

Rancho Seco

Final Status Survey Summary Report

June 30, 2008

East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051
Upper Walls and Ceiling

Survey Unit F8130701

Prepared By: Michael Stein Date: 6/30/2008
FSS Engineer

Reviewed By: Robert L. Dasher Date: 7/3/08
Lead FSS Engineer

Approved By: E. J. [Signature] Date: 7-29-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130701, East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051
Upper Walls and Ceiling

Survey Unit Description:

Operating History: The East Heat Removal Cooler 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. However, inside the East Heat Removal Cooler Room there were a number of areas on the upper walls and ceiling 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 upper walls and ceiling of the East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051.

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 202 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	East Heat Removal Cooler Room Between Columns 10.3 and 9.7, Room 051 Upper Walls and Ceiling
Survey Unit:	0701	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	202	
Evaluator:	Michael Stein	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	3.5	Class 1
Design DCGL_{mc} (dpm/100 cm²):	152301	Class 1
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	7	Class 1
Scan Area (m²):	202	
Scan Coverage (%):	100%	Class 1
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.955435	
Calculated Relative Shift:	1.7	
Relative Shift Used:	1.7	Uses 3.0 if Relative Shift is >3
N-Value:	14	
Design N-Value + 20%:	17	NUREG-1575 Table 5-5
Design Min Samples N:	29	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 29 direct measurements were made in F8130701. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements except for C0017BD were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Scan activity ranged from 2,167 to 137,563 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)
F8130701-C0001BD	1738
F8130701-C0002BD	1670
F8130701-C0003BD	1717
F8130701-C0004BD	1551
F8130701-C0005BD	1603
F8130701-C0006BD	1146
F8130701-C0007BD	1727
F8130701-C0008BD	1852
F8130701-C0009BD	1644
F8130701-C0010BD	1712
F8130701-C0011BD	1089
F8130701-C0012BD	1286
F8130701-C0013BD	1795
F8130701-C0014BD	1743
F8130701-C0015BD	1644
F8130701-C0016BD	986
F8130701-C0017BD	47614
F8130701-C0018BD	1546
F8130701-C0019BD	1349
F8130701-C0020BD	1385
F8130701-C0021BD	1318
F8130701-C0022BD	970
F8130701-C0023BD	954
F8130701-C0024BD	1675
F8130701-C0025BD	2168
F8130701-C0026BD	7807
F8130701-C0027BD	1509
F8130701-C0028BD	1743
F8130701-C0029BD	1904
Mean:	3340
Median:	1644
Standard Deviation:	8600
Range:	954 - 47614

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8130701C0001SM	5.51
F8130701C0002SM	1.64
F8130701C0003SM	1.64
F8130701C0004SM	2.93
F8130701C0005SM	-0.95
F8130701C0006SM	4.22
F8130701C0007SM	-0.95
F8130701C0008SM	0.34
F8130701C0009SM	-0.95
F8130701C0010SM	0.34
F8130701C0011SM	18.42
F8130701C0012SM	2.93
F8130701C0013SM	2.93
F8130701C0014SM	1.64
F8130701C0015SM	4.22
F8130701C0016SM	4.22
F8130701C0017SM	232.8
F8130701C0018SM	-0.95
F8130701C0019SM	-3.53
F8130701C0020SM	9.38
F8130701C0021SM	-0.95
F8130701C0022SM	2.93
F8130701C0023SM	-0.95
F8130701C0024SM	6.8
F8130701C0025SM	21.01
F8130701C0026SM	206.98
F8130701C0027SM	4.22
F8130701C0028SM	5.51
F8130701C0029SM	104.95
Mean:	21.94
Median:	2.93
Standard Deviation:	58.31
Range:	-3.53 to 232.8

Survey Unit Data Assessment:

The survey design required 29 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):	29	
Median (dpm/100 cm ²):	1644	
Mean (dpm/100 cm ²):	3340	
Direct Measurement Standard Deviation	8600	Based on samples and backgrounds.
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	8600	
Maximum (dpm/100 cm ²):	47614	
Material Type:	N/A	
Sign Test Final N Value:	29	Background Subtract Not Applied
S+ Value:	28	
Critical Value:	19	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Investigate	
Median Value < DCGL:	Yes	Small Area < 1 m ² , Activity 47,614 dpm/100cm ²
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	Yes	
Total Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Investigate	Yes, Passed Sign Test
Does the Survey Unit Pass All Criteria?	Investigate	

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.

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. All of the direct measurements except for C0017BD were less than the DCGL of 43000 dpm/100 cm². 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.

