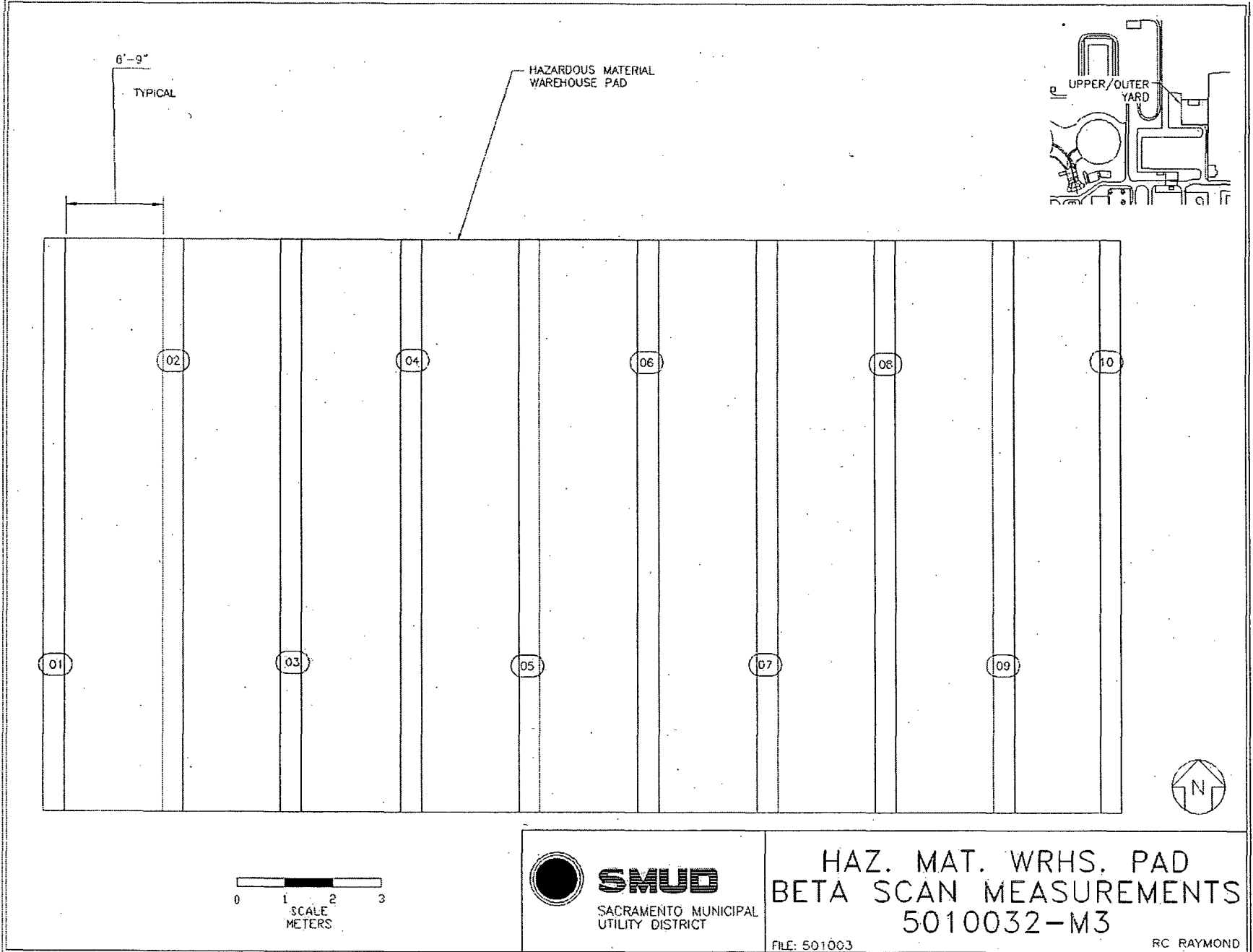


HAZ. MAT. WRHS. PAD
SURVEY UNIT BOUNDARIES
5010032-M1

FILE: 501003

PC RAYMOND





Attachment 2

Instrumentation

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Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 189089	43-68B; 148460	433	1033
M2350; 142499	43-37; 148502	198	616
Tennelec; 0401171	N/A	5 dpm α , 11 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	21500
Investigation Criteria - Scan	43000
DCGL _w	43000
DCGL _{EMC}	N/A

Attachment 3

Investigation

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(none required)

Attachment 4

Data Assessment

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