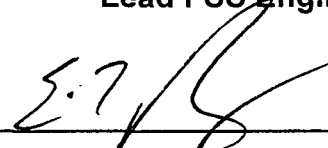


Rancho Seco
Final Status Survey Summary Report
April 8, 2008
Misc. Waste Filter Room, (Room 026)
Survey Unit F8130351

Prepared By:  Date: 4/8/2008
FSS Engineer

Reviewed By:  Date: 4/9/08
Lead FSS Engineer

Approved By:  Date: 5-15-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130351, Misc. Waste Filter Room, (Room 026)

Survey Unit Description:

Operating History: The Misc. Waste Filter Room is located on the -20' elevation of the Auxiliary Building. The Auxiliary Building is a reinforced concrete structure that, during power operations, contained the Radwaste processing and supporting systems. The building has six main elevations. Residual levels of surface radioactivity were detected on all interior elevations of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were taken on each interior elevation of the Auxiliary Building. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements taken 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. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior surfaces of the Auxiliary Building were determined primarily to be a Class 1 for the floors and lower walls (bottom 2 meters of the walls), and Class 2 for the upper walls and ceiling. Inside the Misc. Waste Filter Room there were a number of areas on the floor, lower walls, and upper walls where the gross surface activity levels were higher than the DCGL prior to remediation. Therefore, a Class 1 final status survey was performed on the floor, wall, and ceiling surfaces of the room.

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 182 m² were scanned for 100% coverage. Gamma scans were performed on the floor due to the rough surface left from heavy remediation. Beta scans were performed on the walls and ceiling. 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	Misc. Waste Filter Room, (Room 026)
Survey Unit:	0351	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m ²):	182	
Evaluator:	Michael Stein	
DCGL (dpm/100 cm ²):	16100	Gross Activity DCGL
Area Factor:	6.15	Class 1
Design DCGL _{emc} (dpm/100 cm ²):	99015	Class 1
LBGR (dpm/100 cm ²):	8050	Default = 50% DCGL
Design Sigma (dpm/100 cm ²):	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Co-60	
Sample Area (m ²):	2.8	Class 1
Scan Area (m ²):	182	
Scan Coverage (%):	100%	Class 1
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign P:	0.725747	
Calculated Relative Shift:	0.6	
Relative Shift Used:	0.6	Uses 3.0 if Relative Shift is >3
N-Value:	54	
Design N-Value + 20%:	65	NUREG-1575 Table 5-5
Design Min Samples N:	65	Class 1
Grid Spacing L:	1.7	Class 1

Survey Results:

A total of 65 direct measurements were made in F8130351. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. Five of the scan measurements indicated areas of elevated activity as indicated in Attachment 3. Beta scan measurements of the walls and ceiling resulted in activity range from 4,705 to 545,332 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Gamma scan measurements of the floor resulted in activity range from 2,172 to 2,693 dpm/100 cm² Co-60 and from 2,434 to 20,321 dpm/100 cm² Cs-137. 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)
F8130351-C0001BD	2051
F8130351-C0002BD	2559
F8130351-C0003BD	2324
F8130351-C0004BD	2102
F8130351-C0005BD	3968
F8130351-C0006BD	2140
F8130351-C0007BD	2070
F8130351-C0008BD	2267
F8130351-C0009BD	2133
F8130351-C0010BD	1917
F8130351-C0011BD	1848
F8130351-C0012BD	1816
F8130351-C0013BD	2273
F8130351-C0014BD	2292
F8130351-C0015BD	2425
F8130351-C0016BD	2025
F8130351-C0017BD	4559
F8130351-C0018BD	2095
F8130351-C0019BD	2197
F8130351-C0020BD	2108
F8130351-C0021BD	2387
F8130351-C0022BD	2140
F8130351-C0023BD	2083
F8130351-C0024BD	3365
F8130351-C0025BD	5810
F8130351-C0026BD	2692
F8130351-C0027BD	2070
F8130351-C0028BD	2146
F8130351-C0029BD	2260
F8130351-C0030BD	2317
F8130351-C0031BD	1981
F8130351-C0032BD	2229

F8130351-C0033BD	2559
F8130351-C0034BD	1822
F8130351-C0035BD	2787
F8130351-C0036BD	2076
F8130351-C0037BD	1314
F8130351-C0038BD	2108
F8130351-C0039BD	2324
F8130351-C0040BD	1975
F8130351-C0041BD	1676
F8130351-C0042BD	1924
F8130351-C0043BD	1949
F8130351-C0044BD	1962
F8130351-C0045BD	2317
F8130351-C0046BD	2305
F8130351-C0047BD	2013
F8130351-C0048BD	1486
F8130351-C0049BD	2387
F8130351-C0050BD	1810
F8130351-C0051BD	2298
F8130351-C0052BD	2571
F8130351-C0053BD	2165
F8130351-C0054BD	2457
F8130351-C0055BD	2400
F8130351-C0056BD	1359
F8130351-C0057BD	2387
F8130351-C0058BD	2982
F8130351-C0059BD	3404
F8130351-C0060BD	2196
F8130351-C0061BD	2676
F8130351-C0062BD	2793
F8130351-C0063BD	2604
F8130351-C0064BD	6284
F8130351-C0065BD	3404
Mean:	2422
Median:	2229
Standard Deviation:	844
Range:	1314 - 6284