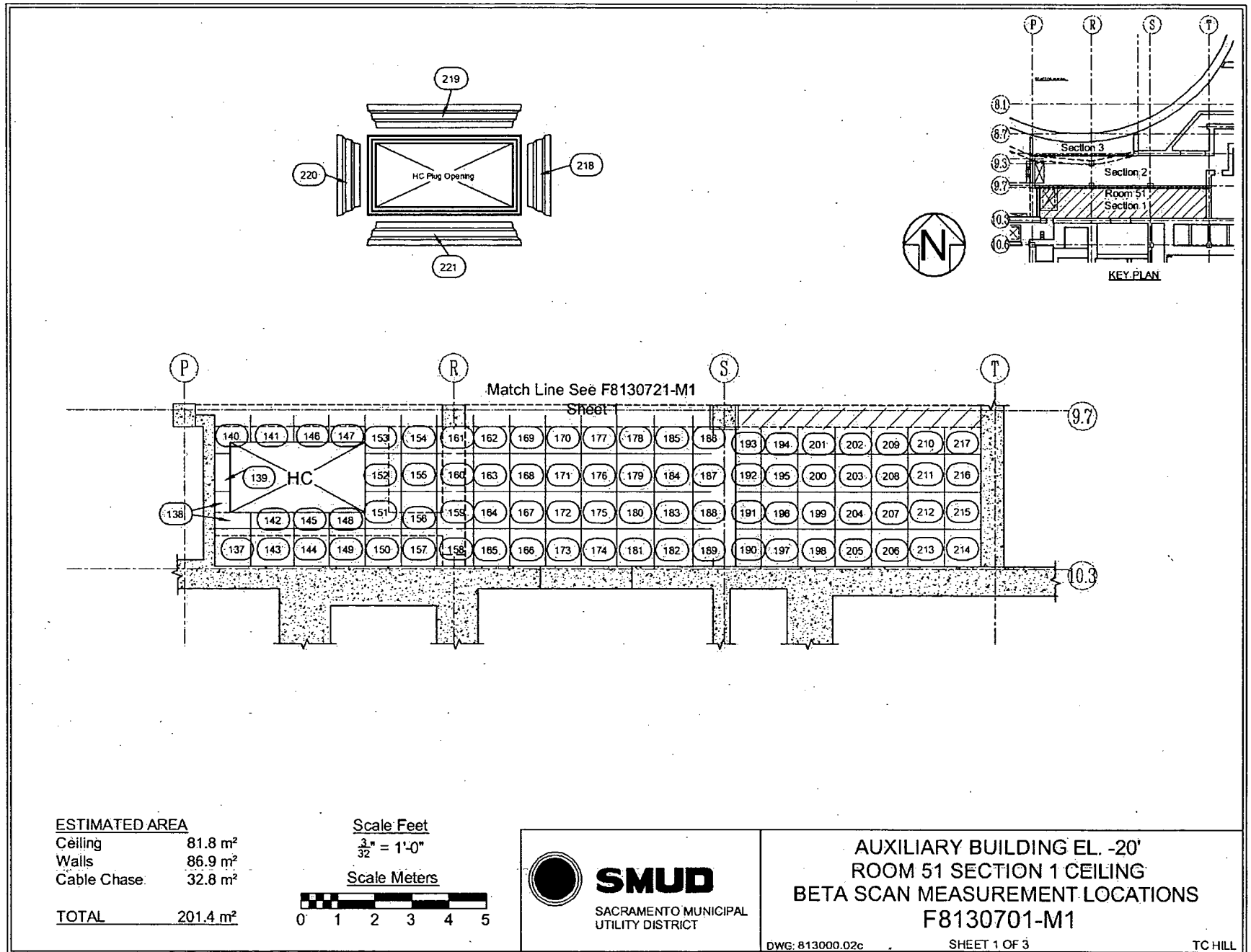
It is concluded that survey unit F8130701 meets the release criteria of 10CFR20.1402.

