

Rancho Seco

Final Status Survey Summary Report

October 31, 2007

Aux. Bldg (-) 20' EI, Rm 43, "B" HPI Pump Room, Floors & Walls

Survey Unit F8130601

Prepared By: D. Anderson Date: 10/31/2007

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Reviewed By: [Signature] Date: 11/5/07

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Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130601, Aux. Bldg (-) 20' El, Rm 43, "B" HPI Pump Room, Floors & Walls

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 162.25 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 43, "B" HPI Pump Room, Floors & Walls
Survey Unit:	0601	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	162.25	
Evaluator:	D. Anderson	
DCGL (dpm/100 cm²):	43,000	Gross Activity DCGL
Area Factor:	3.2	Class 1
Design DCGL_{me} (dpm/100 cm²):	137,600	Class 1
LBGR (dpm/100 cm²):	41,800	Adjusted
Design Sigma (dpm/100 cm²):	400	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 (m²):	6.76	Class 1
Scan Area (m²):	162.25	
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:	24	Class 1
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 25 direct measurements were made in F8130601. 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 2,340 dpm/100 cm² to 60,624 dpm/100 cm² for floor, wall, 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)
F8130601-C0001BD	1,743
F8130601-C0002BD	1,743
F8130601-C0003BD	1,691
F8130601-C0004BD	1,691
F8130601-C0005BD	1,598
F8130601-C0006BD	1,489
F8130601-C0007BD	1,727
F8130601-C0008BD	1,800
F8130601-C0009BD	1,800
F8130601-C0010BD	1,468
F8130601-C0011BD	1,707
F8130601-C0012BD	1,774
F8130601-C0013BD	1,961
F8130601-C0014BD	1,961
F8130601-C0015BD	1,318
F8130601-C0016BD	1,255
F8130601-C0017BD	1,219
F8130601-C0018BD	1,515
F8130601-C0019BD	1,634
F8130601-C0020BD	1,592
F8130601-C0021BD	1,126
F8130601-C0022BD	1,364
F8130601-C0023BD	2,900
F8130601-C0024BD	1,369
F8130601-C0025BD	1,499
Mean:	1,638
Median:	1,634
Standard Deviation:	344
Range:	1,126 – 2,900

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm²)
F8130601C0001SM	8.7
F8130601C0002SM	8.7
F8130601C0003SM	3.58
F8130601C0004SM	6.14
F8130601C0005SM	4.86
F8130601C0006SM	22.8
F8130601C0007SM	3.58
F8130601C0008SM	9.98
F8130601C0009SM	12.55
F8130601C0010SM	8.7
F8130601C0011SM	4.86
F8130601C0012SM	11.27
F8130601C0013SM	2.29
F8130601C0014SM	2.29
F8130601C0015SM	4.86
F8130601C0016SM	3.58
F8130601C0017SM	16.39
F8130601C0018SM	1.01
F8130601C0019SM	1.01
F8130601C0020SM	8.7
F8130601C0021SM	3.58
F8130601C0022SM	3.58
F8130601C0023SM	9.98
F8130601C0024SM	3.58
F8130601C0025SM	1.01
Mean:	6.7
Median:	4.86
Standard Deviation:	5.21
Range:	1.01 to 22.8

Survey Unit Data Assessment:

The survey design required 25 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):	25	
Median (dpm/100 cm ²):	1,634	
Mean (dpm/100 cm ²):	1,638	
Direct Measurement Standard Deviation	344	Based on samples and backgrounds.
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	344	
Maximum (dpm/100 cm ²):	2,900	
Material Type:	N/A	
Sign Test Final N Value:	25	Background Subtract Not Applied
S+ Value:	25	
Critical Value:	17	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	Class 1
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{mc}:	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:

One investigation (Grid C0001BS) was required for the scan measurements and the results are reported in Attachment 3. The EMC unity rule was not exceeded as shown in Table 3-1.

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. One potential area of elevated activity was detected and evaluated as shown in Attachment 3. 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. One investigation was 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.