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8130351C0001SM	24.09
F8130351C0002SM	24.09
F8130351C0003SM	13.83
F8130351C0004SM	1.01
F8130351C0005SM	402.24
F8130351C0006SM	9.98
F8130351C0007SM	2.29
F8130351C0008SM	1.01
F8130351C0009SM	8.7
F8130351C0010SM	-1.55
F8130351C0011SM	1.01
F8130351C0012SM	2.29
F8130351C0013SM	25.37
F8130351C0014SM	2.29
F8130351C0015SM	26.65
F8130351C0016SM	2.29
F8130351C0017SM	130.48
F8130351C0018SM	1.01
F8130351C0019SM	2.29
F8130351C0020SM	1.01
F8130351C0021SM	8.7
F8130351C0022SM	4.86
F8130351C0023SM	1.01
F8130351C0024SM	3.58
F8130351C0025SM	134.33
F8130351C0026SM	6.14
F8130351C0027SM	-0.27
F8130351C0028SM	7.42
F8130351C0029SM	6.14
F8130351C0030SM	3.58
F8130351C0031SM	12.55
F8130351C0032SM	3.58
F8130351C0033SM	1.01
F8130351C0034SM	2.29
F8130351C0035SM	16.39
F8130351C0036SM	2.29
F8130351C0037SM	1.01
F8130351C0038SM	6.14
F8130351C0039SM	-0.27
F8130351C0040SM	7.42
F8130351C0041SM	-1.55
F8130351C0042SM	7.42
F8130351C0043SM	1.01
F8130351C0044SM	2.29
F8130351C0045SM	39.47
F8130351C0046SM	6.14
F8130351C0047SM	15.11
F8130351C0048SM	-1.55

F8130351C0049SM	3.58
F8130351C0050SM	25.37
F8130351C0051SM	2.29
F8130351C0052SM	3.58
F8130351C0053SM	9.98
F8130351C0054SM	2.29
F8130351C0055SM	36.9
F8130351C0056SM	17.68
F8130351C0057SM	13.83
F8130351C0058SM	-0.27
F8130351C0059SM	-0.27
F8130351C0060SM	1.01
F8130351C0061SM	1.01
F8130351C0062SM	-0.27
F8130351C0063SM	1.01
F8130351C0064SM	-0.27
F8130351C0065SM	-0.27
Mean:	16.83
Median:	3.58
Standard Deviation:	54.01
Range:	-1.55 to 402.24

Survey Unit Data Assessment:

The survey design required 65 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):	65		
Median (dpm/100 cm ²):	2229		
Mean (dpm/100 cm ²):	2422		
Direct Measurement Standard Deviation	844		
(dpm/100 cm ²):			
Total Standard Deviation (dpm/100 cm ²):	844		Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	6284		Background Subtract Not Applied
Material Type:	N/A		
Sign Test Final N Value:	65	Class 1	
S+ Value:	65		
Critical Value:	39		
Sufficient Samples Collected:	Yes		
Maximum Value < DCGL:	Yes		
Median Value < DCGL:	Yes		
Mean Value < DCGL:	Yes		
Maximum Value < DCGL_{emc}:	Yes		
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:

An investigation was required for the five scan measurements as indicated in Attachment 3. Investigation of the areas resulted in the decision to perform additional remediation. The investigation results in Attachment 3 represent the residual radioactivity levels achieved after additional remediation.

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. Five potential areas of elevated activity were detected as indicated in Attachment 3.

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 16,100 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of the DCGL.

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.

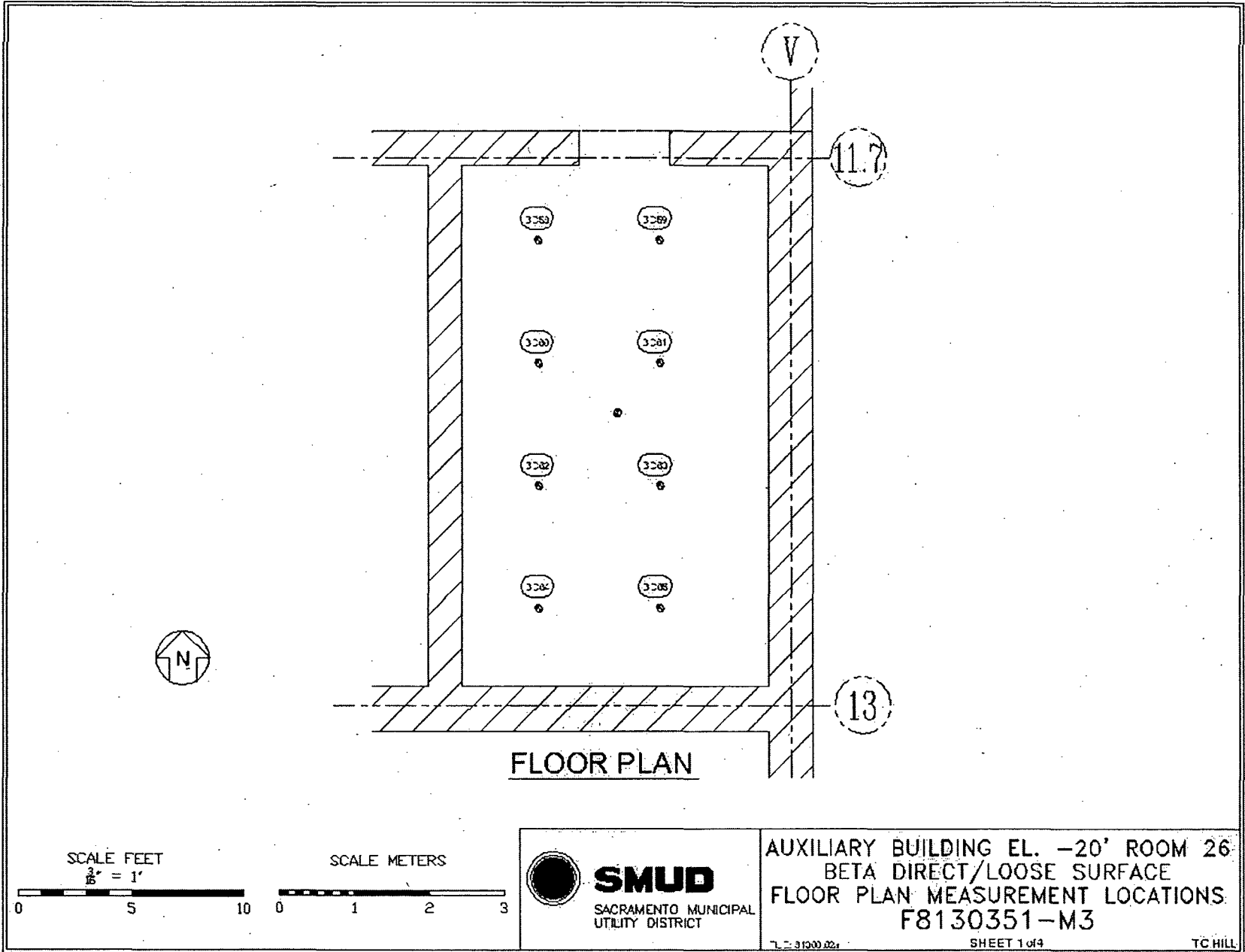
It is concluded that survey unit F8130351 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