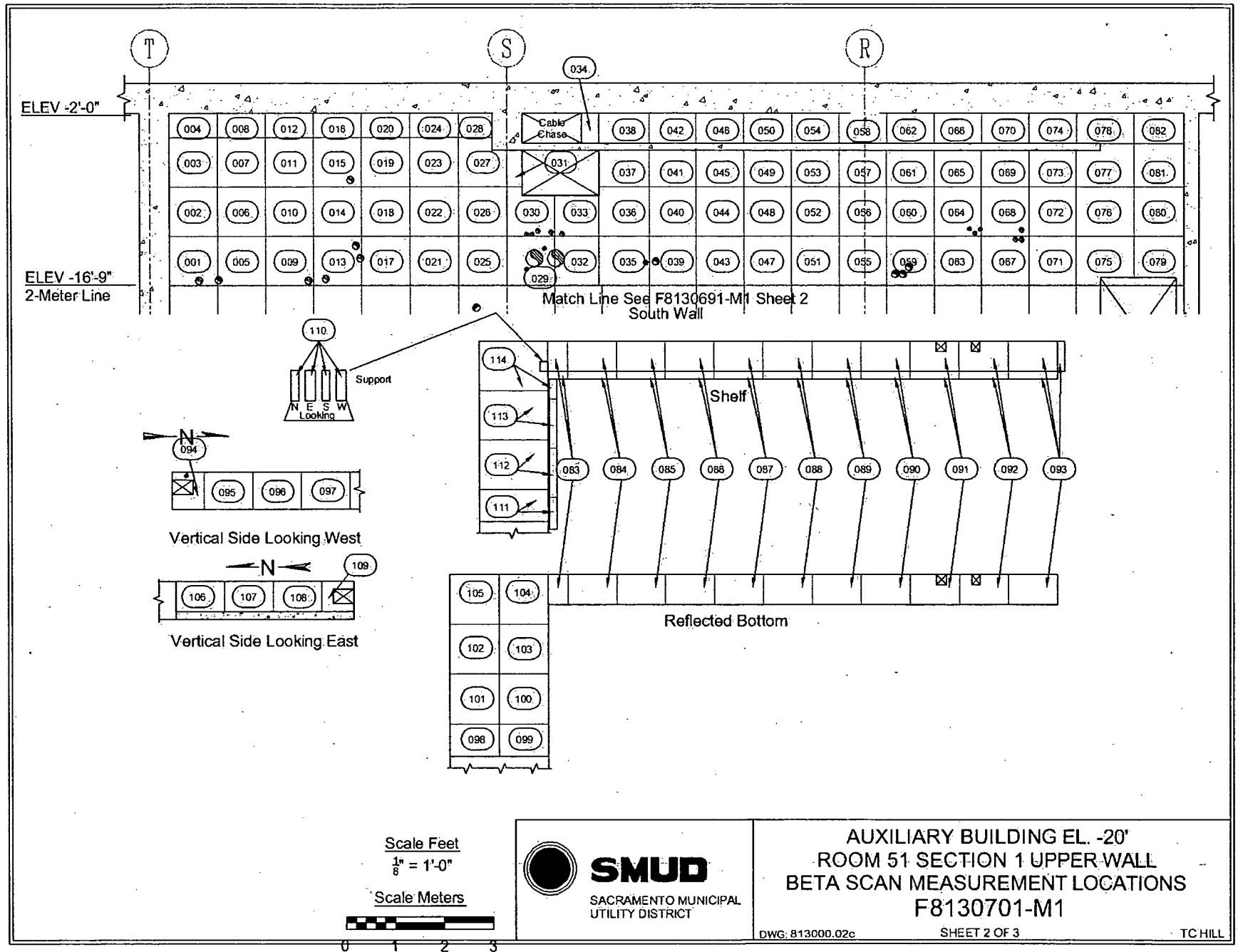
Attachment 1

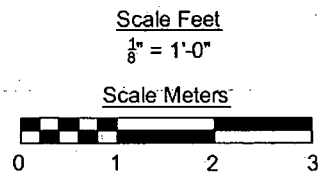
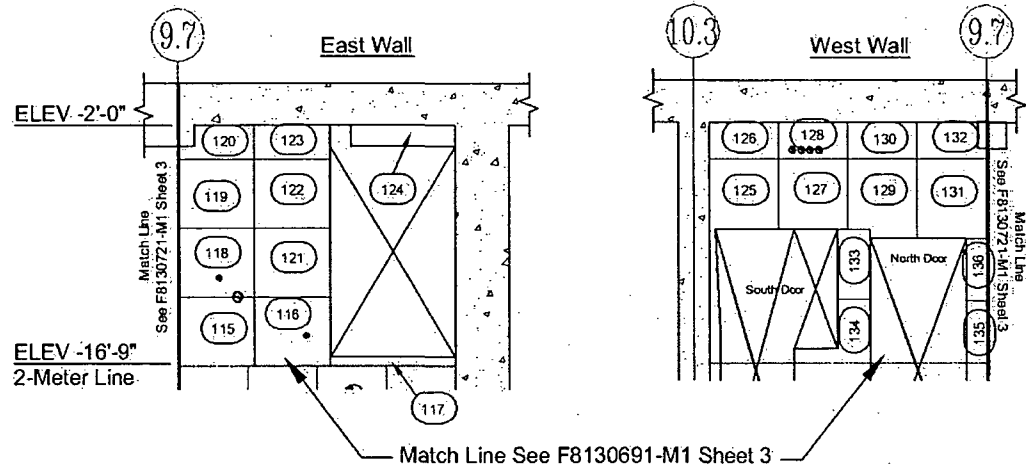
Maps