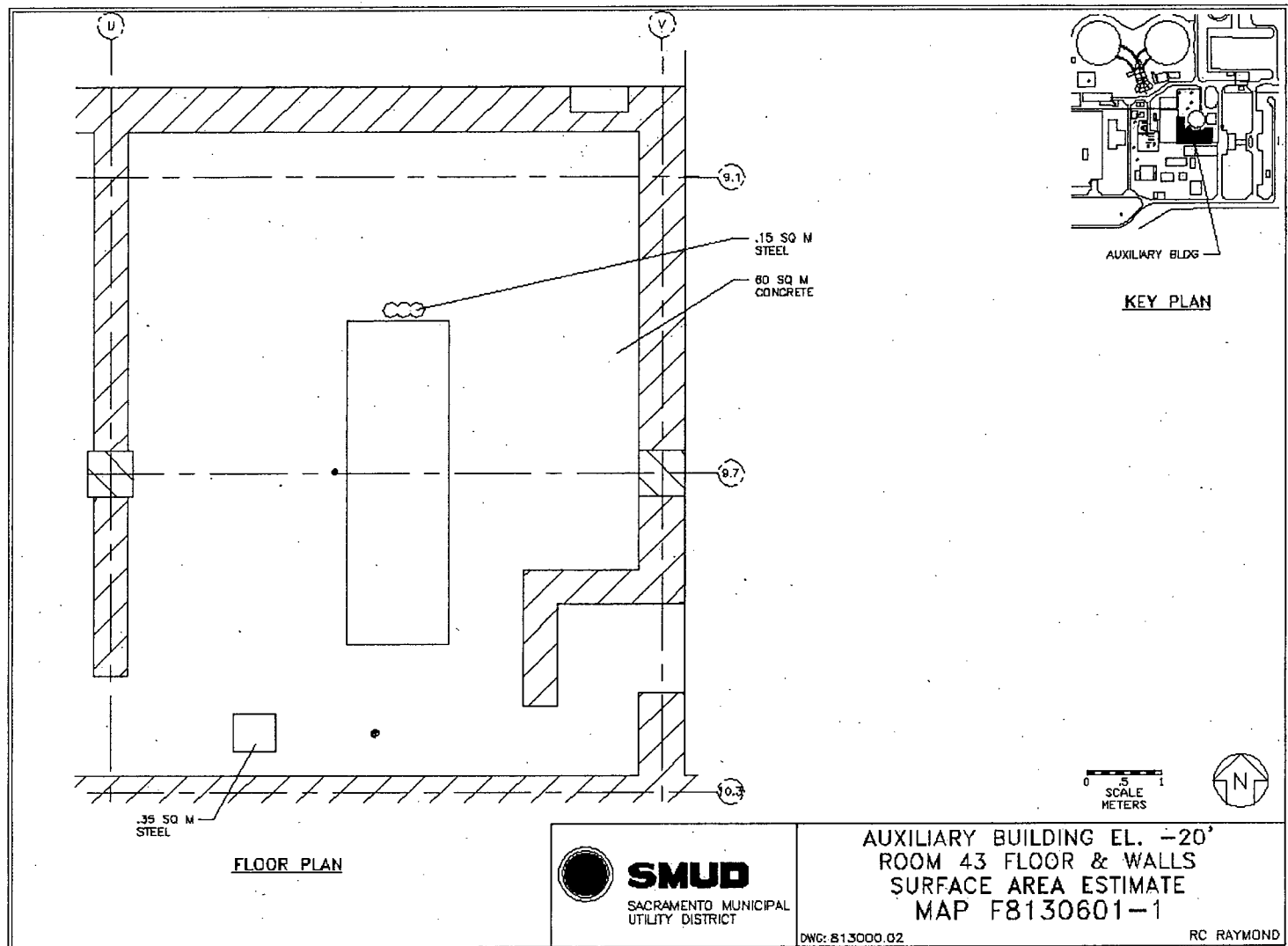
It is concluded that survey unit F8130601 meets the release criteria of 10CFR20.1402.