April 8, 2008

Survey Unit F8130351



SCALE FEET
3/8" = 1'

SCALE METERS

0 5 10

0 1 2 3



SMUD

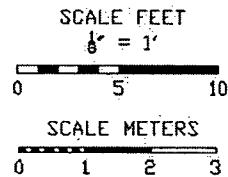
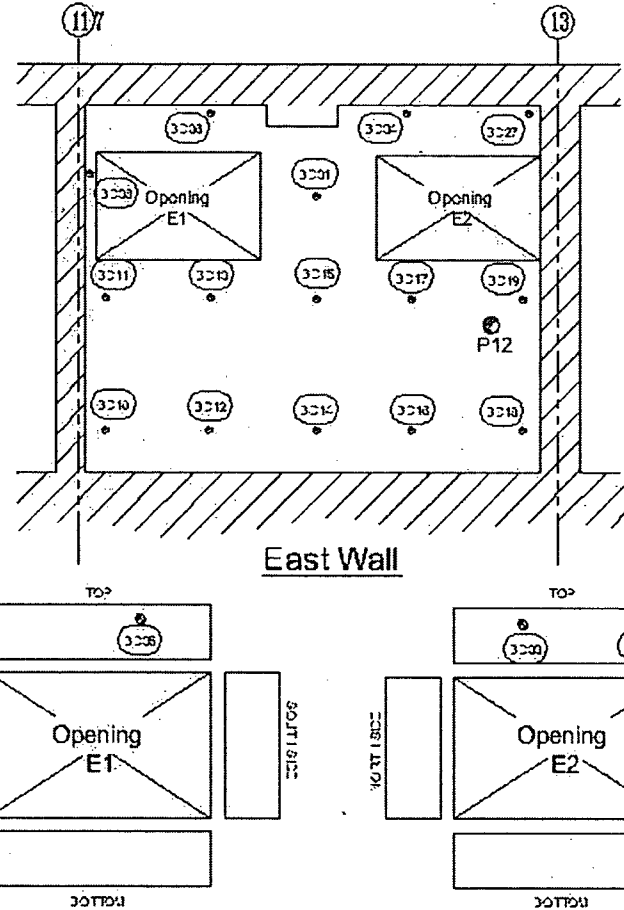
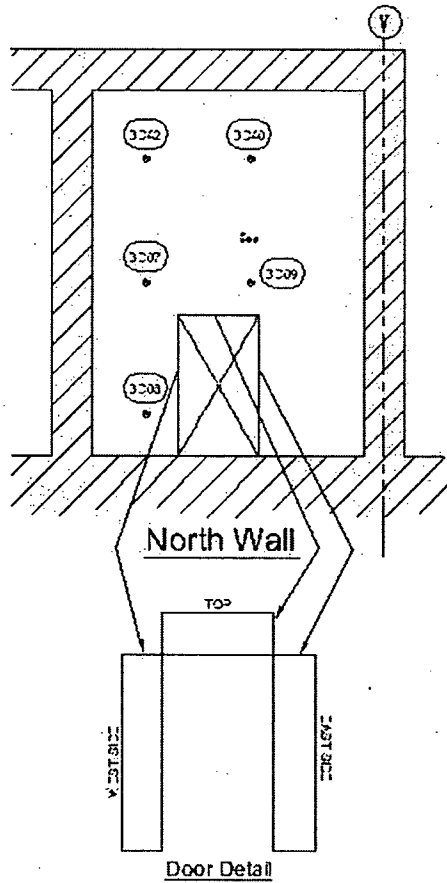
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. -20' ROOM 26
BETA DIRECT/LOOSE SURFACE
FLOOR PLAN MEASUREMENT LOCATIONS
F8130351-M3

