

Rancho Seco

Final Status Survey Summary Report

October 24, 2007

Aux. Bldg (-) 20' El., Rm 47, Spent Resin Tank Room

Survey Unit F8130651

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Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130651, Aux. Bldg (-) 20' El., Rm 47, Spent Resin Tank Room

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 97.45 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	Aux. Bldg (-) 20' El., Rm 47, Spent Resin Tank Room
Survey Unit:	0651	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m ²):	97.45	
Evaluator:	D. Anderson	
DCGL (dpm/100 cm ²):	43,000	Gross Activity DCGL
Area Factor:	3.3	Class 1
Design DCGL _{me} (dpm/100 cm ²):	141,900	Class 1
LBGR (dpm/100 cm ²):	41,905	Adjusted
Design Sigma (dpm/100 cm ²):	365	Based on post-remediation data
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	Used Co-60 area factor as conservative measure
Sample Area (m ²):	6.96	Class 1
Scan Area (m ²):	97.45	
Scan Coverage (%):	100%	Class 1
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	3	
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 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 14 direct measurements were made in F8130651. 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 2,523 dpm/100 cm² to 34,061 dpm/100 cm² for floor, wall, ceiling, and juncture surfaces, based on a surveyor efficiency of 0.5 with 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)
F8130651-C0001BD	2,500
F8130651-C0002BD	2,350
F8130651-C0003BD	2,547
F8130651-C0004BD	1,753
F8130651-C0005BD	2,044
F8130651-C0006BD	3,538
F8130651-C0007BD	2,557
F8130651-C0008BD	1,634
F8130651-C0009BD	1,675
F8130651-C0010BD	2,739
F8130651-C0011BD	2,350
F8130651-C0012BD	1,821
F8130651-M0013BD	880
F8130651-M0014BD	720
Mean:	2,079
Median:	2,197
Standard Deviation:	.742
Range:	720 – 3,538

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8130651C0001SM	3.58
F8130651C0002SM	7.42
F8130651C0003SM	3.58
F8130651C0004SM	4.86
F8130651C0005SM	8.7
F8130651C0006SM	4.86
F8130651C0007SM	3.58
F8130651C0008SM	9.98
F8130651C0009SM	3.58
F8130651C0010SM	8.7
F8130651C0011SM	4.86
F8130651C0012SM	8.7
F8130651M0013SM	8.7
F8130651M0014SM	1.01
Mean:	5.86
Median:	4.86
Standard Deviation:	2.76
Range:	1.01 to 9.98

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 slightly greater than the design standard deviation.. Both values of sigma result in a relative shift of greater than 3 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	
Ambient Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	14	
Median (dpm/100 cm ²):	2,197	
Mean (dpm/100 cm ²):	2,079	
Direct Measurement Standard Deviation	742	
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	742	Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	3,538	
Material Type:	N/A	Background Subtract Not Applied
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}:	Yes	Class 1
Total Standard Deviation <= Sigma:	Investigate	No additional samples required.
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	Investigate	No additional samples required.

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 slightly greater 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 43,000 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.

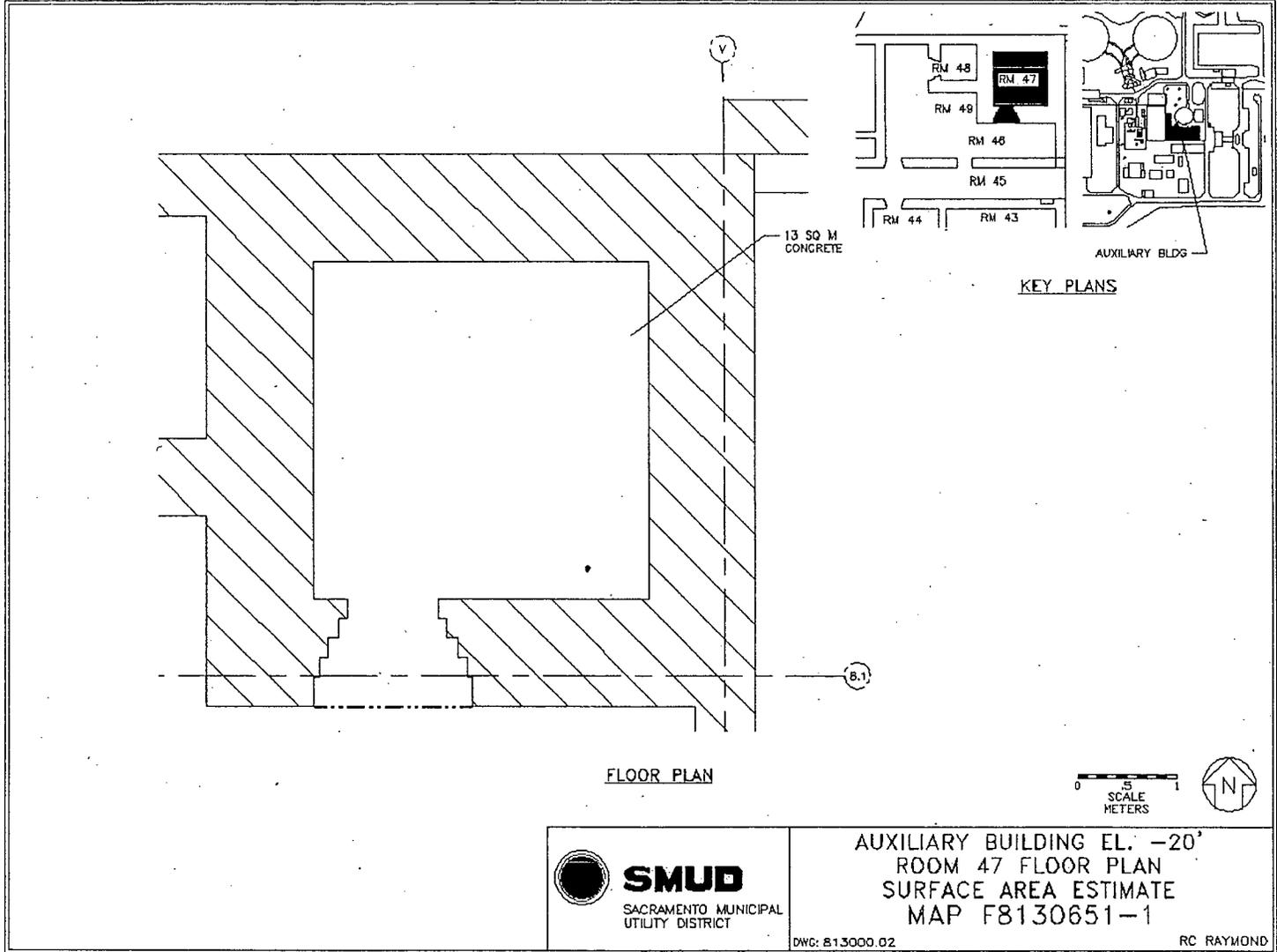
It is concluded that survey unit F8130651 meets the release criteria of 10CFR20.1402.