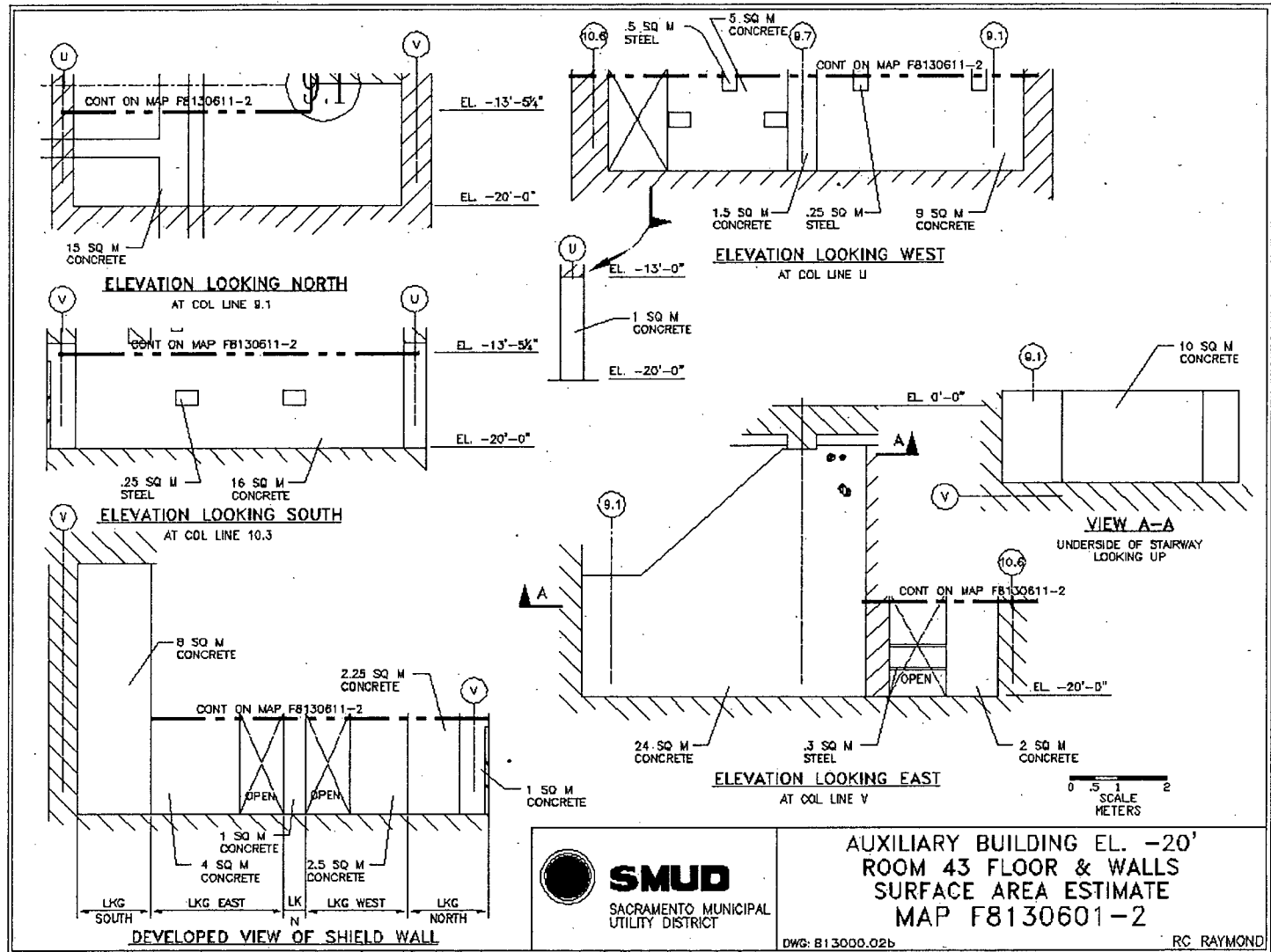
Attachment 1

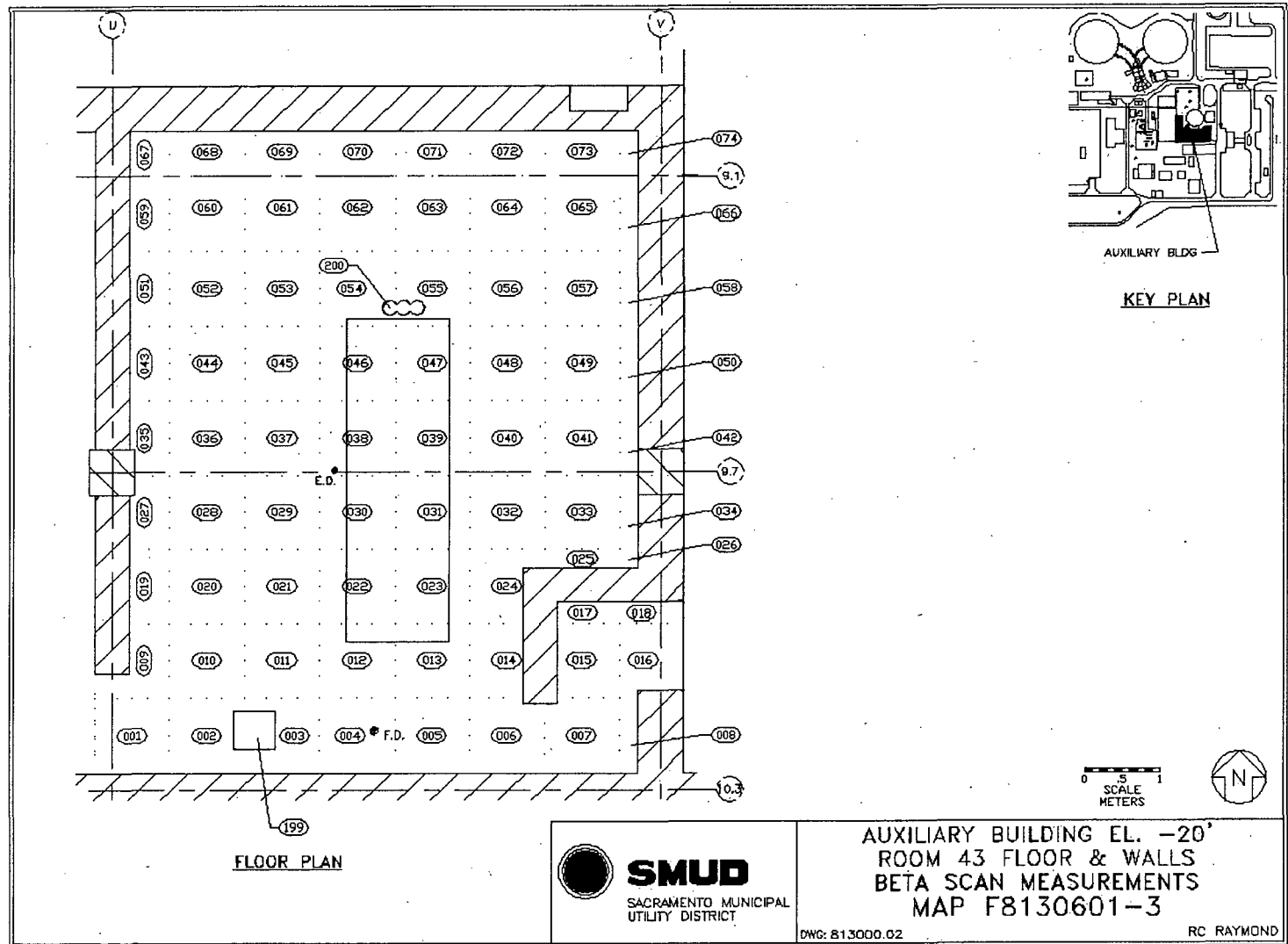
Maps