June 30, 2008

Survey Unit F8130701







SMUD

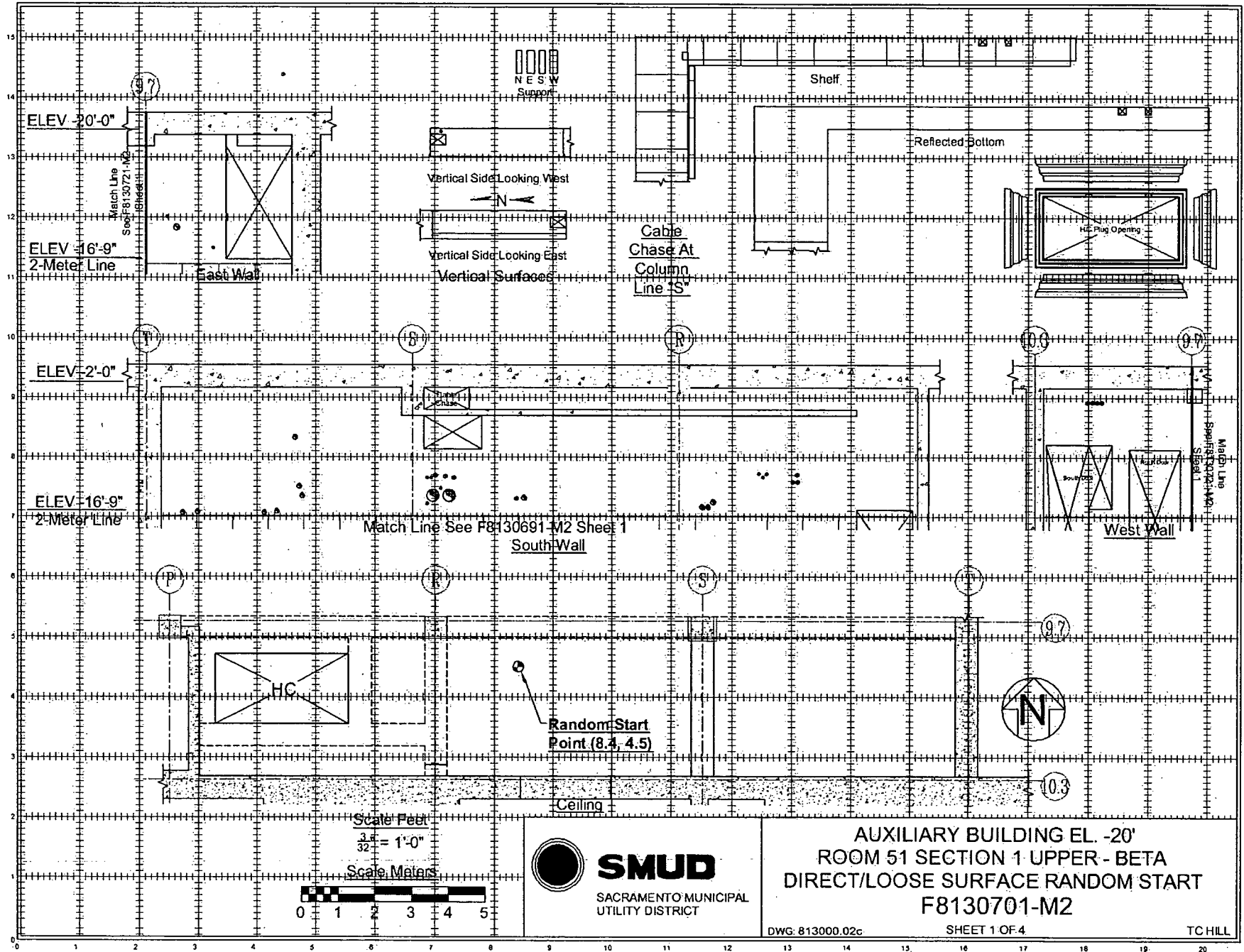
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. -20'
ROOM 51 SECTION 1 UPPER WALL
BETA SCAN MEASUREMENT LOCATIONS
F8130701-M1

DWG: 813000.02c

SHEET 3 OF 3

TC HILL



SMUD

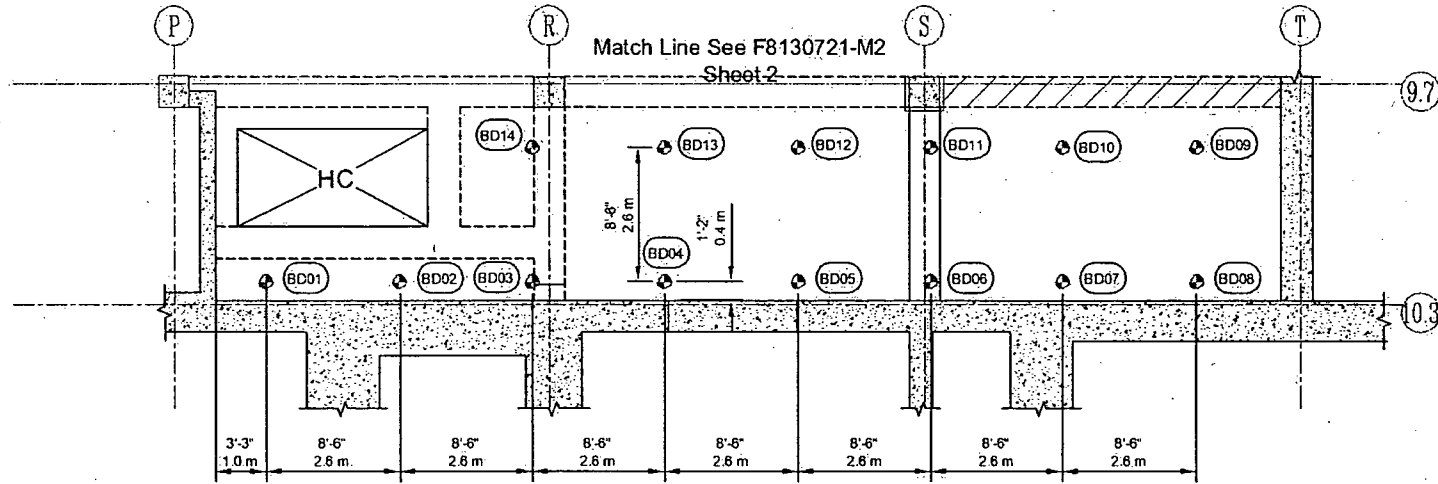
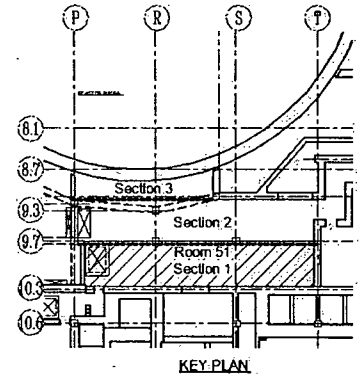
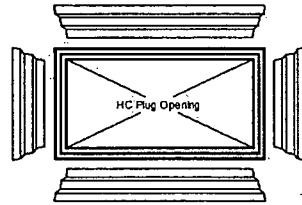
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

