


Rancho Seco

Final Status Survey Summary Report

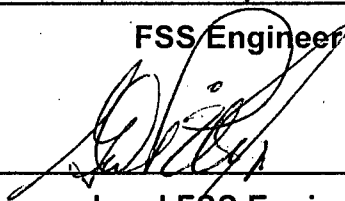
February 11, 2008

Room 114, 136, 137

Survey Unit F8131021

Prepared By:  Date: 2-11-2008

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Reviewed By:  Date: 2/14/08

Lead FSS Engineer

Approved By:  Date: 4-21-08

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8131021, Room 114, 136, 137, Make-Up Valve and Filter Rooms

Survey Unit Description:

Operating History: The reinforced concrete structure contained the RadWaste processing and supporting systems. The building contained six main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure. One report documented contamination of the auxiliary building roof. The roof was later replaced.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements on the -47' elevation showed a mean gross activity level of 320,071 dpm/100 cm² and a maximum value of 5,720,000 dpm/100 cm². Direct measurements on the -29' elevation showed a mean gross activity level of 544,756 dpm/100 cm² and a maximum value of 11,370,000 dpm/100 cm². Direct measurements on the -20' elevation showed a mean gross activity level of 247,831 dpm/100 cm² and a maximum value of 10,080,000 dpm/100 cm². Direct measurements on the grade elevation showed a mean gross activity level of 373,758 dpm/100 cm² and a maximum value of 5,800,000 dpm/100 cm². Direct measurements on the +20' elevation showed a mean gross activity level of 85,408 dpm/100 cm² and a maximum value of 1,900,000 dpm/100 cm². Direct measurements on the +40' elevation showed a mean gross activity level of 3,288 dpm/100 cm² and a maximum value of 24,781 dpm/100 cm². Direct measurements on the building exterior, including the mezzanine roof, showed a mean gross activity level of 1,897 dpm/100 cm² and a maximum value of 2,990 dpm/100 cm². (The roof had been replaced prior to the classification survey.) Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of the auxiliary building was determined to be a Class 1, 2 area and the exterior was a Class 2,3.

HSA Events: HSA Report pg. 63.

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 242.5 m² were scanned for 100% 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.

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F813	Room 114, 136, 137
Survey Unit:	1021	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	242.5	
Evaluator:	Gary Frank	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	3.3	Class 1
Design DCGLemc (dpm/100 cm²):	141900	Class 1
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	6935	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	C0-60 used for Area factor and emc
Sample Area (m²):	7	Class 1
Scan Area (m²):	242.5	
Scan Coverage (%):	100%	Class 1
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	3.1	
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:	35	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 46 direct measurements were made in F8131021. 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 1033 (MDA) to 81018 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)
F8131021-C0001BD	1214
F8131021-C0002BD	1266
F8131021-C0003BD	1069
F8131021-C0004BD	1146
F8131021-C0005BD	1359
F8131021-C0006BD	1385
F8131021-C0007BD	1110
F8131021-C0008BD	1344
F8131021-C0009BD	1333
F8131021-C0010BD	1442
F8131021-C0011BD	1318
F8131021-C0012BD	1478
F8131021-C0013BD	1261
F8131021-C0014BD	1302
F8131021-C0015BD	1219
F8131021-C0016BD	1063
F8131021-C0017BD	1193
F8131021-C0022BD	1525
F8131021-C0023BD	1421
F8131021-C0024BD	1188
F8131021-C0025BD	1416
F8131021-C0026BD	1836
F8131021-C0027BD	4736
F8131021-C0028BD	3149
F8131021-C0029BD	8149
F8131021-C0030BD	1468
F8131021-C0031BD	1722
F8131021-C0032BD	2811
F8131021-C0033BD	1961
F8131021-C0034BD	1390
F8131021-C0035BD	1753
F8131021-C0036BD	1655
F8131021-C0037BD	1354
F8131021-C0038BD	2111
F8131021-C0039BD	1769
F8131021-C0040BD	3595
F8131021-C0041BD	3465

Measurement ID	Gross Activity (dpm/100 cm ²)
F8131021-C0042BD	1344
F8131021-C0043BD	1328
F8131021-C0044BD	1219
F8131021-C0045BD	1385
F8131021-C0046BD	1411
F8131021-C0047BD	1406
F8131021-C0048BD	1027
F8131021-C0049BD	1312
F8131021-C0050BD	1338
Mean:	1777
Median:	1385
Standard Deviation:	1216
Range:	1027 - 8149

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8131021C0001SM	-4.82
F8131021C0002SM	4.22
F8131021C0003SM	8.09
F8131021C0004SM	-3.53
F8131021C0005SM	-4.82
F8131021C0006SM	0.34
F8131021C0007SM	0.34
F8131021C0008SM	-4.82
F8131021C0009SM	-4.82
F8131021C0010SM	0.34
F8131021C0011SM	-0.95
F8131021C0012SM	-3.53
F8131021C0013SM	-2.24
F8131021C0014SM	0.34
F8131021C0015SM	0.34
F8131021C0016SM	0.34
F8131021C0017SM	-4.82
F8131021C0022SM	1.64
F8131021C0023SM	-0.95
F8131021C0024SM	4.22
F8131021C0025SM	-3.53
F8131021C0026SM	-0.95
F8131021C0027SM	-2.24
F8131021C0028SM	2.93
F8131021C0029SM	2.93
F8131021C0030SM	1.64
F8131021C0031SM	-2.24
F8131021C0032SM	-0.95
F8131021C0033SM	-0.95
F8131021C0034SM	-2.24
F8131021C0035SM	-2.24
F8131021C0036SM	1.64
F8131021C0037SM	-3.53
F8131021C0038SM	1.64
F8131021C0039SM	1.64
F8131021C0040SM	35.21
F8131021C0041SM	61.04
F8131021C0042SM	-2.24
F8131021C0043SM	-3.53
F8131021C0044SM	-2.24
F8131021C0045SM	-3.53
F8131021C0046SM	-3.53
F8131021C0047SM	0.34
F8131021C0048SM	0.34
F8131021C0049SM	0.34
F8131021C0050SM	-0.95
Mean:	1.3
Median:	-0.95
Standard Deviation:	10.82
Range:	-4.82 to 61.04