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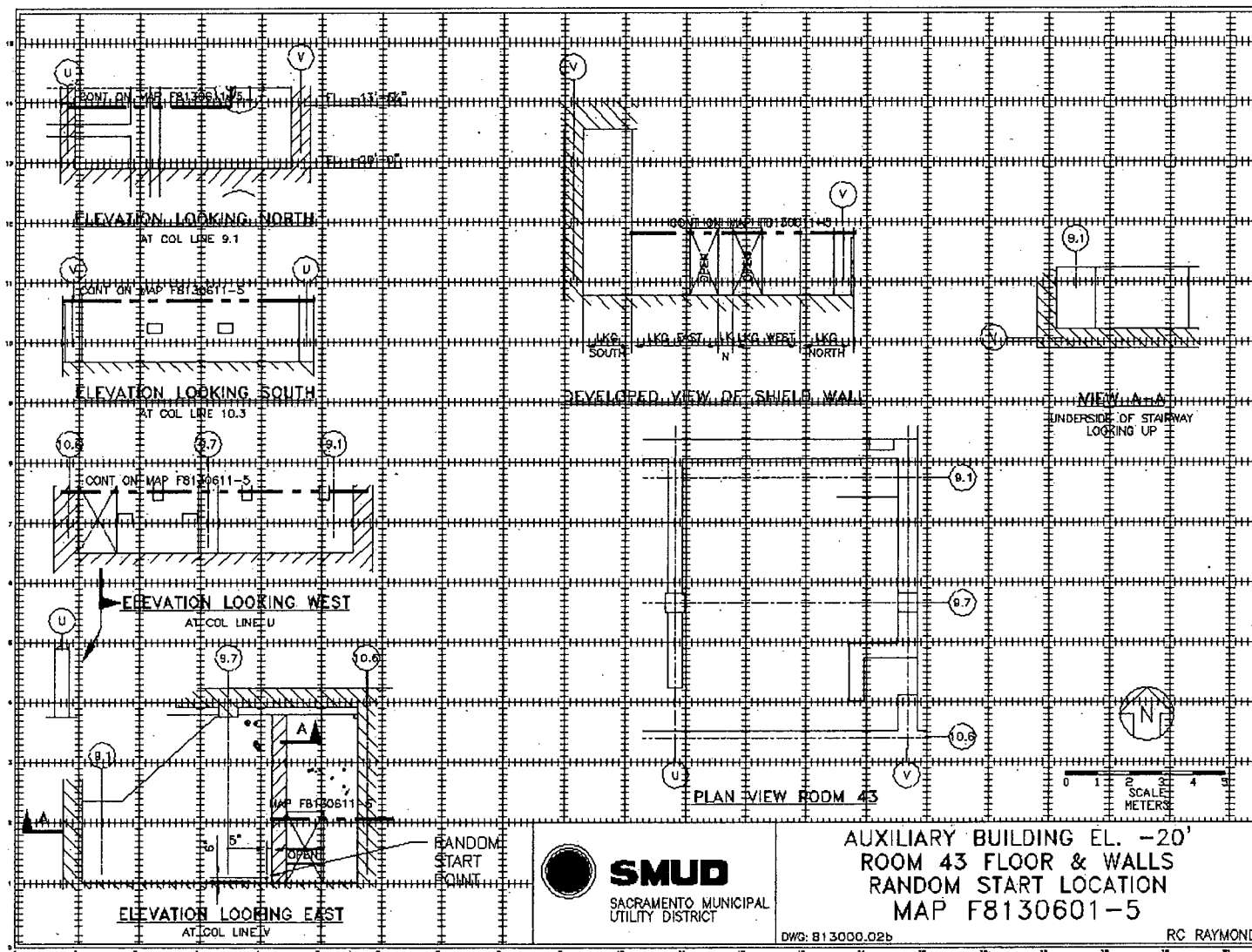
Survey Unit F8130601