AUXILIARY BUILDING EL. -20'
ROOM 51 SECTION 1 UPPER - BETA
DIRECT/LOOSE SURFACE RANDOM START
F8130701-M2

DWG: 813000.02c

SHEET 1 OF 4

TC HILL



ESTIMATED AREA

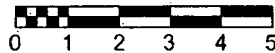
Ceiling	81.8 m ²
Walls	86.9 m ²
Cable Chase	32.8 m ²

TOTAL 201.4 m²

Scale Feet

$\frac{3}{32}'' = 1'-0''$

Scale Meters



SMUD

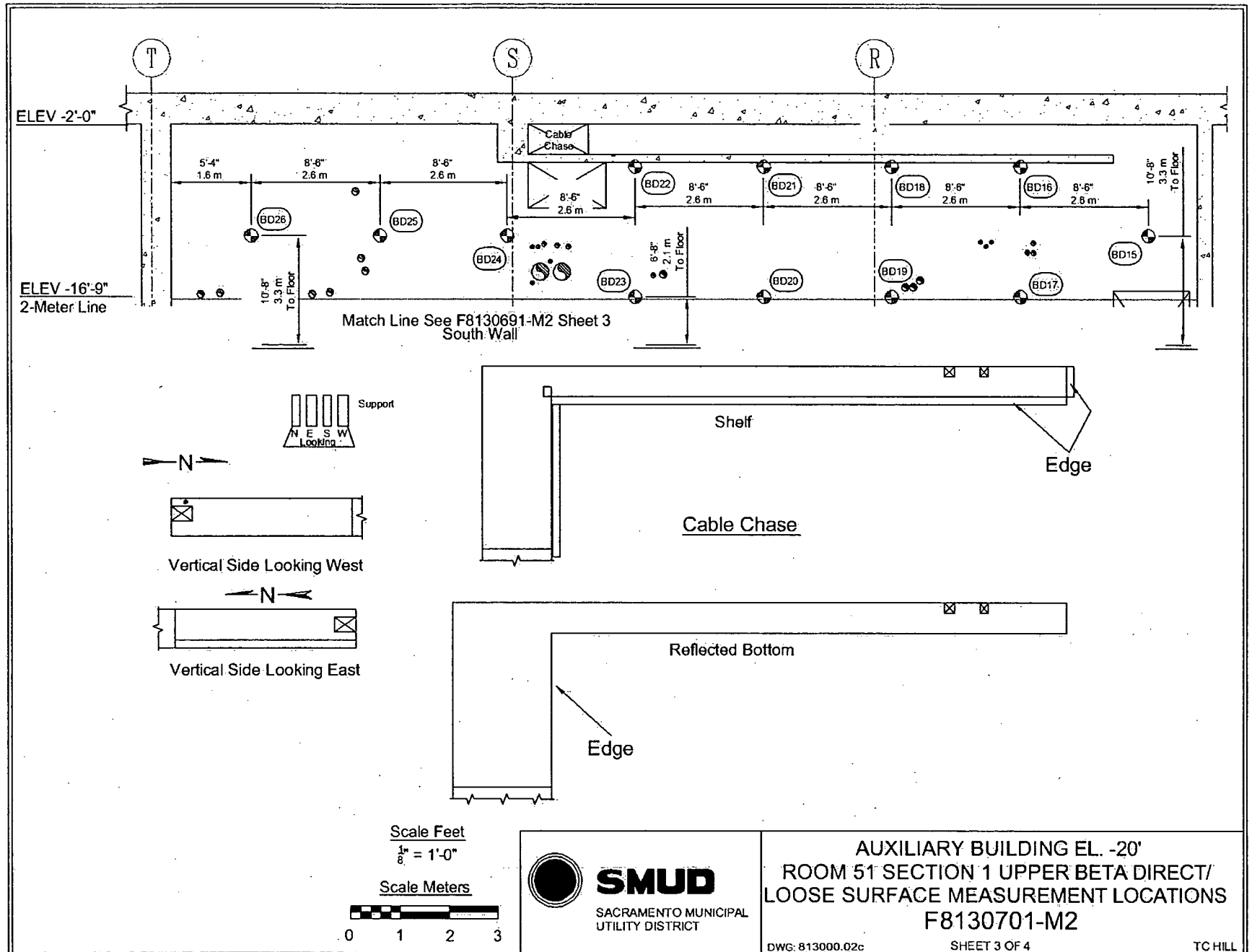
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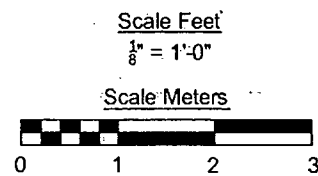
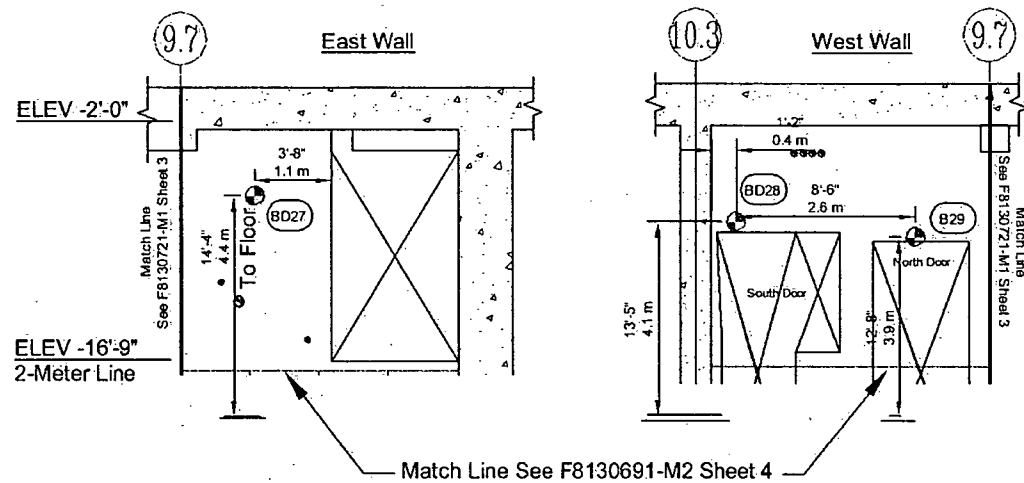
AUXILIARY BUILDING EL. -20'
ROOM 51 SECTION 1 CEILING BETA DIRECT/
LOOSE SURFACE MEASUREMENT LOCATIONS
F8130701-M2