7.2.2000.021

SHEET 1 of 4

TC HILL

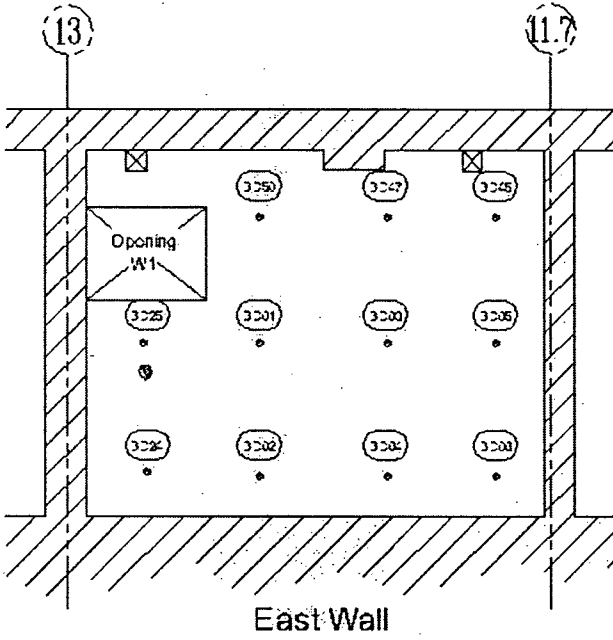


AUXILIARY BUILDING EL. -20' ROOM 26
BETA DIRECT/LOOSE SURFACE
WALL MEASUREMENT LOCATIONS.
F8130351-M3

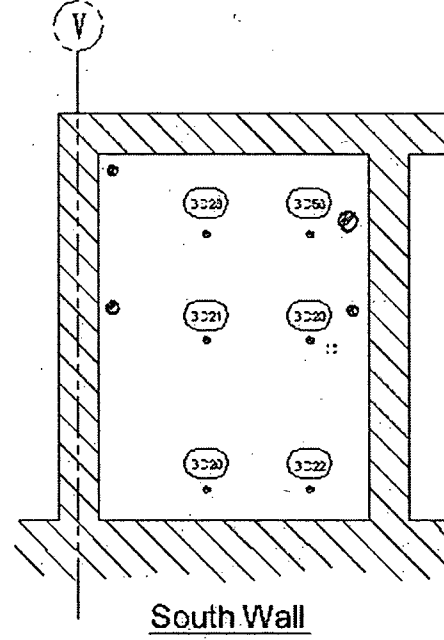
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SHEET 2 of 4

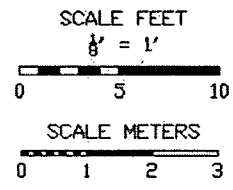
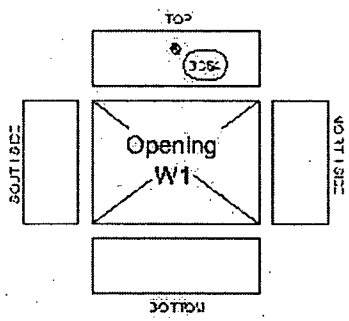
TC HILL



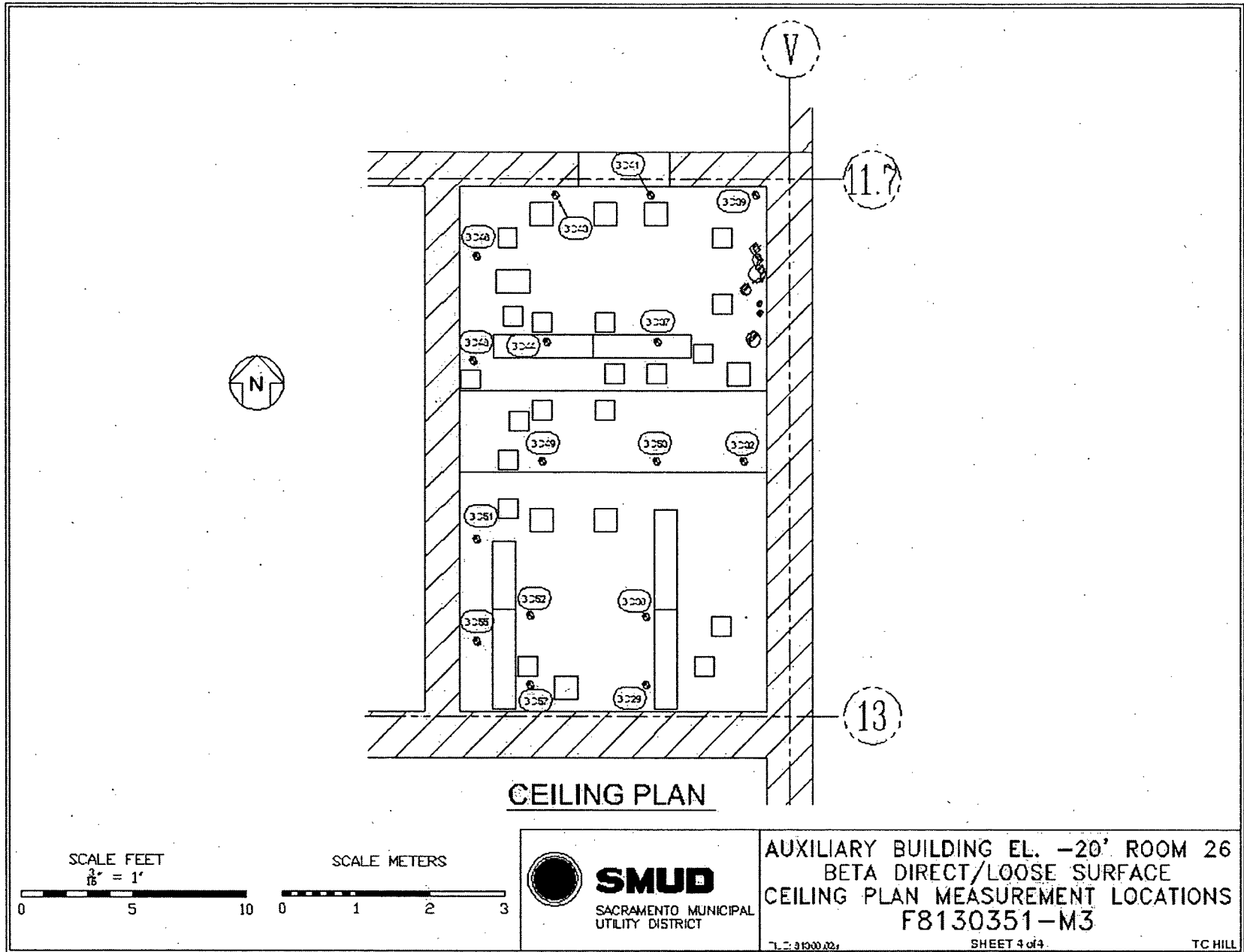
East Wall



South Wall



AUXILIARY BUILDING EL. -20' ROOM 26
 BETA DIRECT/LOOSE SURFACE
 WALL MEASUREMENT LOCATIONS
 F8130351-M3



SCALE FEET
1/8" = 1'