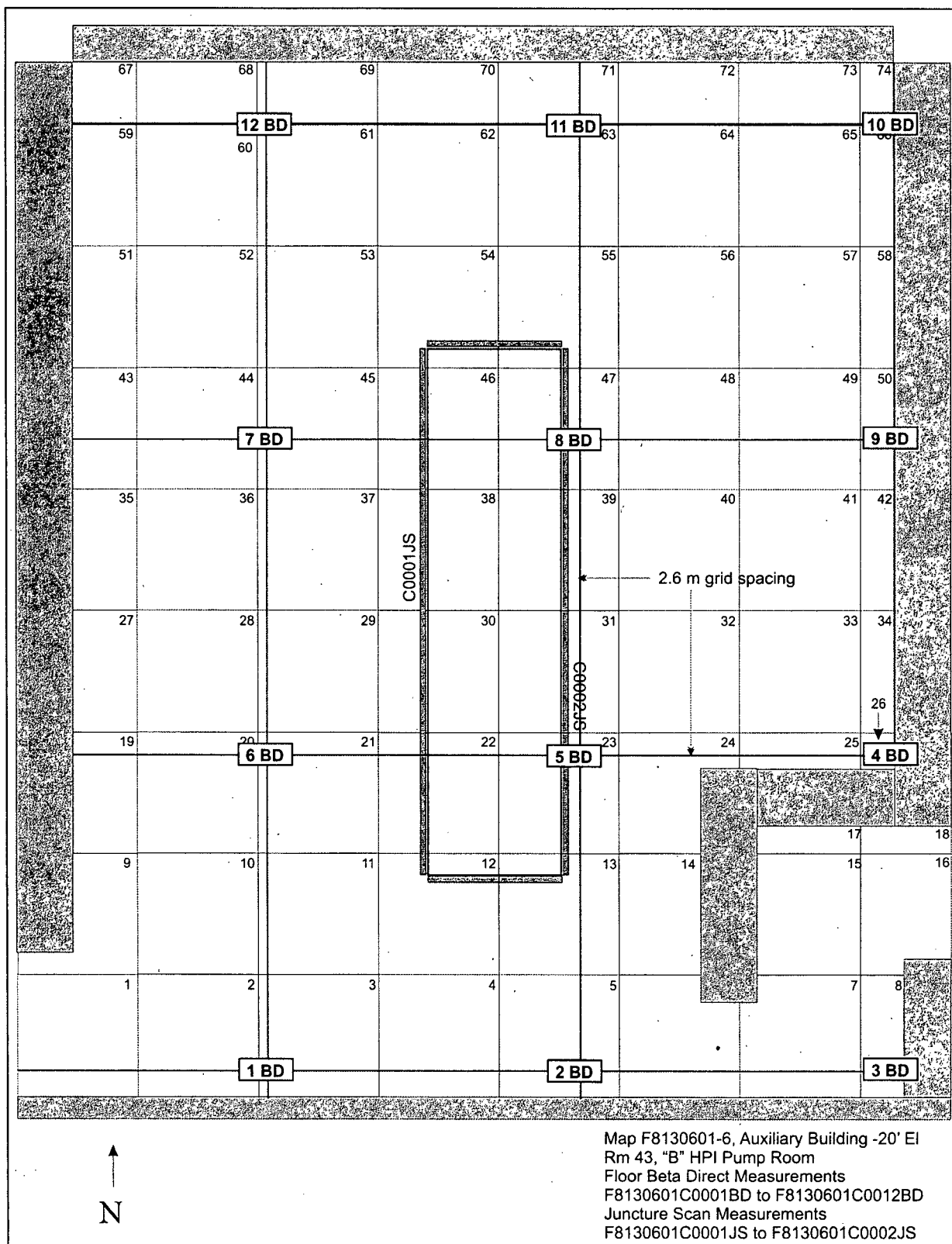




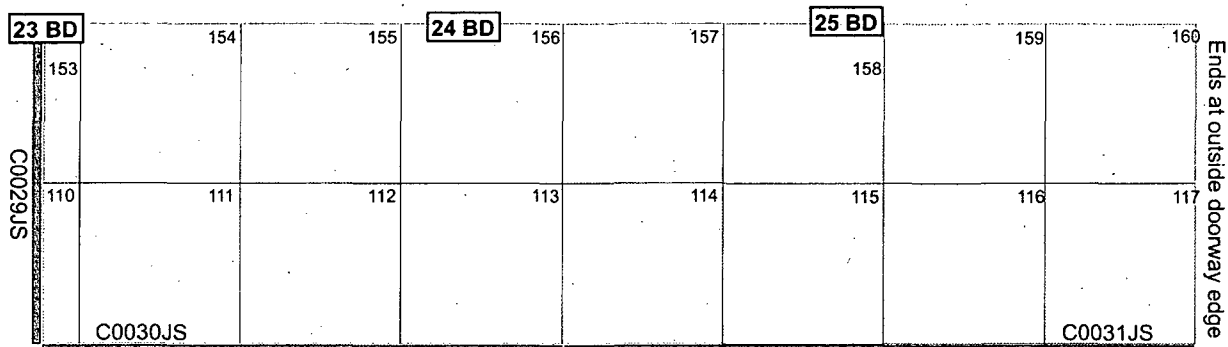




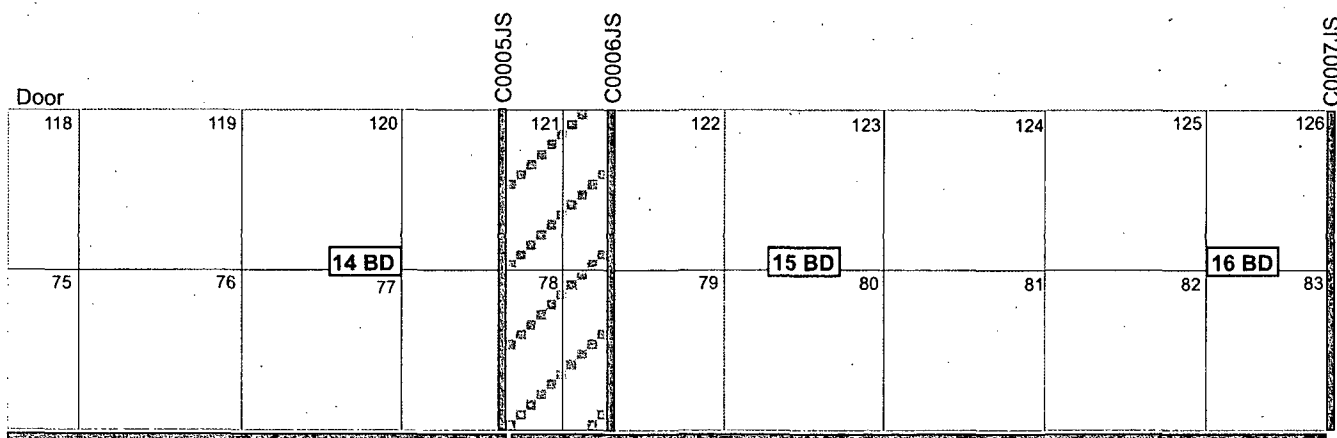




Map F8130601-7, Auxiliary Building -20' EI
 Rm 43, "B" HPI Pump Room
 South Wall Beta Direct Measurements
 F8130601C0023BD to F8130601C0025BD
 Juncture Scan Measurements
 F8130601C0029JS to F8130601C0031JS