Survey Unit Data Assessment:

The survey design required 46 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):	46		
Median (dpm/100 cm ²):	1385		
Mean (dpm/100 cm ²):	1777		
Direct Measurement Standard Deviation (dpm/100 cm ²):	1216		
Total Standard Deviation (dpm/100 cm ²):	1216		Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	8149		Background Subtract Not Applied
Material Type:	N/A		
Sign Test Final N Value:	46		
S+ Value:	46		
Critical Value:	29		
Sufficient Samples Collected:	Yes		
Maximum Value < DCGL:	Yes		
Median Value < DCGL:	Yes		
Mean Value < DCGL:	Yes		
Maximum Value < DCGL_{mc}:	Yes	Class 1	
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 1 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. Therefore the EMC criterion was met.

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. 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.

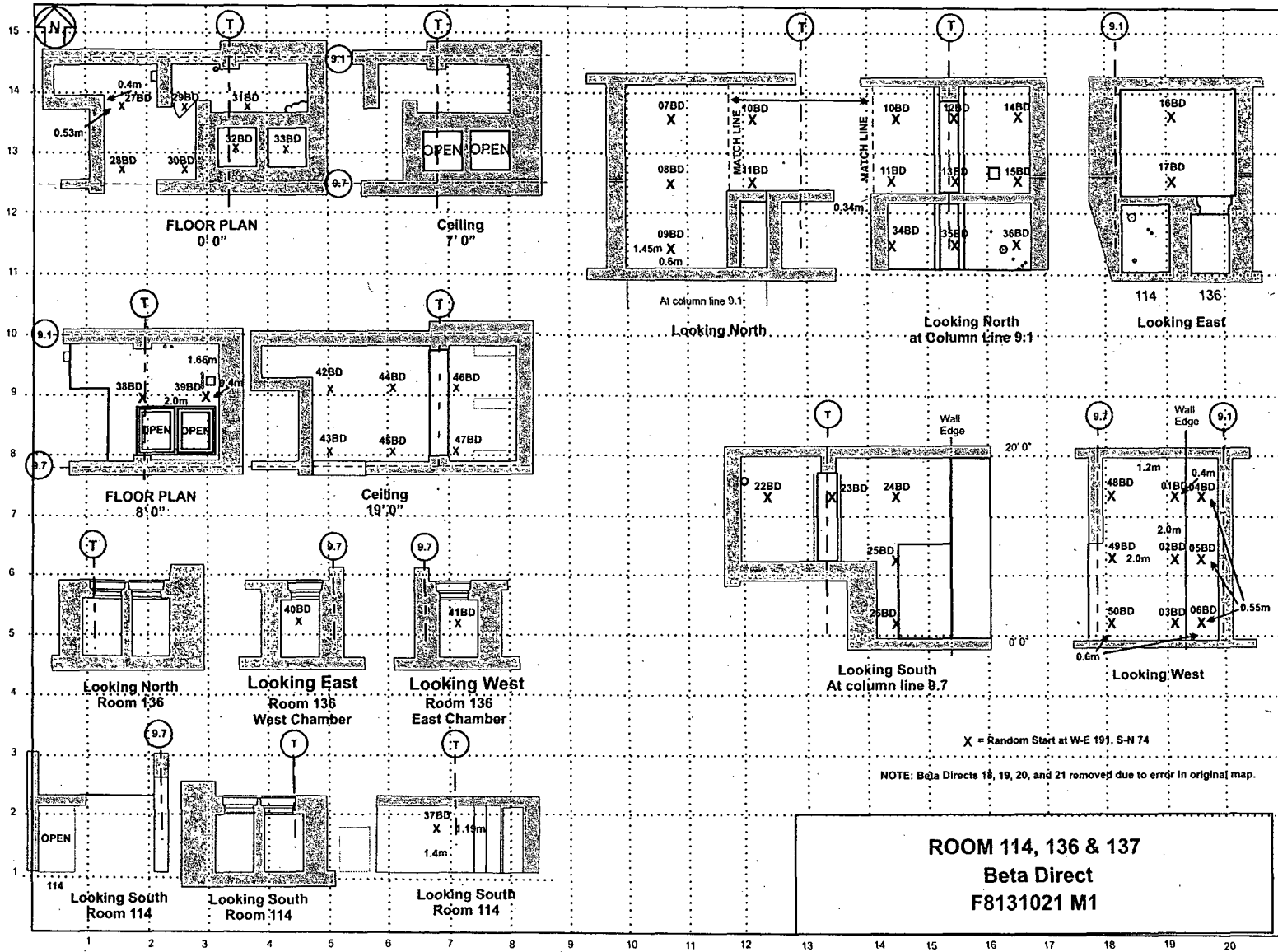
It is concluded that survey unit F8131021 meets the release criteria of 10CFR20.1402.