Attachment 1

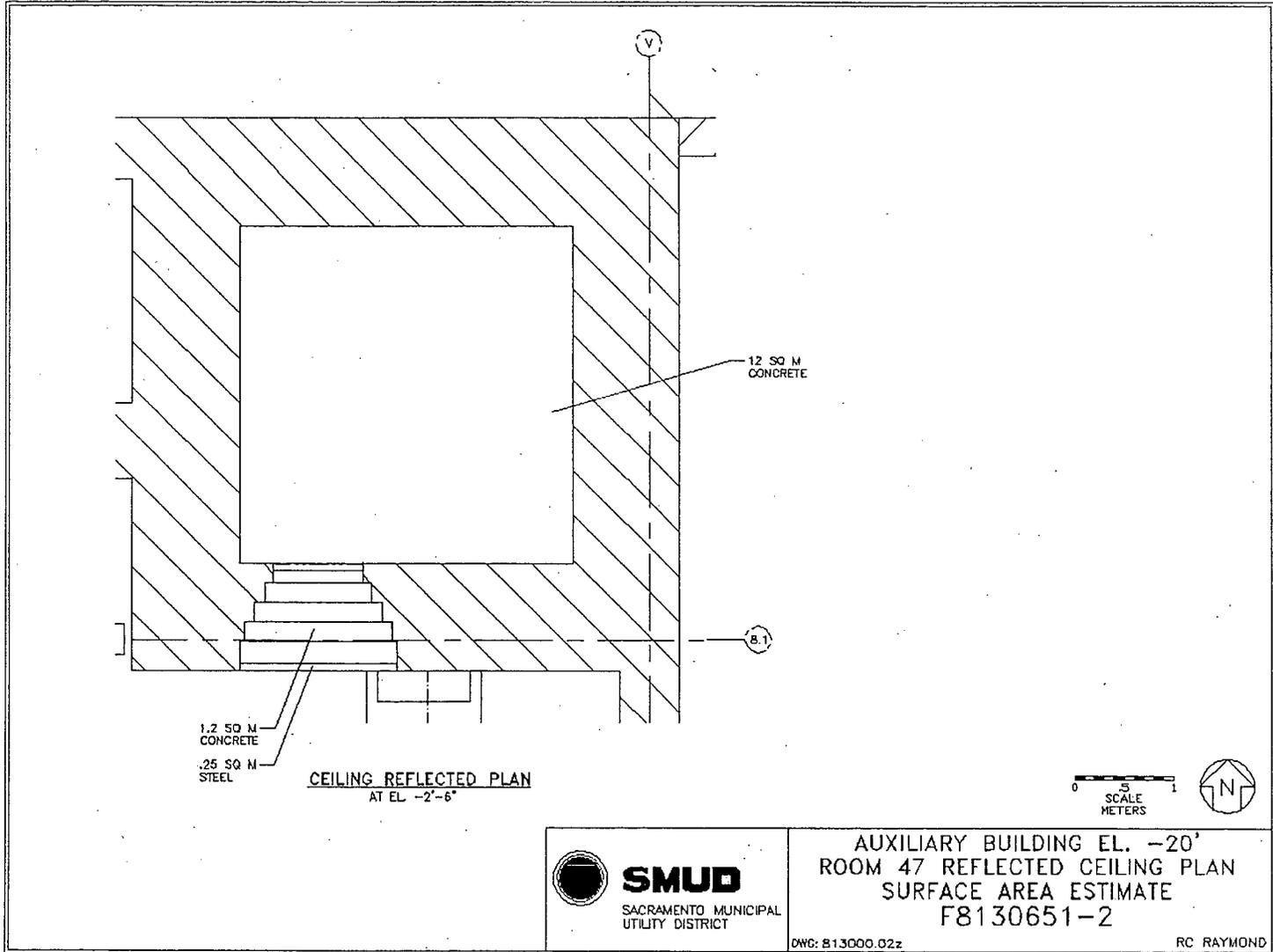
Maps

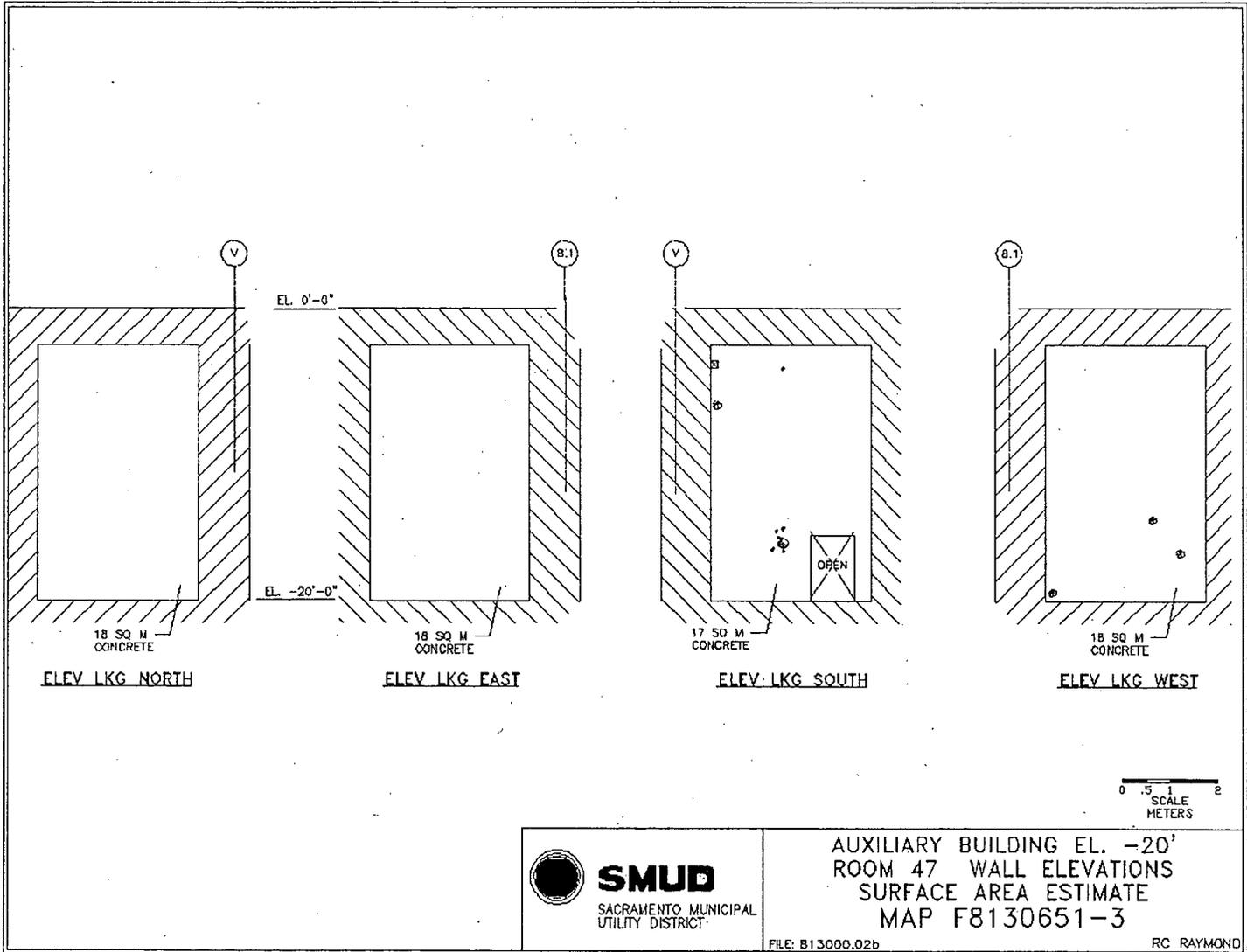
October 24, 2007