DWG: 813000.02c

SHEET 2 OF 4

TC HILL





SMUD

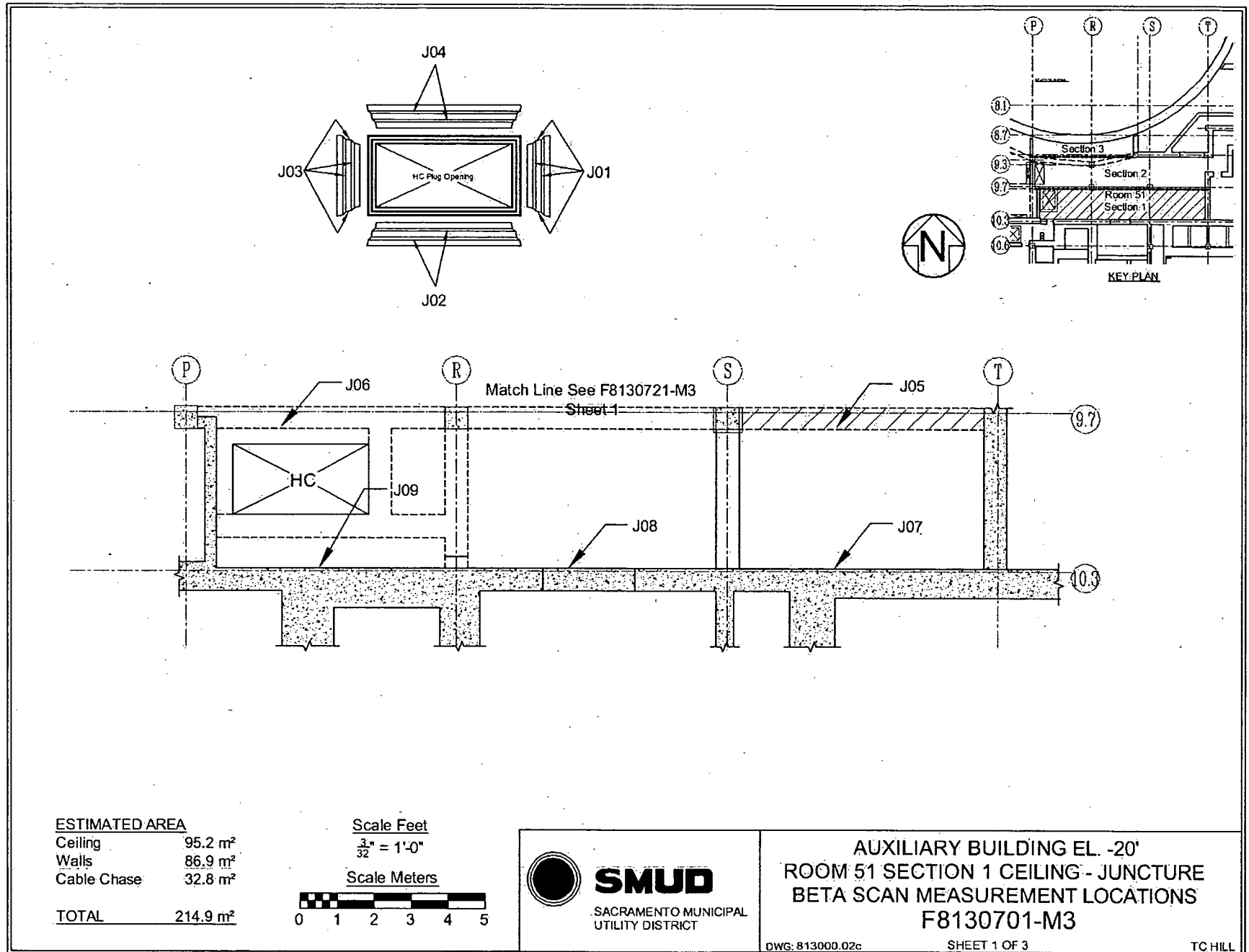
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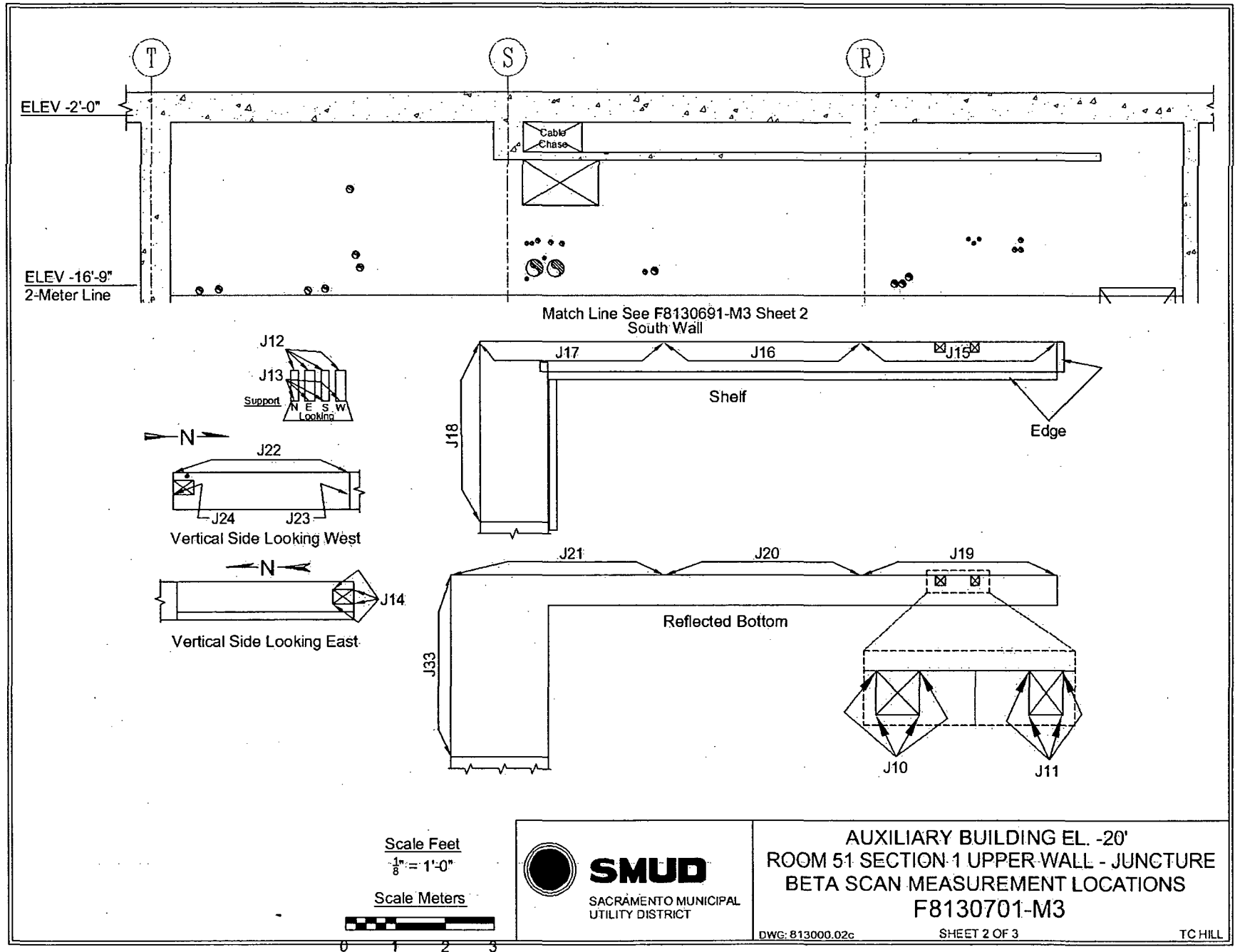
AUXILIARY BUILDING EL. -20'
ROOM 51 SECTION 1 UPPER BETA DIRECT/
LOOSE SURFACE MEASUREMENT LOCATIONS
F8130701-M2