SCALE METERS



SMUD

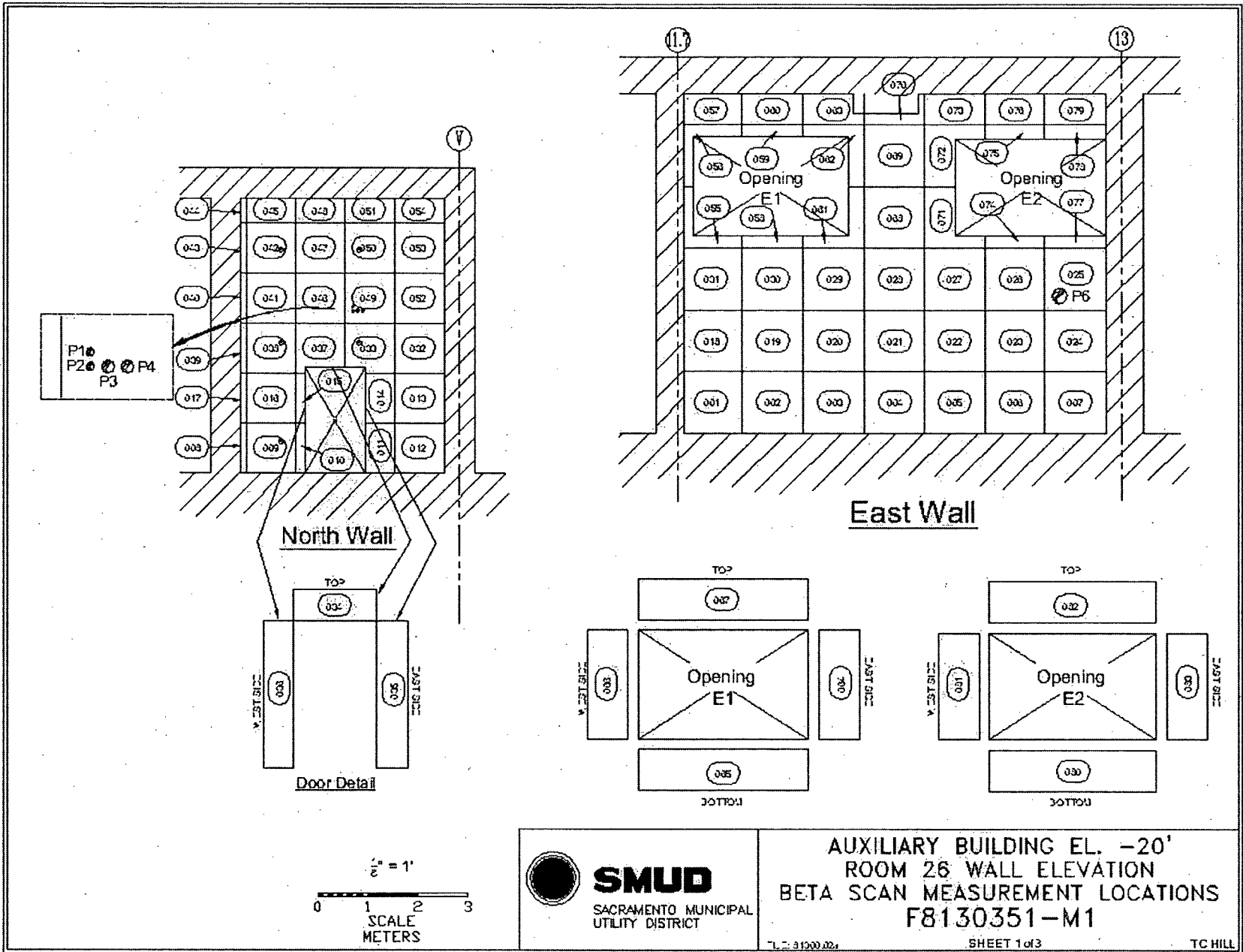
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