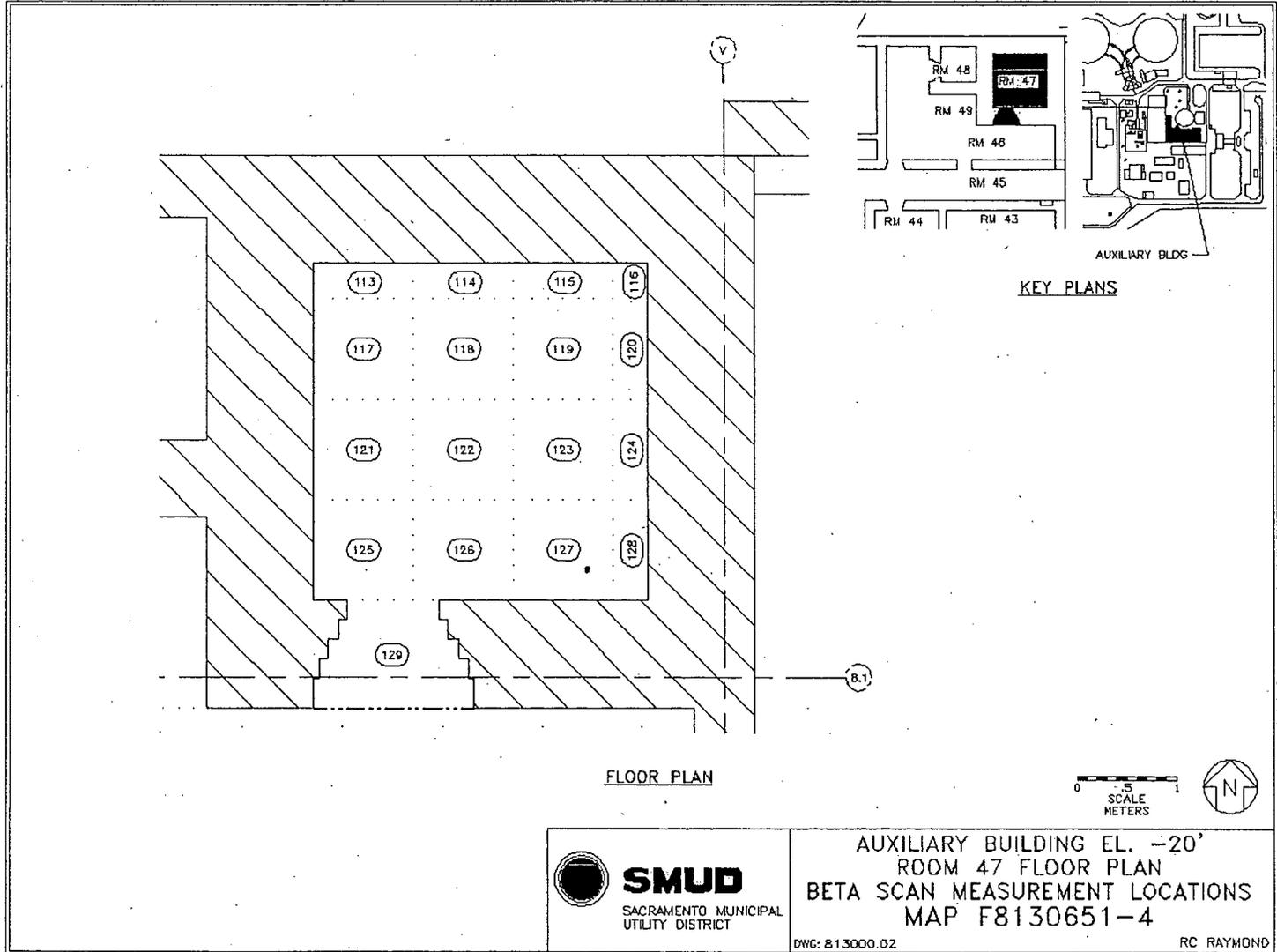
Survey Unit F8130651



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SACRAMENTO MUNICIPAL
UTILITY DISTRICT