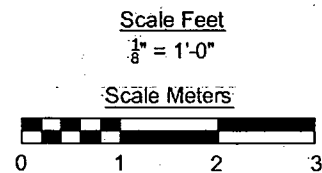
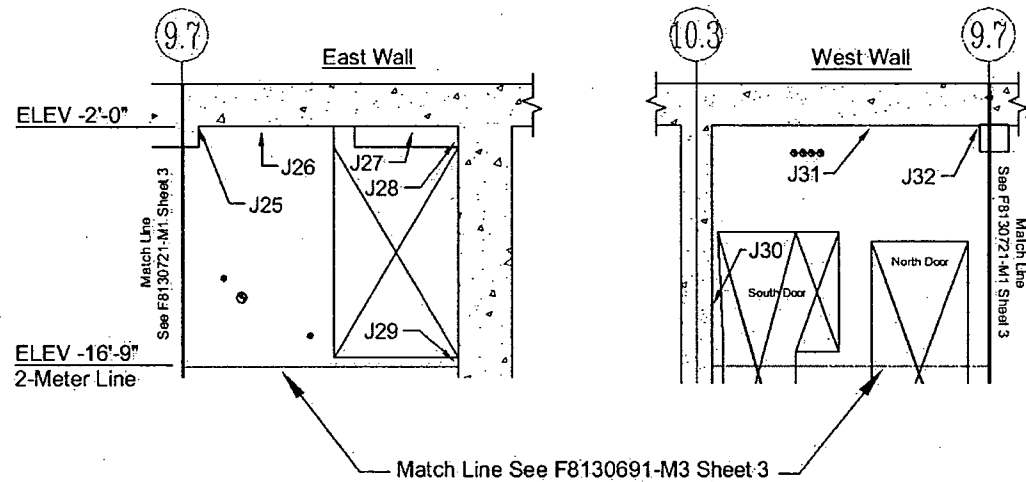
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SHEET 4 OF 4