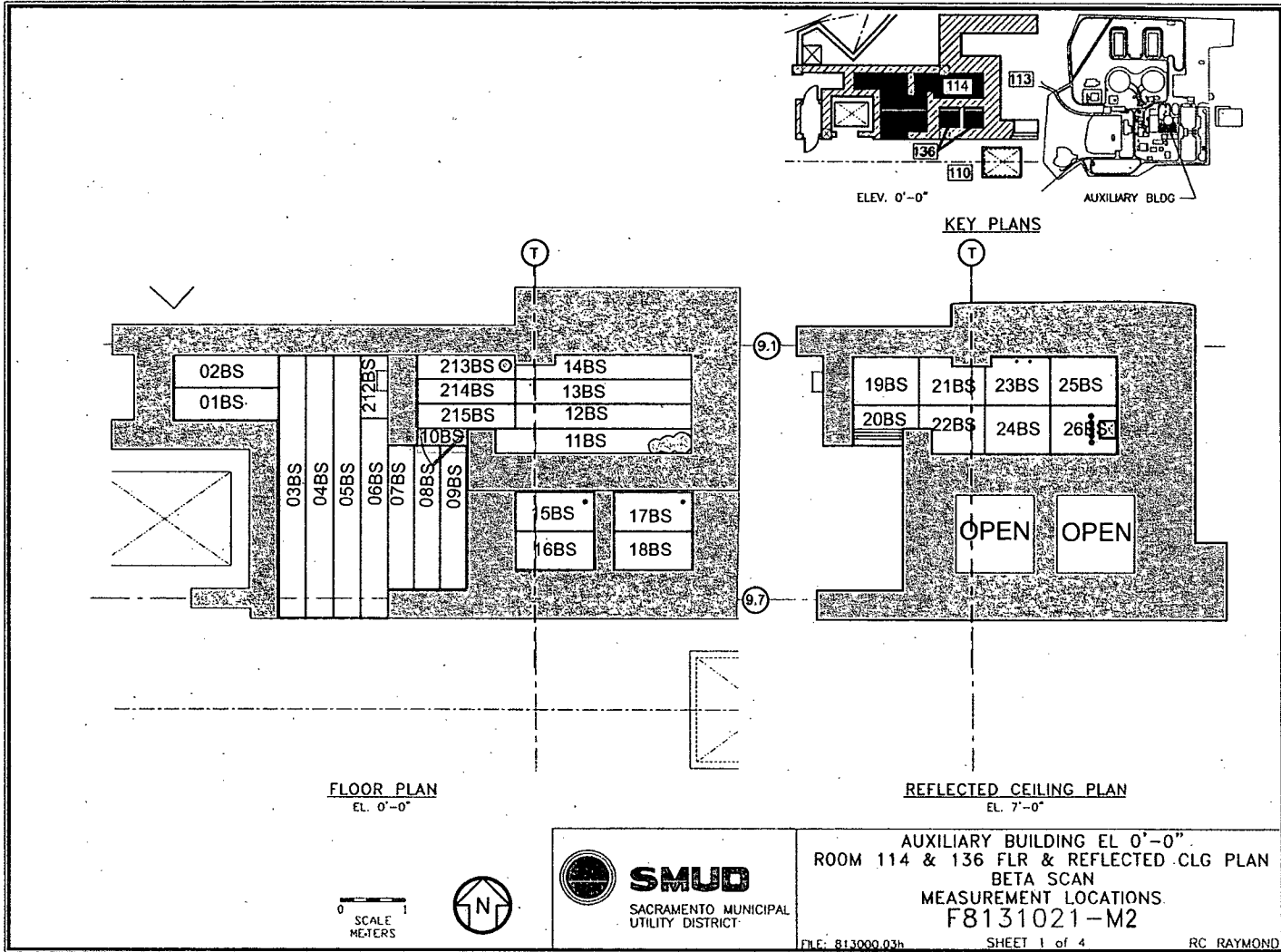
Attachment 1

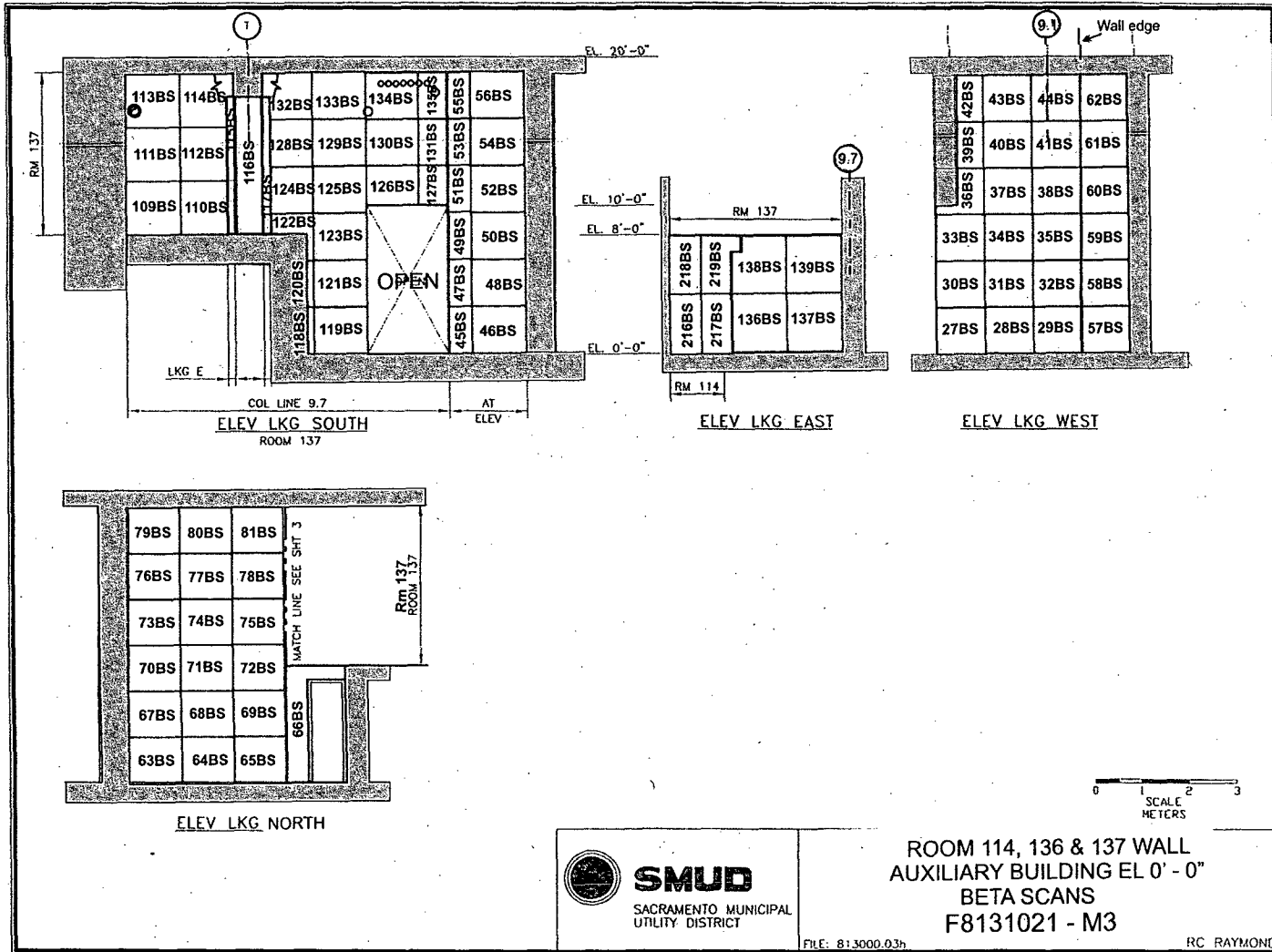