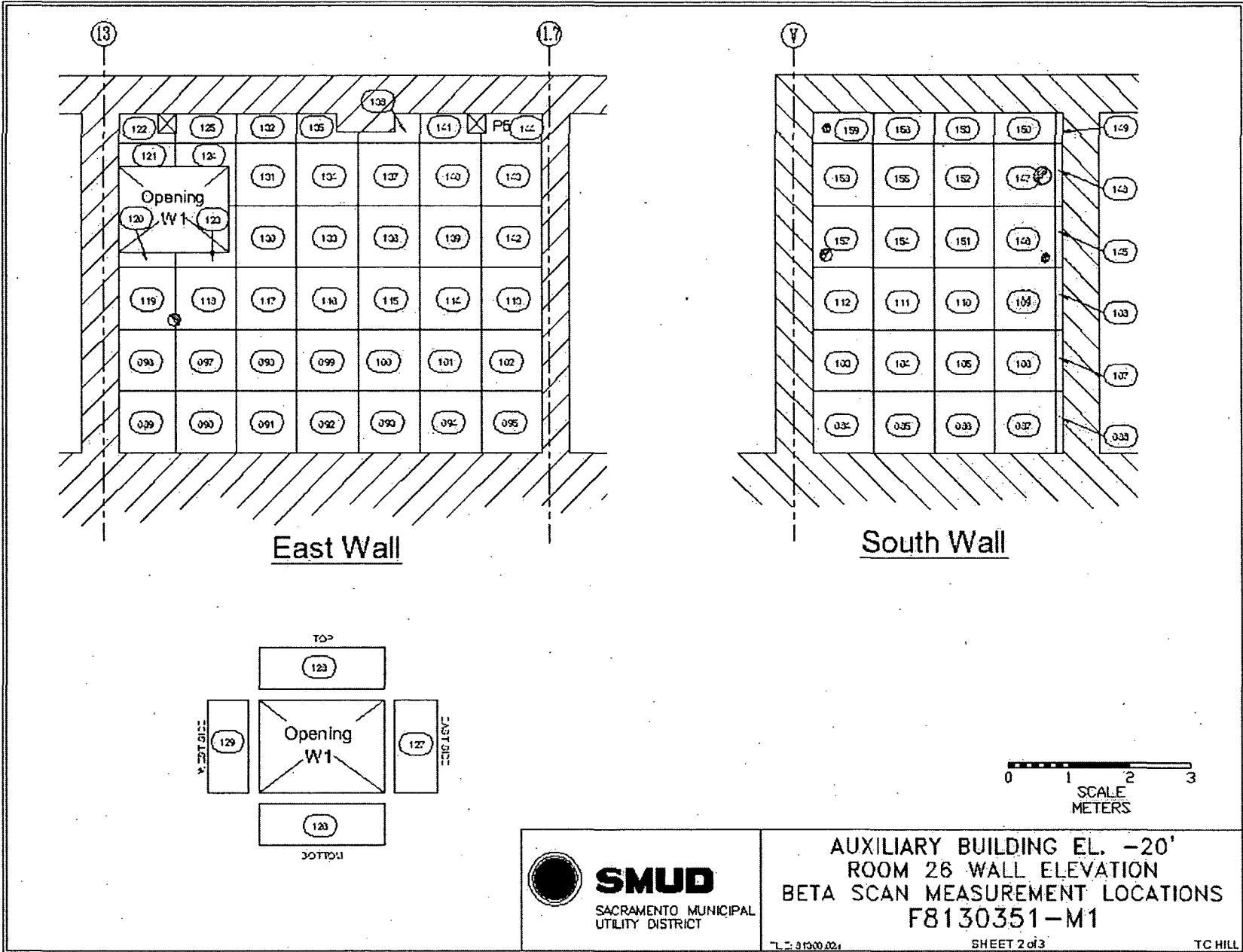
AUXILIARY BUILDING EL. -20' ROOM 26
 BETA DIRECT/LOOSE SURFACE
 CEILING PLAN MEASUREMENT LOCATIONS
 F8130351-M3