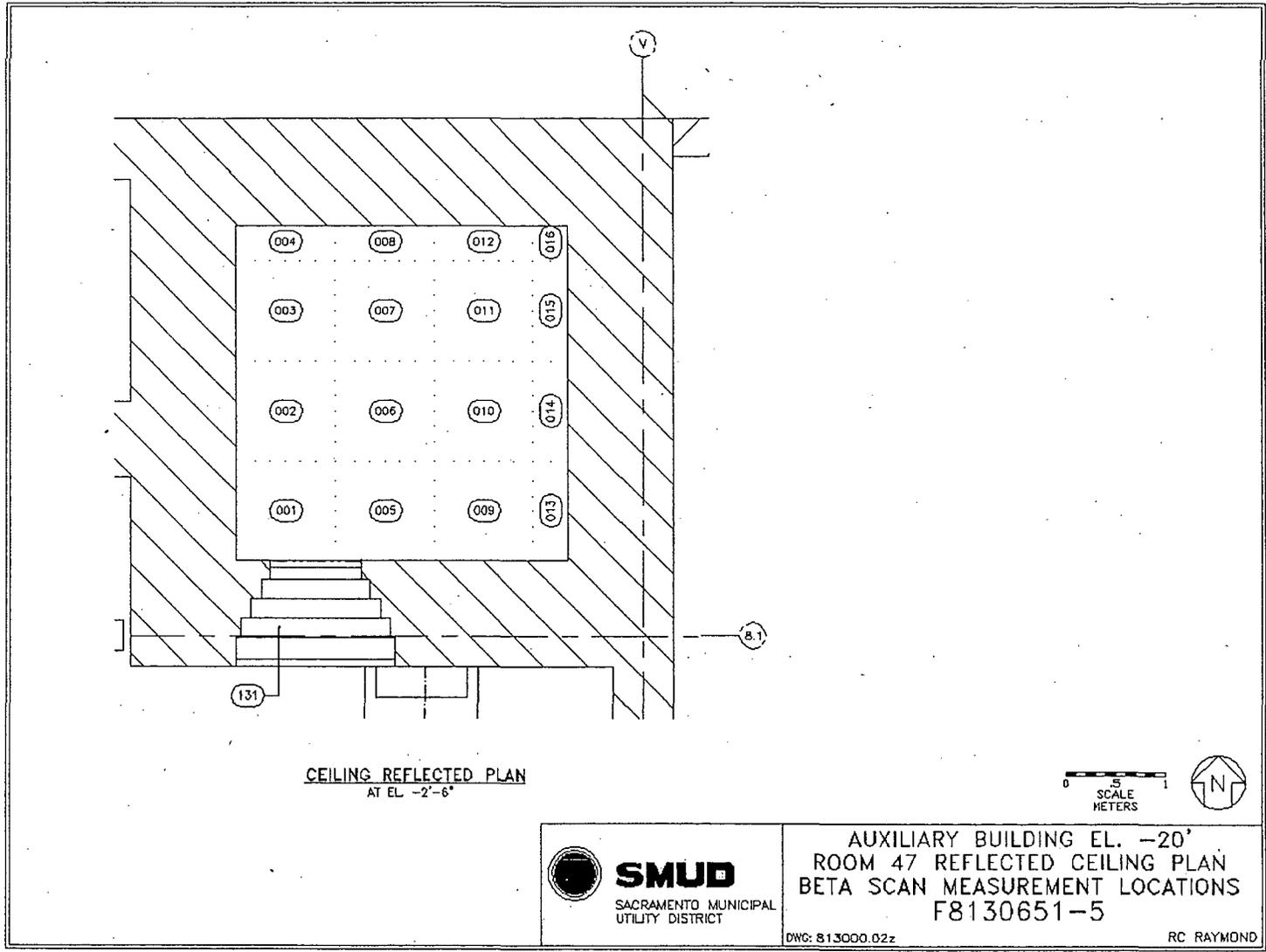


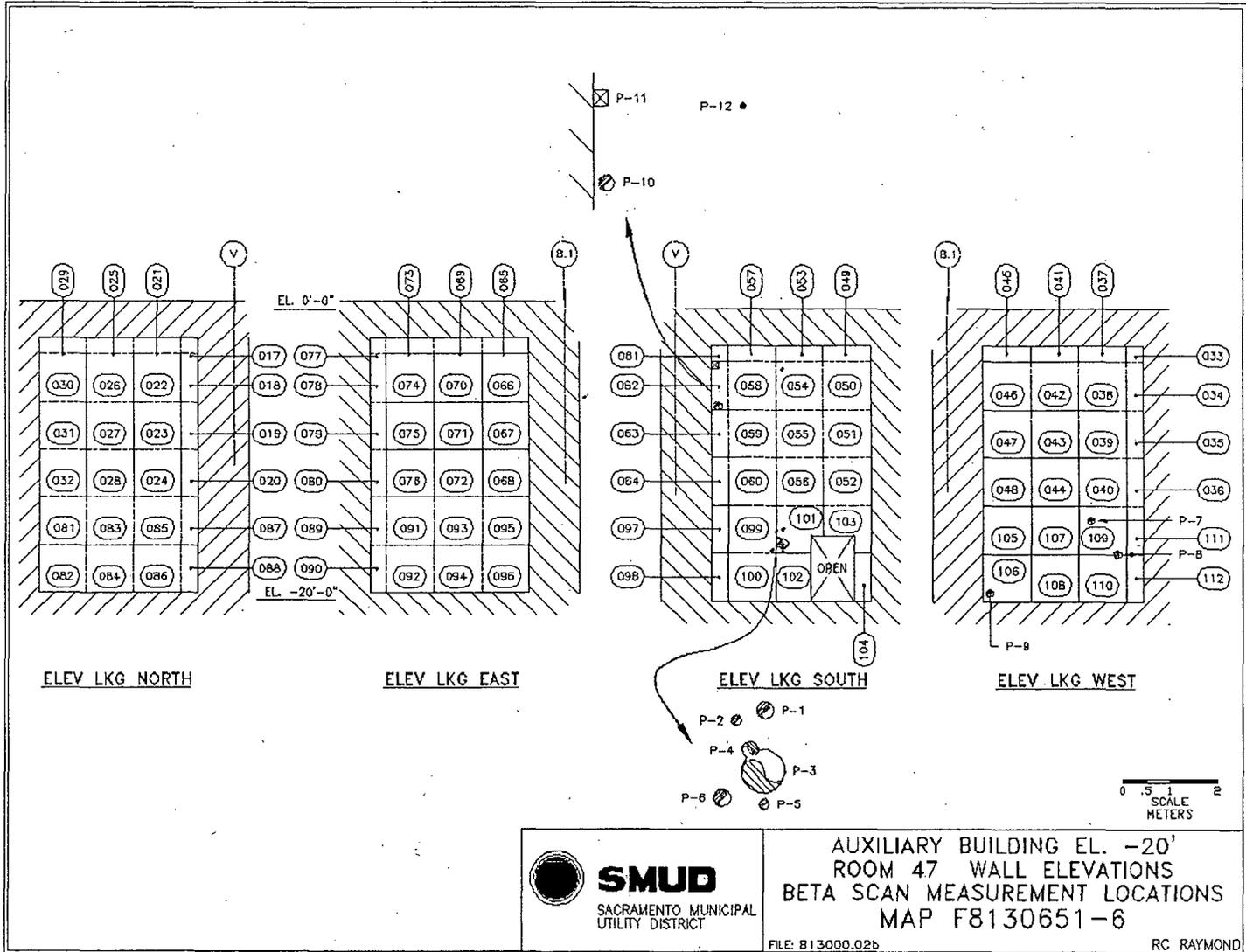


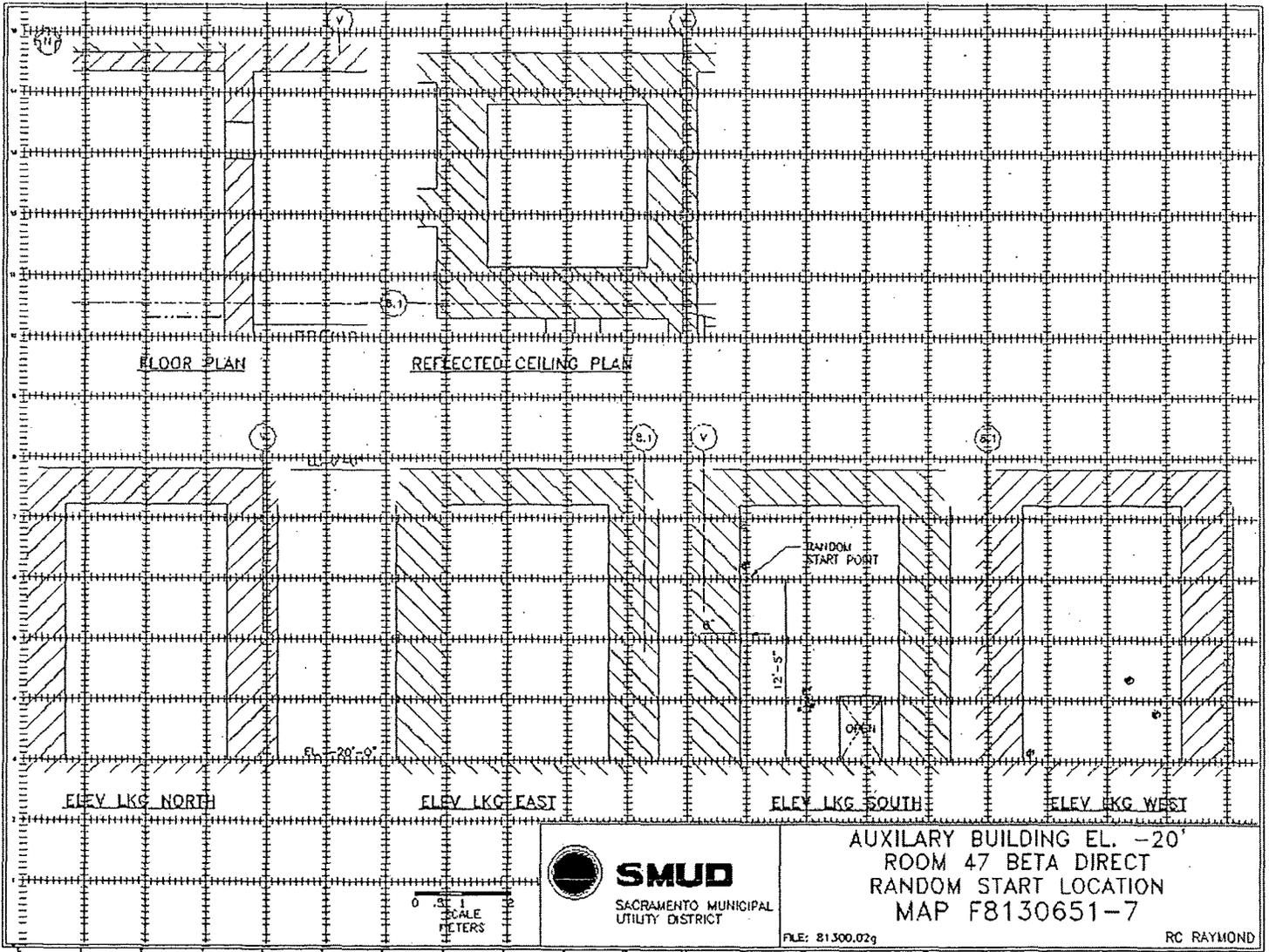


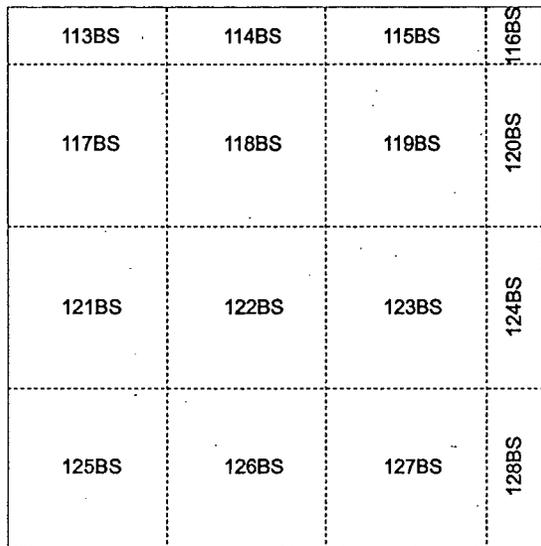
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UTILITY DISTRICT

AUXILIARY BUILDING EL. -20'
ROOM 47 FLOOR PLAN
BETA SCAN MEASUREMENT LOCATIONS
MAP F8130651-4
DWC: 81.3000.02
RC RAYMOND