TC HILL







SMUD

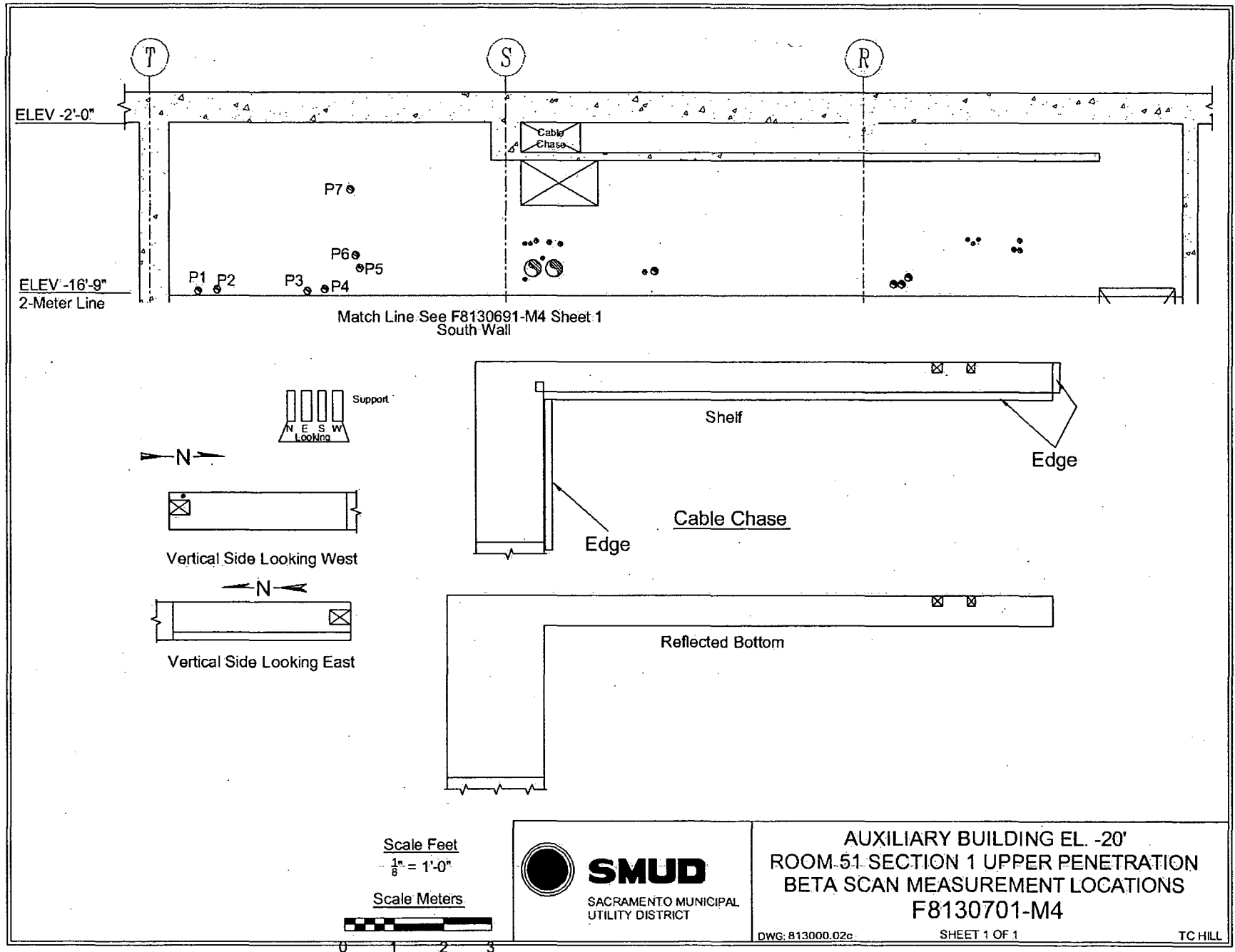
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AUXILIARY BUILDING EL. -20'
ROOM 51 SECTION 1 UPPER WALL - JUNCTURE
BETA SCAN MEASUREMENT LOCATIONS
F8130701-M3

DWG: 813000.02c

SHEET 3 OF 3

TC HILL



Attachment 2

Instrumentation

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Survey Unit F8130701

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; 142514	43-98B; 148639	550	990
M2350; 193700	43-68B; 190294	433	1033
M2350; 149789	43-68B; 161397	433	1033
M2350; 203481	43-68B; 148629	433	1033
M2350; 149789	43-116-1B; 256006	491 β Junction	739 β Junction
M2350; 193700	43-116-1B; 216072	796	3258
Tennelec; 0401171	N/A	5.9 dpm α , 11.7 dpm β	N/A

The scan and static MDC's provided represent the most conservative MDC values for the survey conducted.

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	150500
Investigation Criteria – Scan	150500
DCGL _w	43000
DCGL _{EMC}	150500

Attachment 3

Investigation

June 30, 2008

Survey Unit F8130701

(none required)

Attachment 4

Data Assessment

June 30, 2008

Survey Unit F8130701