Maps

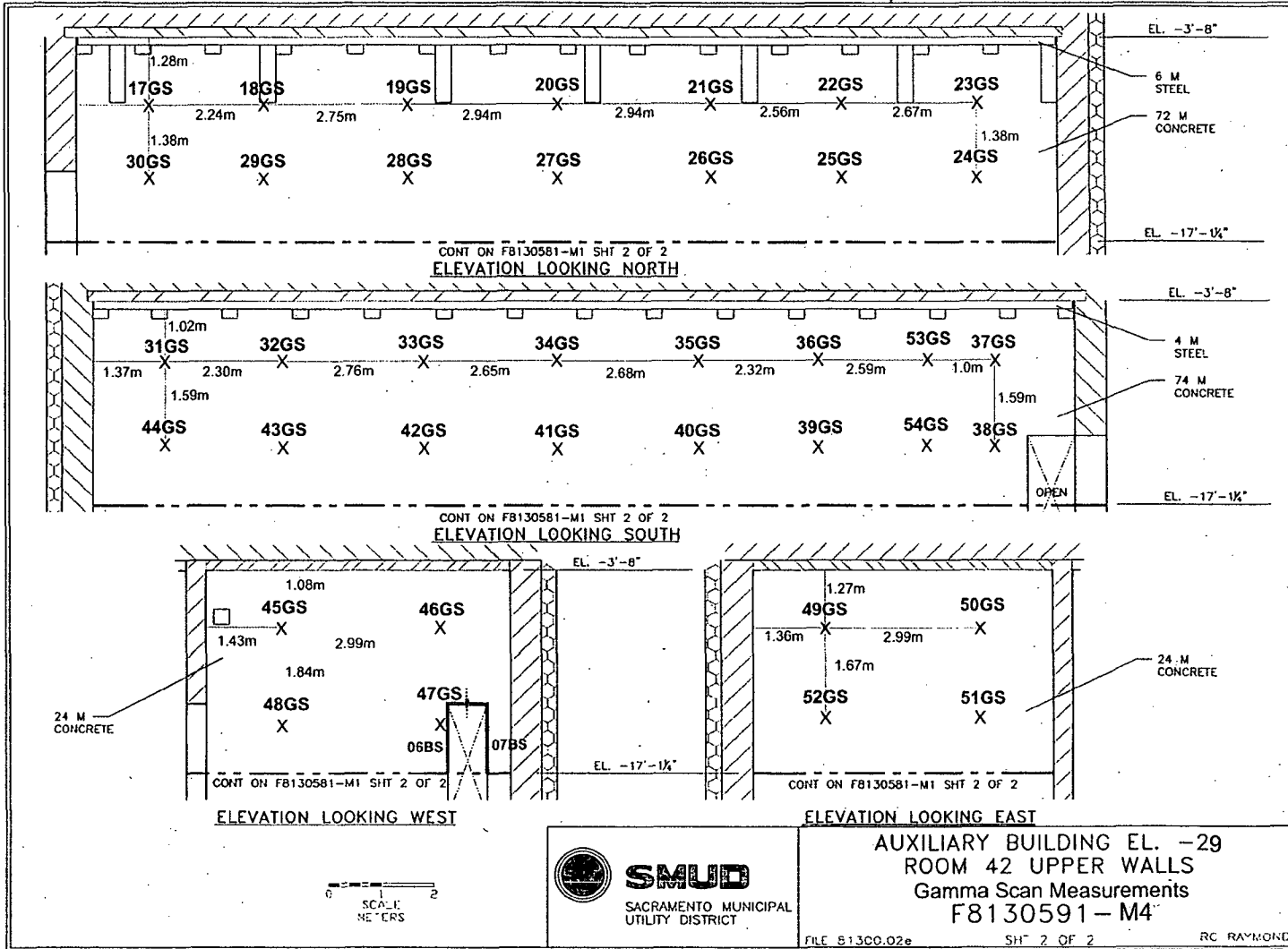