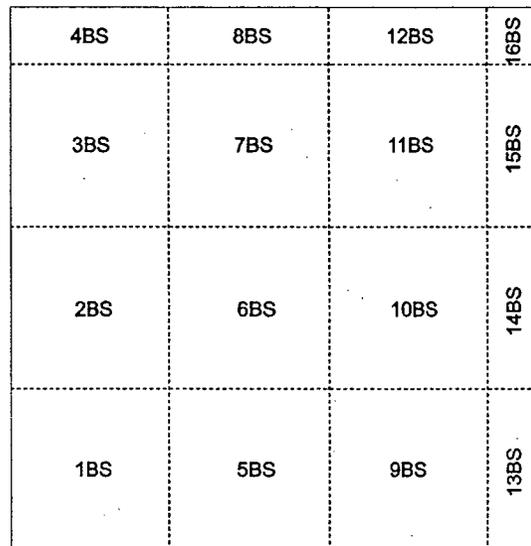




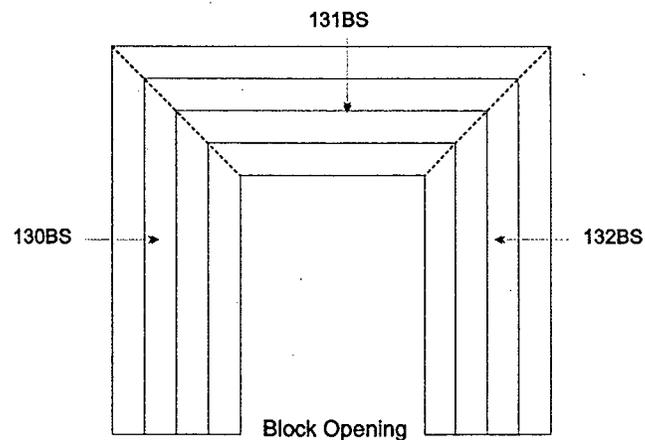




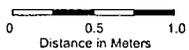
Floor



Ceiling



N



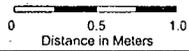
Map F8130651-8, Auxiliary Building -20' El.
Rm 47, Spent Resin Tank Room Floor and Ceiling
Beta Scan Measurements
F8130651M0001BS to F8130651M0016BS and
F8130651C0113BS to F8130651C0132BS