7.2.2000.02r

SHEET 4 of 4

TC HILL





East Wall

South Wall

0 1 2 3
SCALE
METERS

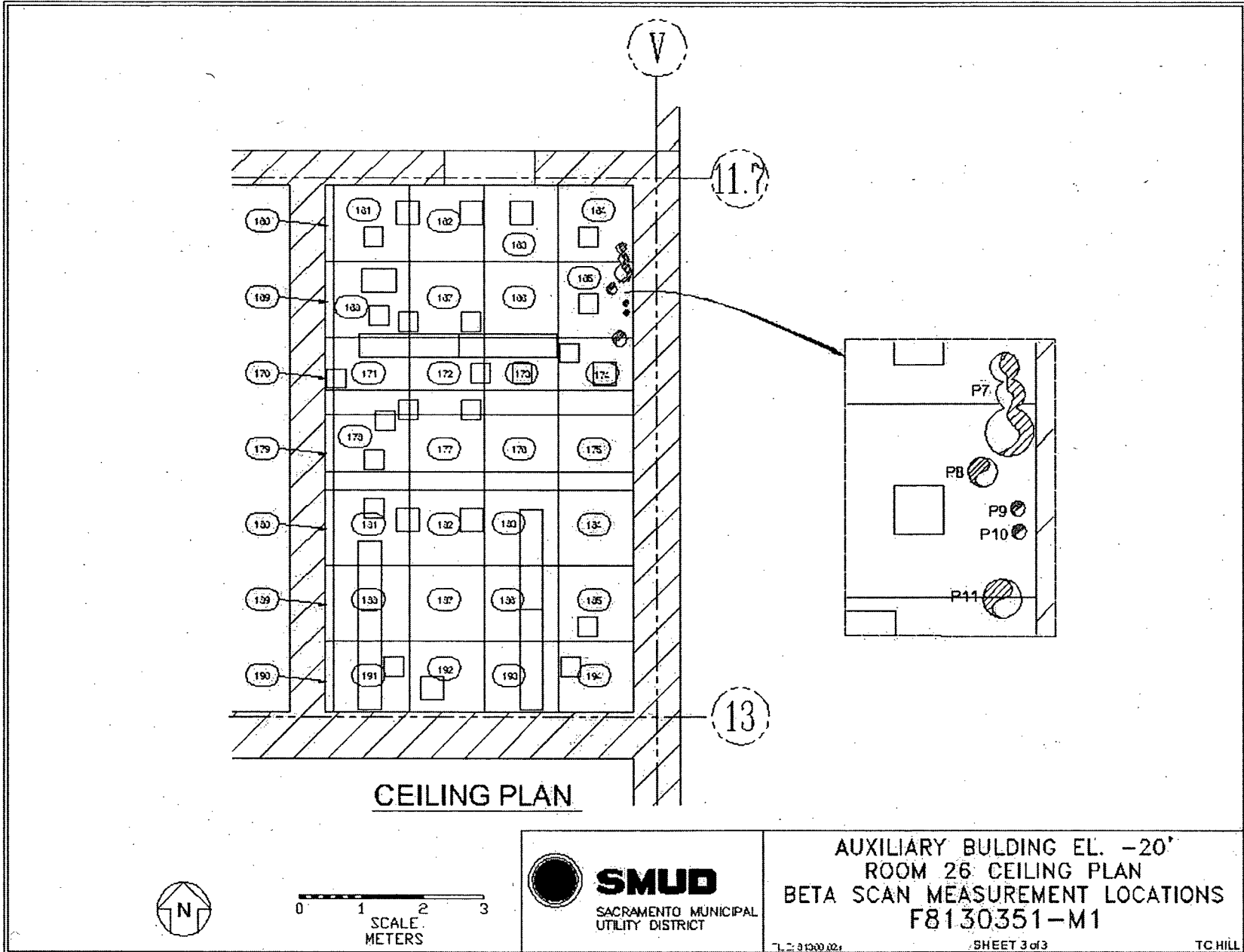


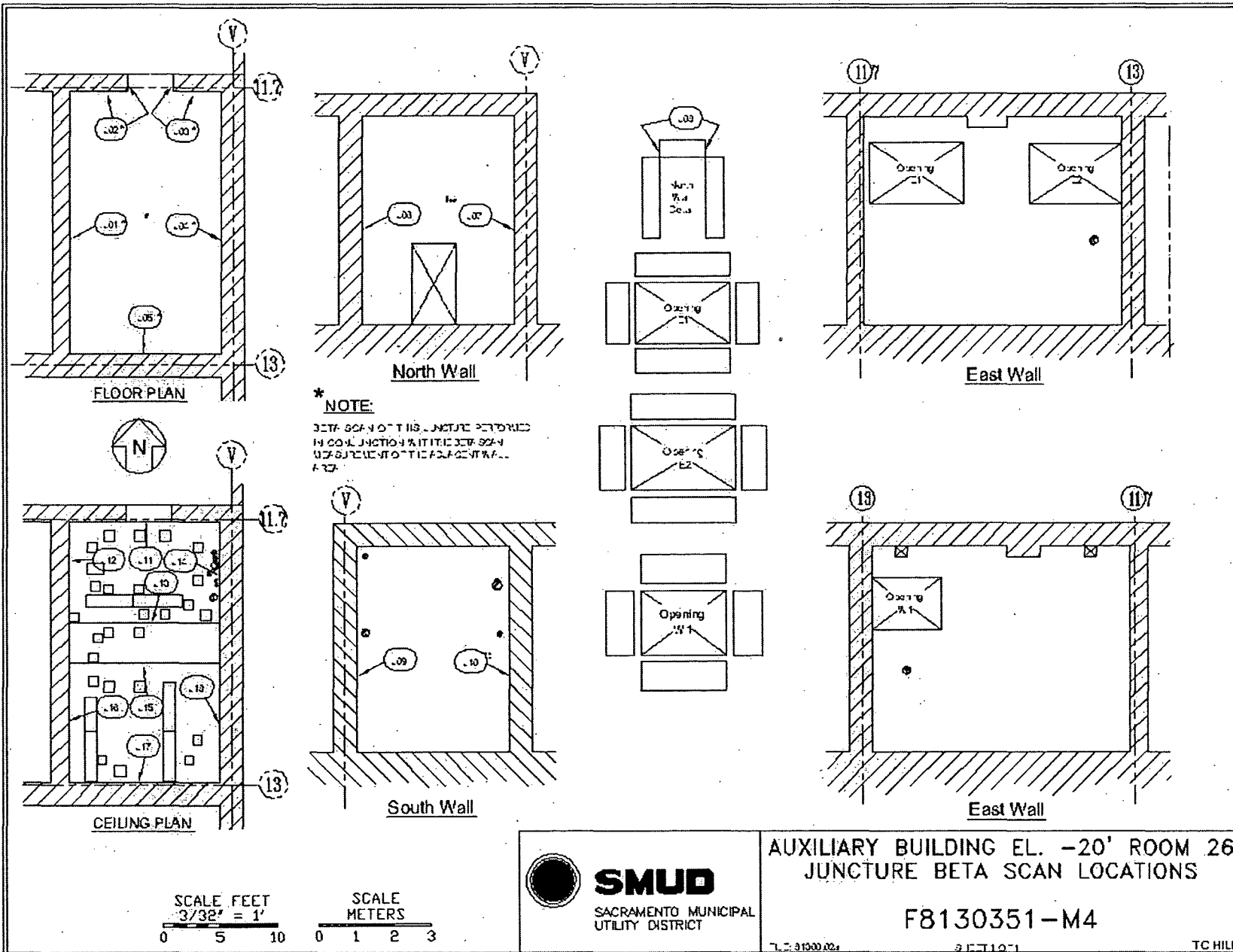
AUXILIARY BUILDING EL. -20'
ROOM 26 WALL ELEVATION
BETA SCAN MEASUREMENT LOCATIONS
F8130351-M1