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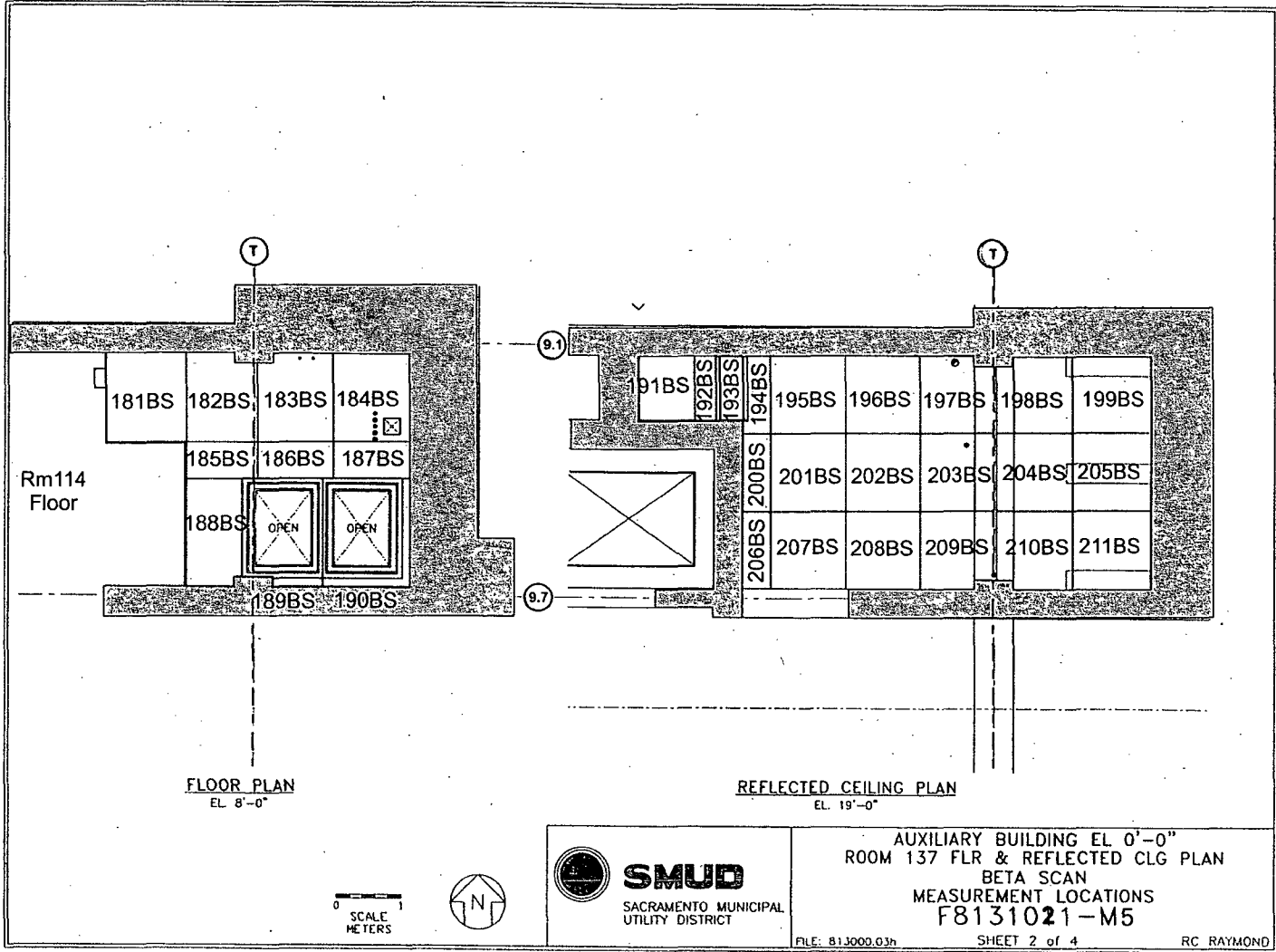