29BS	25BS	21BS	17BS
30BS	26BS	22BS	18BS
31BS	27BS	23BS	19BS
32BS	28BS	24BS	20BS
81BS	83BS	85BS	87BS
82BS	84BS	86BS	88BS

North Wall

77BS	73BS	69BS	65BS
78BS	74BS	70BS	66BS
79BS	75BS	71BS	67BS
80BS	76BS	72BS	68BS
89BS	91BS	93BS	95BS
90BS	92BS	94BS	96BS

East Wall



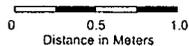
Map F8130651-9, Auxiliary Building -20' E1.
Rm 47, Spent Resin Tank Room North and West Walls
Beta Scan Measurements
F8130651C0017BS to F8130651C0032BS and
F8130651C0065BS to F8130651C0096BS

61BS	57BS	53BS	49BS
62BS	58BS	54BS	50BS
63BS	59BS	55BS	51BS
64BS	60BS	56BS	52BS
97BS	99BS	101BS	103BS
98BS	100BS	102BS	104BS

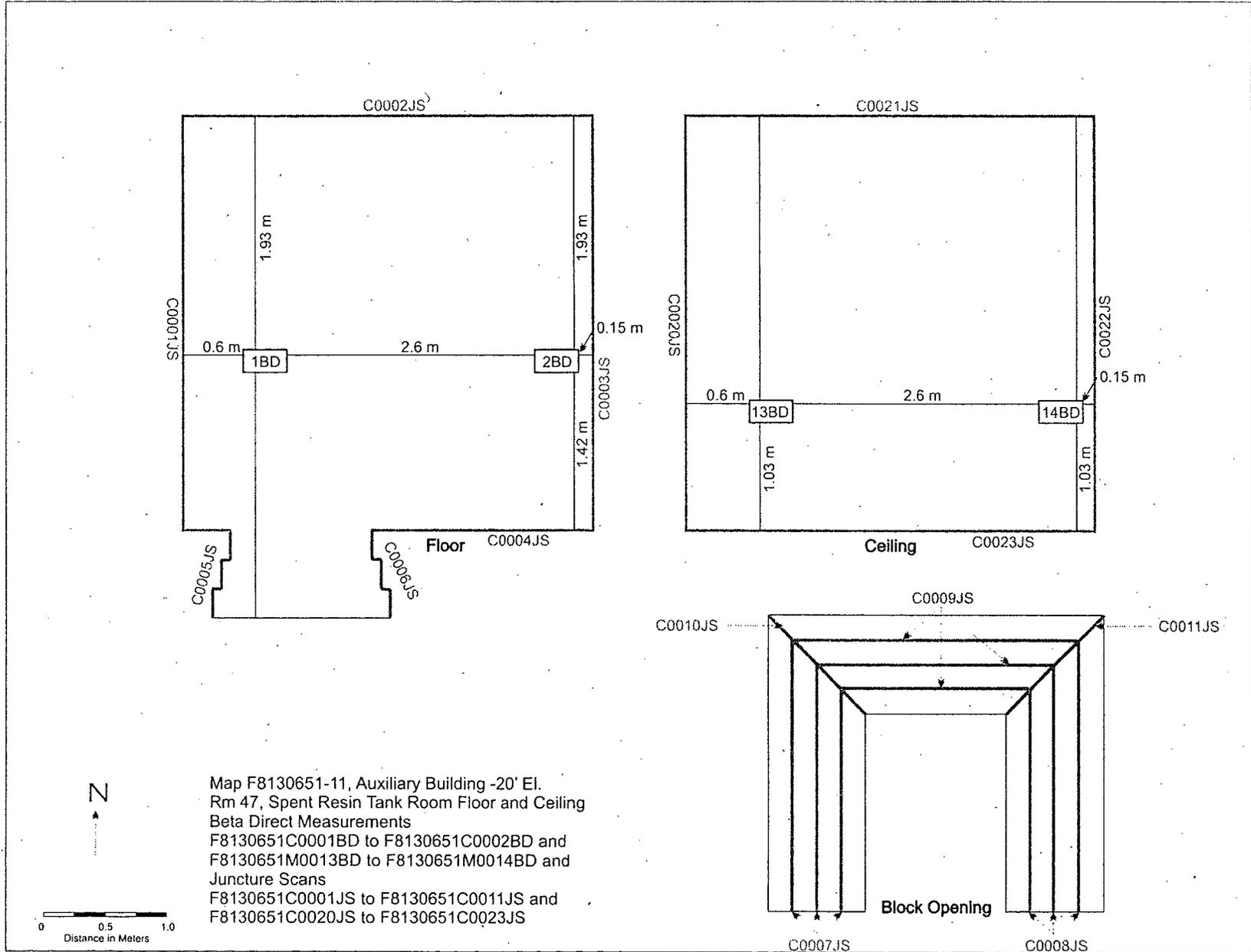
South Wall

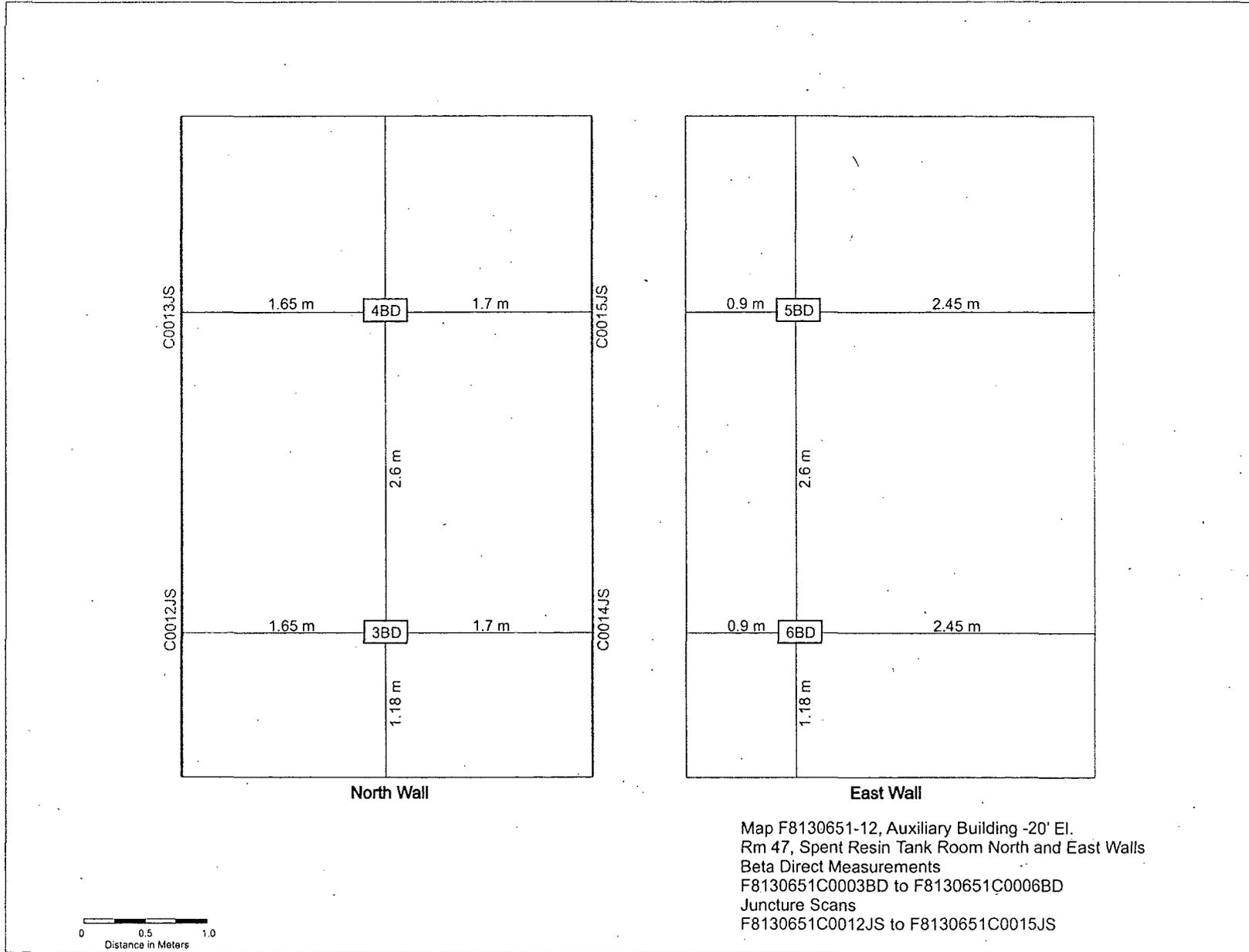
45BS	41BS	37BS	33BS
46BS	42BS	38BS	34BS
47BS	43BS	39BS	35BS
48BS	44BS	40BS	36BS
105BS	107BS	109BS	111BS
106BS	108BS	110BS	112BS