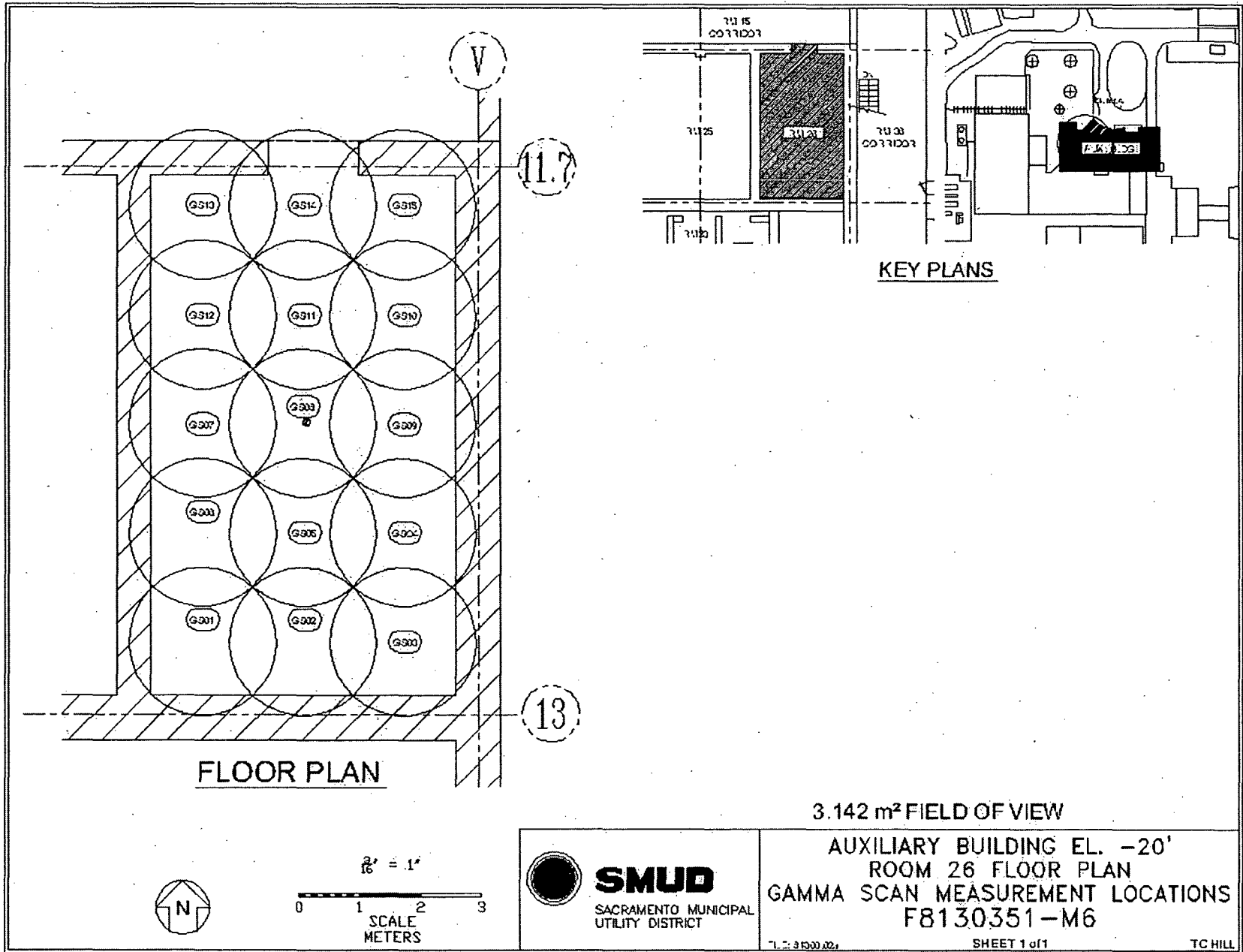
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SHEET 2 of 3

TC HILL



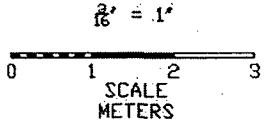




11.7

13

V



Attachment 2

Instrumentation

April 8, 2008

Survey Unit F8130351

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; 142507	43-68B; 160781	530	1263
M2350; 142507	43-116-1B; 256008	1000	4092
M2350; 175834	43-116-1B; 190642	1000	4092
M2350; 180733	43-98B; 148638	2540	4580
M2350; 142515	43-111B; 148642	1700	3070
ISOCS	1983947	N/A	1550 Cs-137 1590 Co-60
Tennelec; 0401171	N/A	5.15 dpm α , 8.12 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	99015
Investigation Criteria – Scan	99015
DCGL _W	16100
DCGL _{EMC}	99015

Attachment 3

Investigation

April 8, 2008

Survey Unit F8130351

Table 3-1 Survey Unit Investigation

<i>Grid</i>	<i>Investigation Level (cpm)</i>	<i>Initial Value (cpm)</i>	<i>Investigation Result (cpm)</i>	<i>Elevated Area (m²)</i>	<i>Area Factor</i>	<i>DCGL_{emc}</i>	<i>Investigation Result (dpm/100cm²)</i>	<i>DCGL_{emc} Unity Fraction</i>
C0002BS	3,650	14,220	890	0.0055	2187	35,210,700	24,089	0.00
C0006BS	3,650	20,148	412	N/A	N/A	N/A	11,151	0.00
C0007BS	3,650	5,587	389	N/A	N/A	N/A	10,529	0.00
C0093BS	3,650	7,074	2,655	0.0126	952	15,327,200	71,861	0.00
C0008JS	7,178	8,679	565	N/A	N/A	N/A	7,767	0.00
Survey Unit Remainder						DCGL = 16,100	SU Mean = 2,422	0.15
EMC Unity Sum								0.15

All of the grids above were initially greater than *DCGL_{emc}*. Investigation of the areas resulted in the decision to perform additional remediation. The investigation results above represent the residual radioactivity levels after additional remediation.

Attachment 4

Data Assessment

April 8, 2008

Survey Unit F8130351