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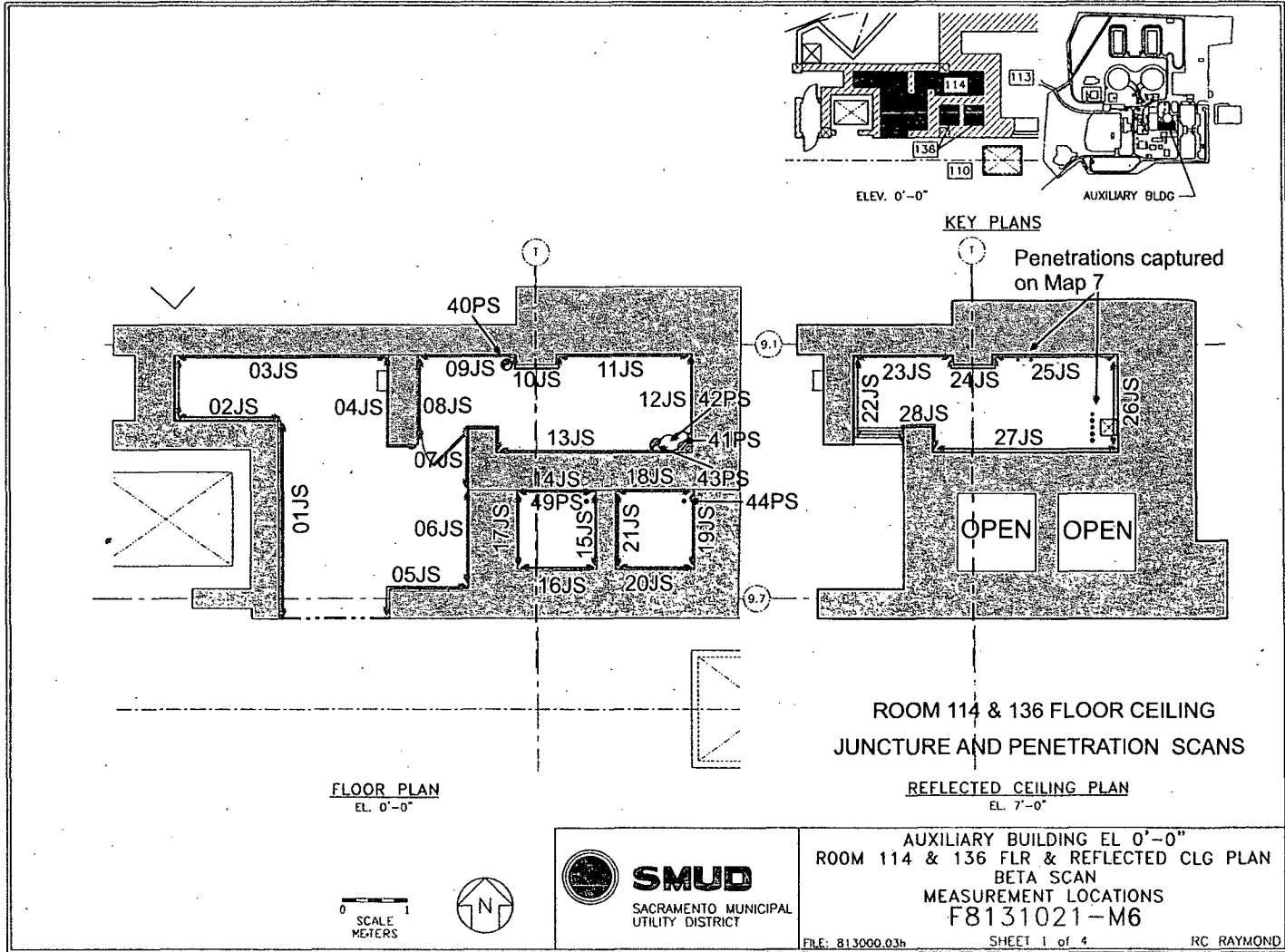