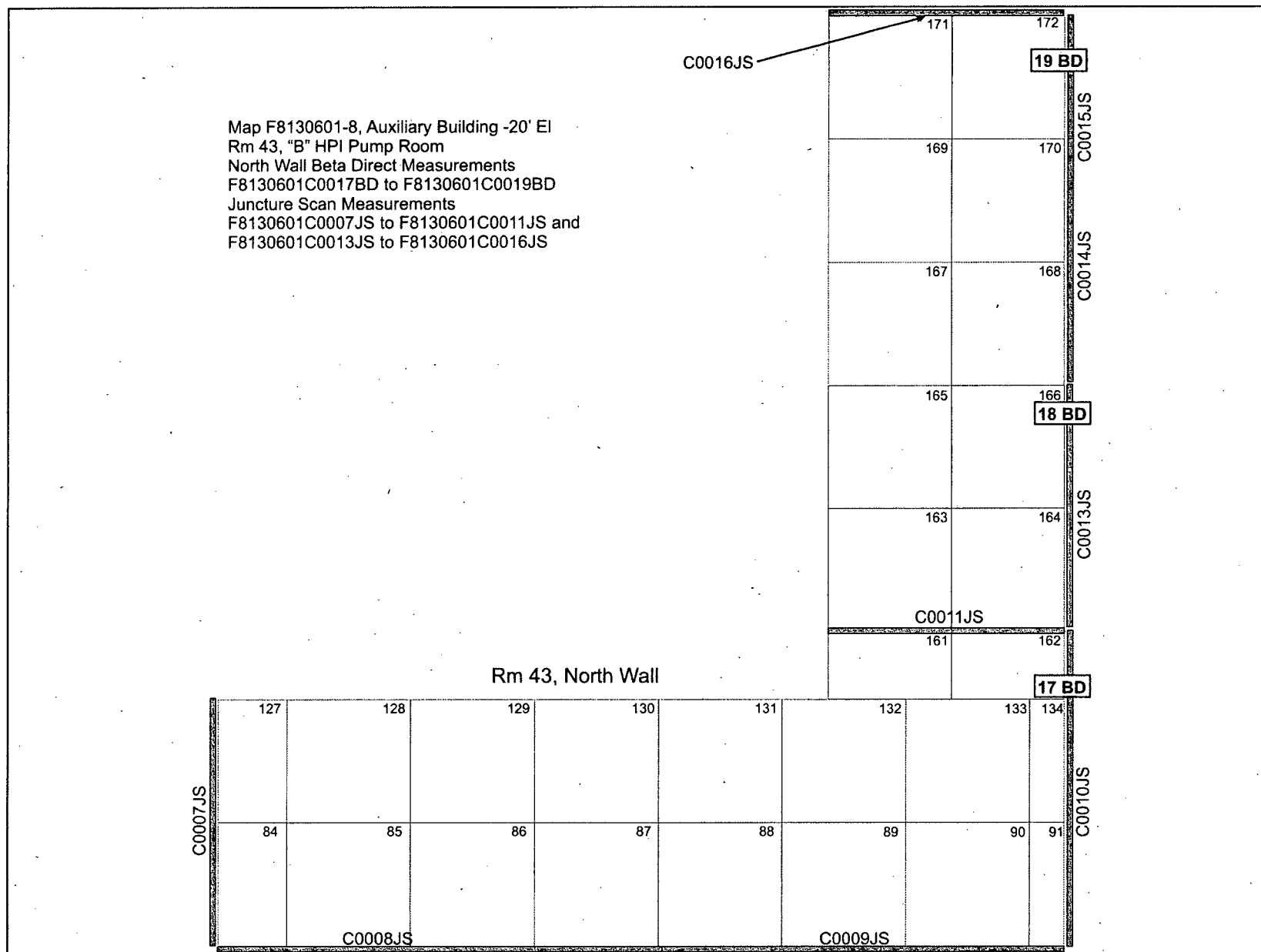


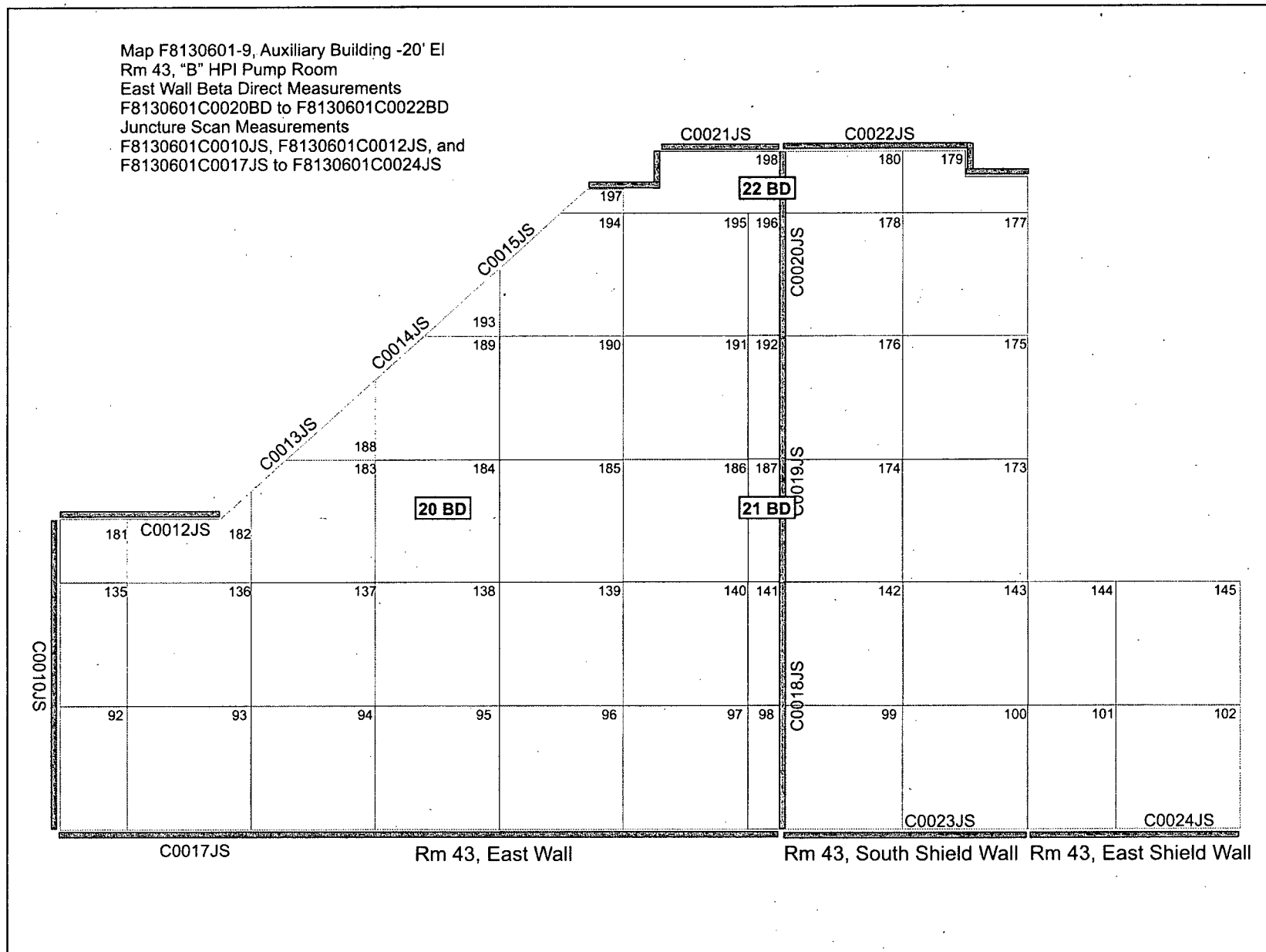
Rm 43, South Wall



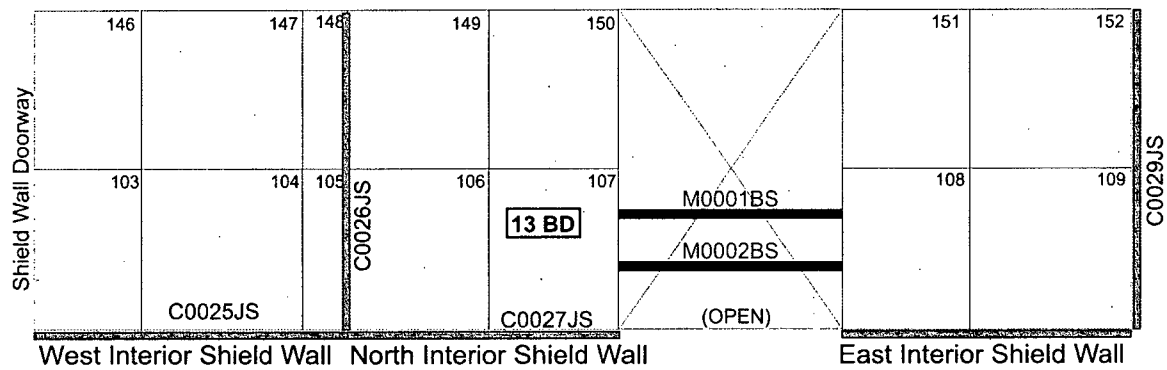
Rm 43, West Wall

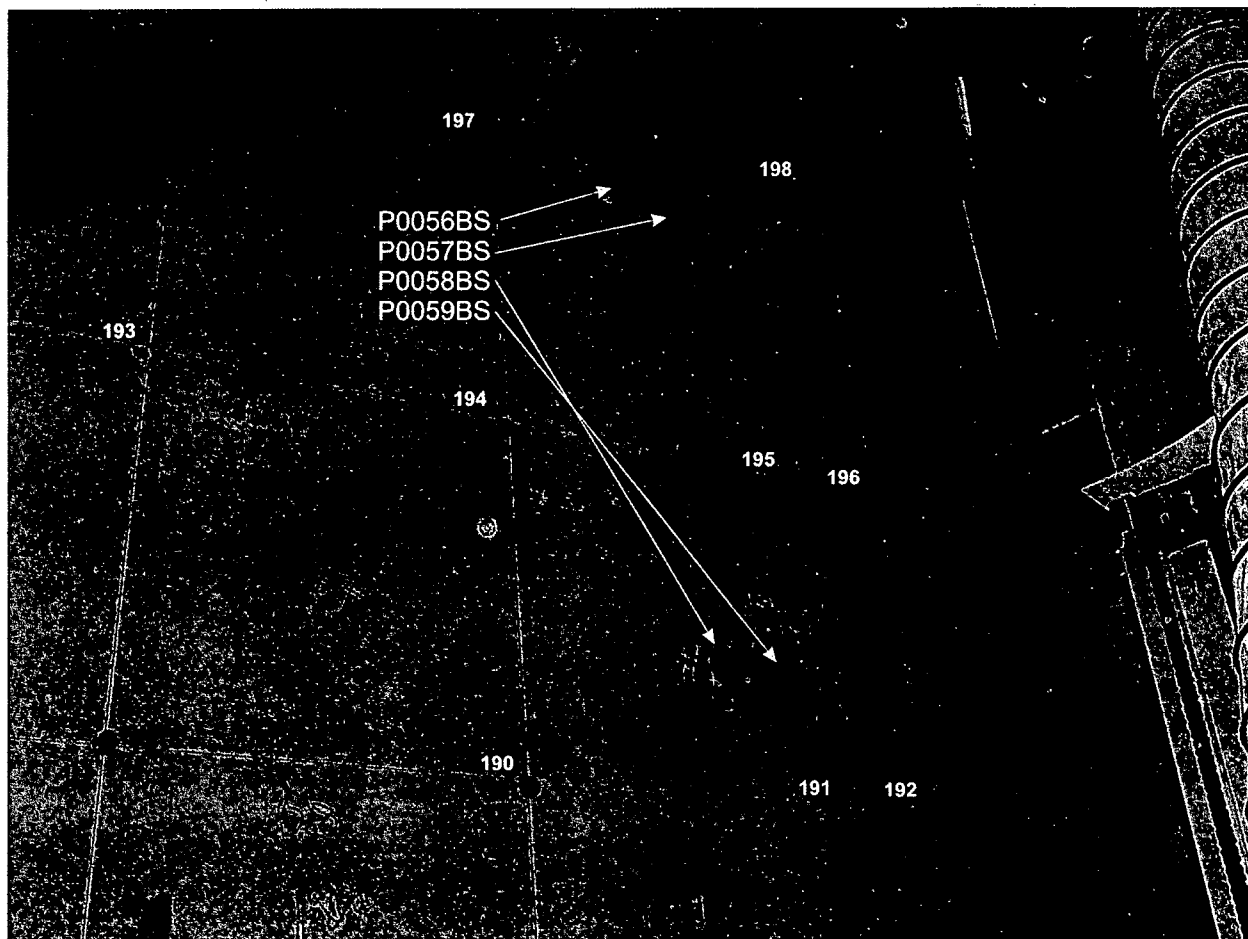
West Wall Beta Direct Measurements
 F8130601C0014BD to F8130601C0016BD
 Juncture Scan Measurements
 F8130601C0003JS to F8130601C0007JS





Map F8130601-10, Auxiliary Building -20' EI
 Rm 43, "B" HPI Pump Room
 Inside Shield Wall Beta Direct Measurements
 F8130601C0013BD
 Juncture Scan Measurements
 F8130601C0025JS to F8130601C0029JS
 Metal Bar Scan Measurements
 F8130601M0001BS to F8130601M0002BS





Map F8130601-11, Auxiliary Building -20' El.