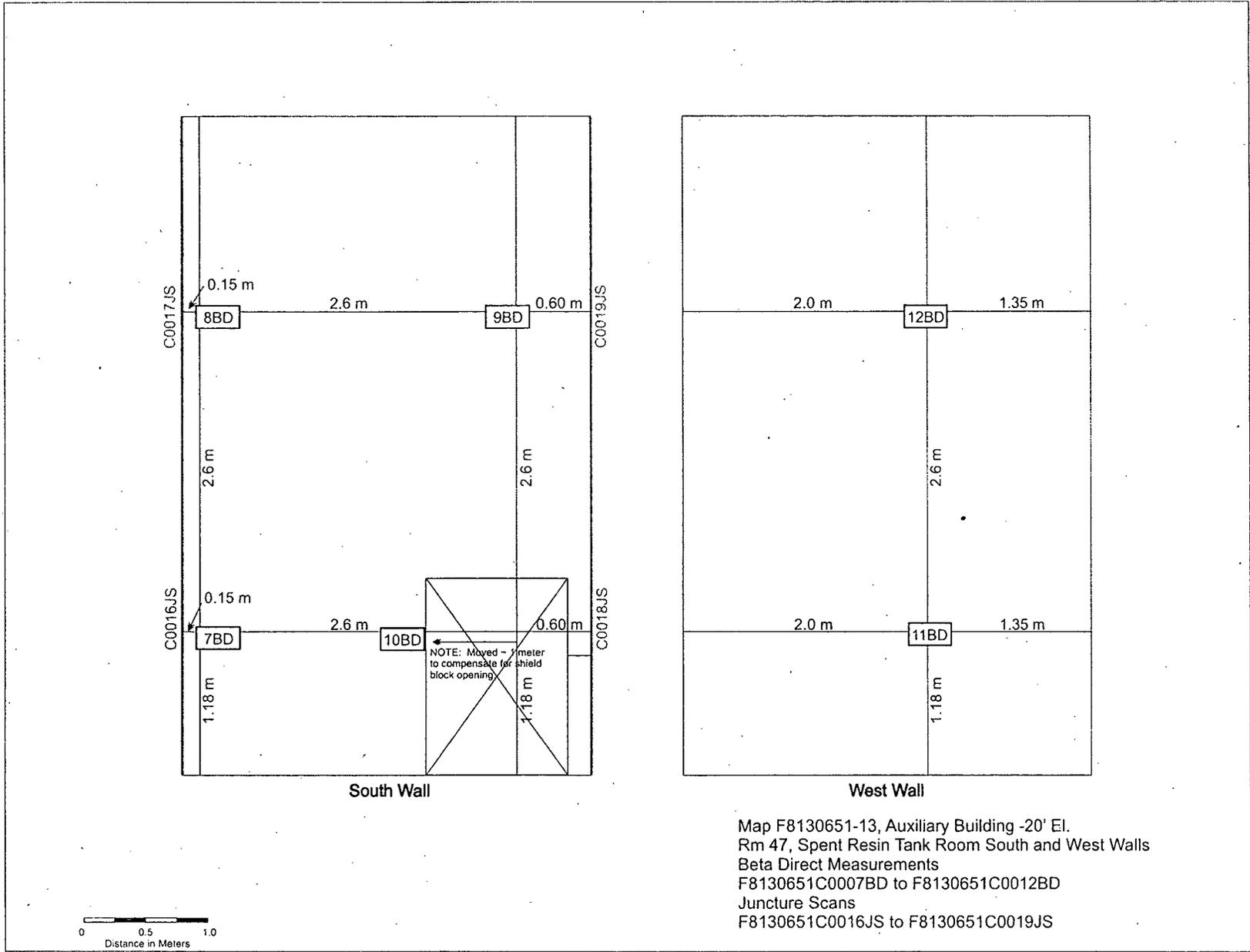
West Wall

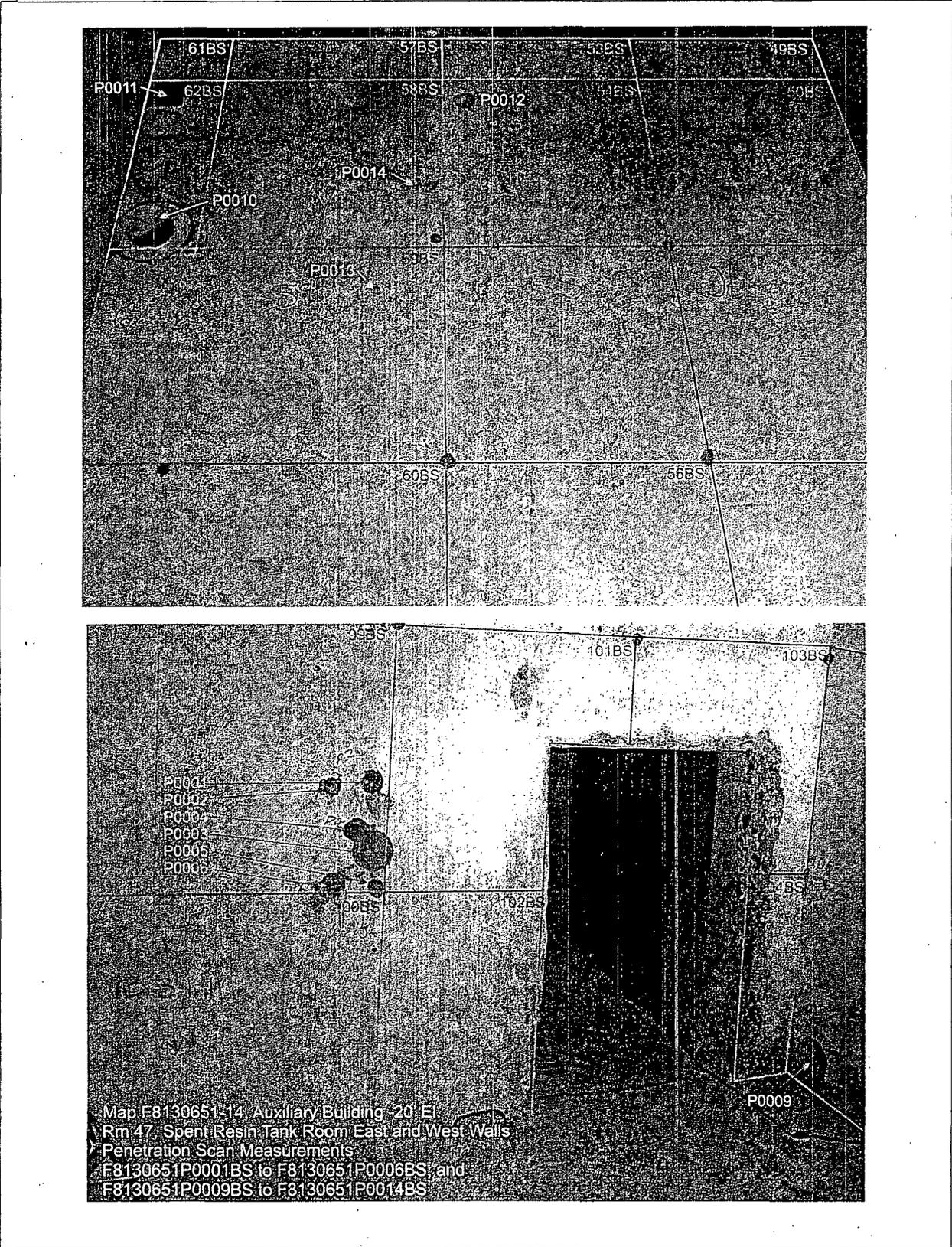


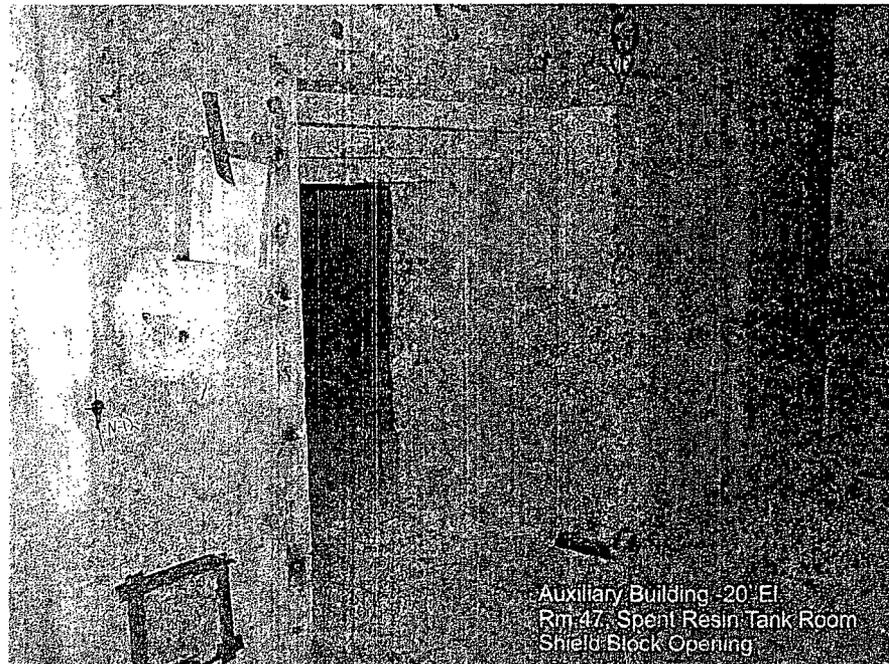
Map F8130651-10, Auxiliary Building -20' El.
Rm 47, Spent Resin Tank Room South and West Walls
Beta Scan Measurements
F8130651C0033BS to F8130651C0064BS and
F8130651C0097BS to F8130651C0112BS











Attachment 2
Instrumentation
October 24, 2007
Survey Unit F8130651

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static	MDC Scan
M2350; 180733	43-94; 148620	2,630	4,580
M2350; 175834	43-68B; 190482 ¹	433	1,033
M2350; 175834	43-68B; 190482 ²	257	612
M2350; 149794	43-116-1B; 216072 ³	491	739
M2350; 149794	43-116-1B; 216072 ⁴	796	5,895
M2350; 149794	43-116-1B; 216072 ⁵	472	3,492
InSpector	08051294	625 dpm/100 cm ² Cs-137 790 dpm/100 cm ² Co-60	
Tennelec; 0401171	N/A	5 dpm α, 11 dpm β	N/A

¹43-68B Concrete surfaces

²43-68B Metal surfaces

³43-116-1B Concrete junctures

⁴43-116-1B Concrete penetrations

⁵43-116-1B Metal penetrations

Instrument	Detector Serial No.	MDC (dpm/100 cm²)
InSpector	08051294	625 dpm/100 cm ² Cs-137 790 dpm/100 cm ² Co-60

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	141,900
Investigation Criteria - Scan	141,900
DCGL _w	43,000
DCGL _{EMC}	141,900

Attachment 3

Investigation

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Survey Unit F8130651

(none required)

Attachment 4

Data Assessment

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