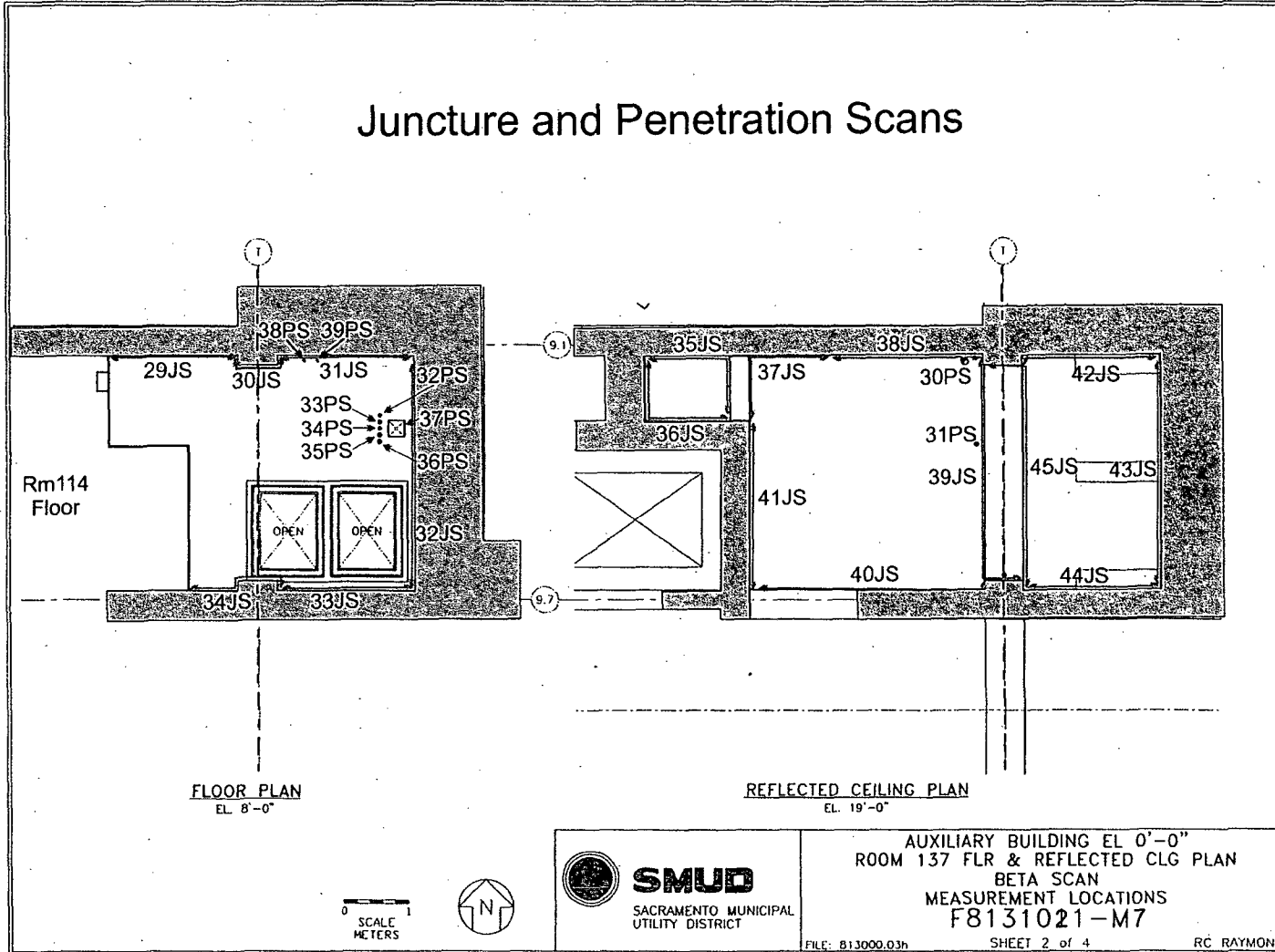


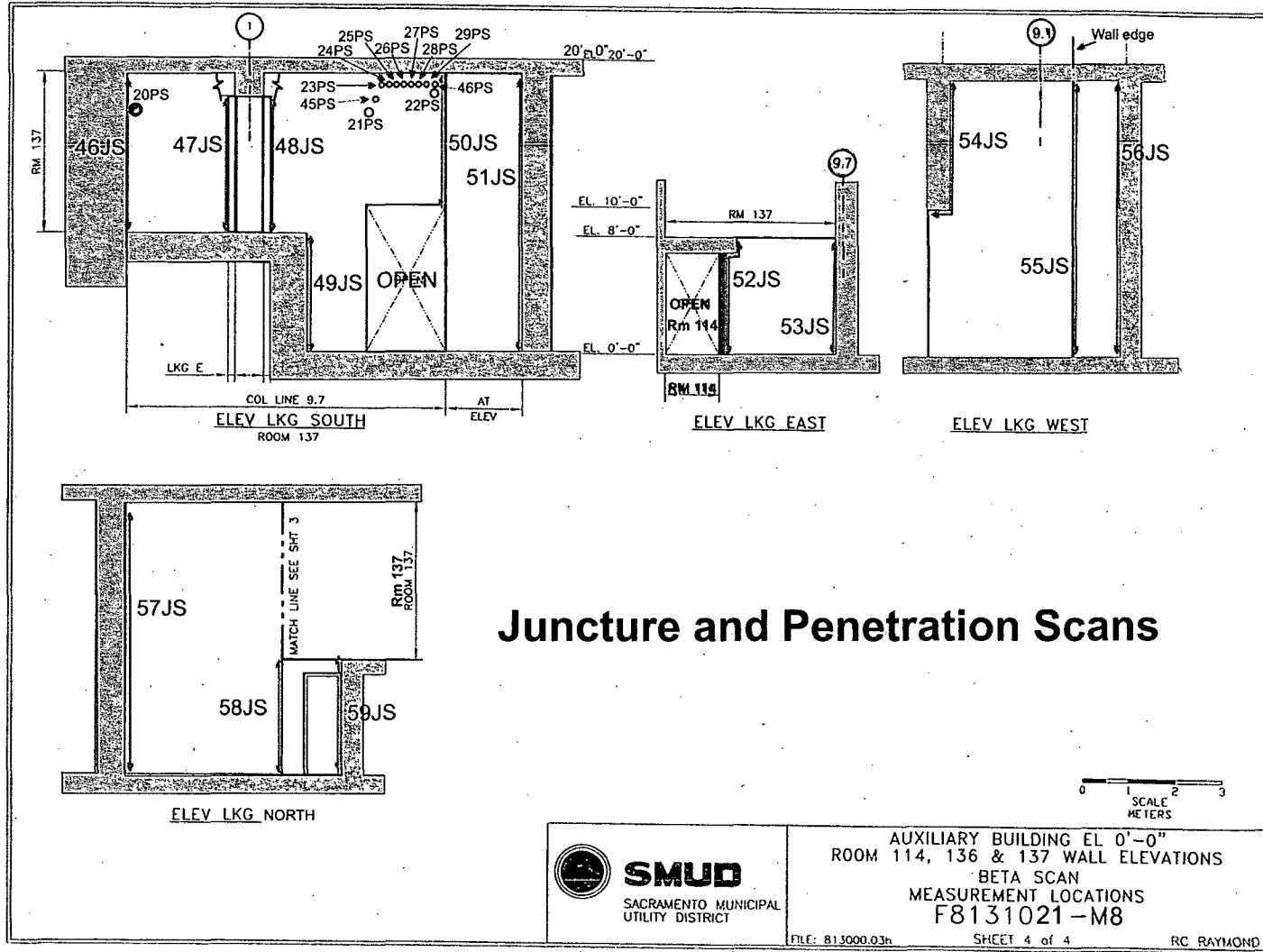


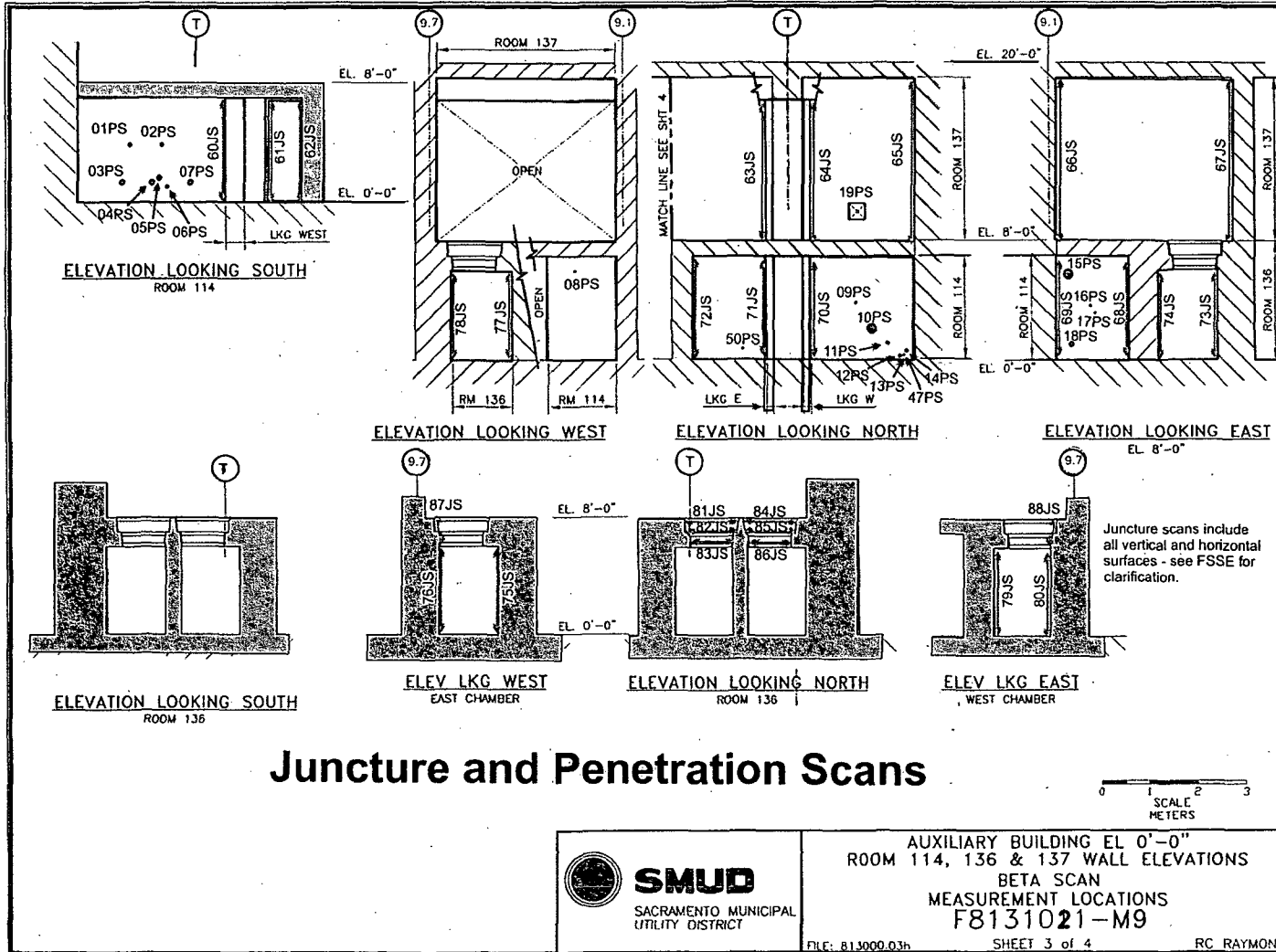




Juncture and Penetration Scans







Attachment 2

Instrumentation

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Survey Unit F8131021

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; 180733	43-98B; 148638 ⁵	550	990
M2350; 180733	43-94; 148620 ⁴	350	610
M2350; 175834	43-68B; 190482 ¹	433	1033
M2350; 203486	43-68B; 190476 ¹	433	1033
M2350; 193700	43-68B; 190294 ¹	433	1033
M2350; 203486	43-68B; 161400 ¹	433	1033
M2350; 149789	43-68B; 161397 ¹	433	1033
M2350; 193715	43-68B; 160703 ¹	433	1033
M2350; 149789	43-116-1B; 256006 ³	796	3258
M2350; 175834	43-116-1B; 190642 ³	796	3258
M2350; 203486	43-116-1B; 190173 ²	491	739
M2350; 180733	43-111B; 148641 ⁶	360	660
M2350; 180733	43-111B; 148641 ⁷	730	1320
Tennelec; 0401171	N/A	5.9 dpm α , 11.9 dpm β	N/A

¹43-68B Concrete Surface

³43-116-1B Concrete Surface

⁵43-98B 2" Metal

⁷43-111B 2" Metal

²43-116-1B Concrete Juncture

⁴43-94B 1" Metal

⁶43-111B 1" Metal

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	141900
Investigation Criteria - Scan	141900
DCGL _W	43000
DCGL _{EMC}	141900

Attachment 3

Investigation

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(none required)

Attachment 4

Data Assessment

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