Rm 43, "B" HPI Pump Room
Penetrations in East Wall

Attachment 2

Instrumentation

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Survey Unit F8130601

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	1,400	2,520
M2350; 149794	43-68/5B; 149103	433	1,033
M2350; 149794	43-116-1B; 216072 ¹	491	739
M2350; 149794	43-116-1B; 216072 ²	796	5,895
M2350; 149794	43-116-1B; 216072 ³	472	3,492
Tennelec; 0401171	N/A	5 dpm α , 11 dpm β	N/A

¹43-116-1B Concrete junctures²43-116-1B Concrete surfaces and penetrations³43-116-1B Metal surfaces and penetrations**Table 2-2. Investigation Criteria and DCGL**

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	34,400
Investigation Criteria – Scan	34,400
DCGL _W	43,000
DCGL _{EMC}	137,600

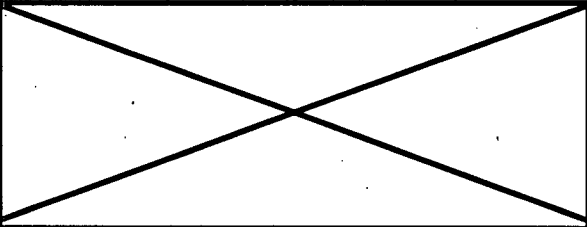
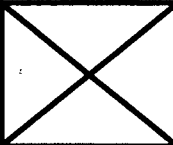
Attachment 3

Investigation

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Table 3-1. Survey Unit Investigation

Grid	Initial cpm	Elevated Area (m²)	Area Factor	DCGLEMC (dpm/100 cm²)	Investigation Result (dpm/100 cm²)	DCGLEMC Unity
C0001GS	8,264	0.041	25.1	1.11E+06	36,710	3.30E-02
				SU Mean (dpm/100 cm²)	Unitized Mean	
				1.64E+03	3.81E-02	3.81E-02
EMC Unity Sum						7.11E-02

Attachment 4

Data Assessment

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