Rancho Seco

Final Status Survey Summary Report

October 24, 2007

Switchyard Control Building - Interior

Survey Unit F8510004

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Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8510004, Switchyard Control Building - Interior

Survey Unit Description:

Operating History: This structure was used to house the instrumentation and equipment associated with monitoring and operating the electrical switchyard. This area was not reported to have been used for the storage of radioactive material. Operating records and the HSA document no occurrences of radioactive material with the potential for a release of radioactivity associated with this survey area.

Site Characterization: Direct measurements were made of the interior and exterior surfaces of the structure which confirmed the absence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of 1,663 dpm/100 cm^2 and a maximum value of 2,376 dpm/100 cm^2. Direct measurements of the exterior showed a mean gross activity level of 1,397 dpm/100 cm^2 and a maximum value of 1,843 dpm/100 cm^2. Based on the classification procedure (DSIP-0020) and levels of activity reported, the area was determined to be a Class 3 area.

HSA Events: None. However, there was a later report of contaminated cameras being stored in the building.

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 randomly determined and 137.8 m^2 were scanned for approximately 10% 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:	F851	Switchyard Control Building - Interior
Survey Unit:	0004	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	1374.25	
Evaluator:	D. Anderson	
DCGL (dpm/100 cm^2)**:**	43,000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGLemc (dpm/100 cm^2)**:**	N/A	Class 3
LBGR (dpm/100 cm^2)**:**	41,974	Adjusted
Design Sigma (dpm/100 cm^2)**:**	342	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m^2)**:**	N/A	Class 3
Scan Area (m^2)**:**	137.8	
Scan Coverage (%):	10%	Class 3
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	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 3
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 14 direct measurements were made in F8510004. 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 2,287 dpm/100 cm^2 to 5,810 dpm/100 cm^2 for interior 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)
F8510004-U0001BD	1,655
F8510004-U0002BD	1,515
F8510004-F0003BD	1,515
F8510004-M0004BD	809
F8510004-I0005BD	1,572
F8510004-I0006BD	1,805
F8510004-I0007BD	1,924
F8510004-C0008BD	1,919
F8510004-C0009BD	1,904
F8510004-C0010BD	1,696
F8510004-C0011BD	2,215
F8510004-C0012BD	2,137
F8510004-C0013BD	1,748
F8510004-C0014BD	1,769
Mean:	1,727
Median:	1,758
Standard Deviation:	338
Range:	809 – 2,215

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8510004U0001SM	-0.27
F8510004U0002SM	3.58
F8510004F0003SM	1.01
F8510004M0004SM	-0.27
F8510004I0005SM	15.11
F8510004I0006SM	4.86
F8510004I0007SM	6.14
F8510004C0008SM	-1.55
F8510004C0009SM	3.58
F8510004C0010SM	6.14
F8510004C0011SM	3.58
F8510004C0012SM	2.29
F8510004C0013SM	1.01
F8510004C00014SM	-1.55
Mean:	3.12
Median:	2.93
Standard Deviation:	4.31
Range:	-1.55 to 15.11

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 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 cm²):	N/A	
Ambient Background Used (dpm/100 cm²):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	14	
Median (dpm/100 cm²):	1,758	
Mean (dpm/100 cm²):	1,727	
Direct Measurement Standard Deviation (dpm/100 cm²):	338	
Total Standard Deviation (dpm/100 cm²):	338	Based on samples and backgrounds.
Maximum (dpm/100 cm²):	2,215	
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 < DCGLemc:	N/A	Class 3
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 3 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 3 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 cm^2 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 F8510004 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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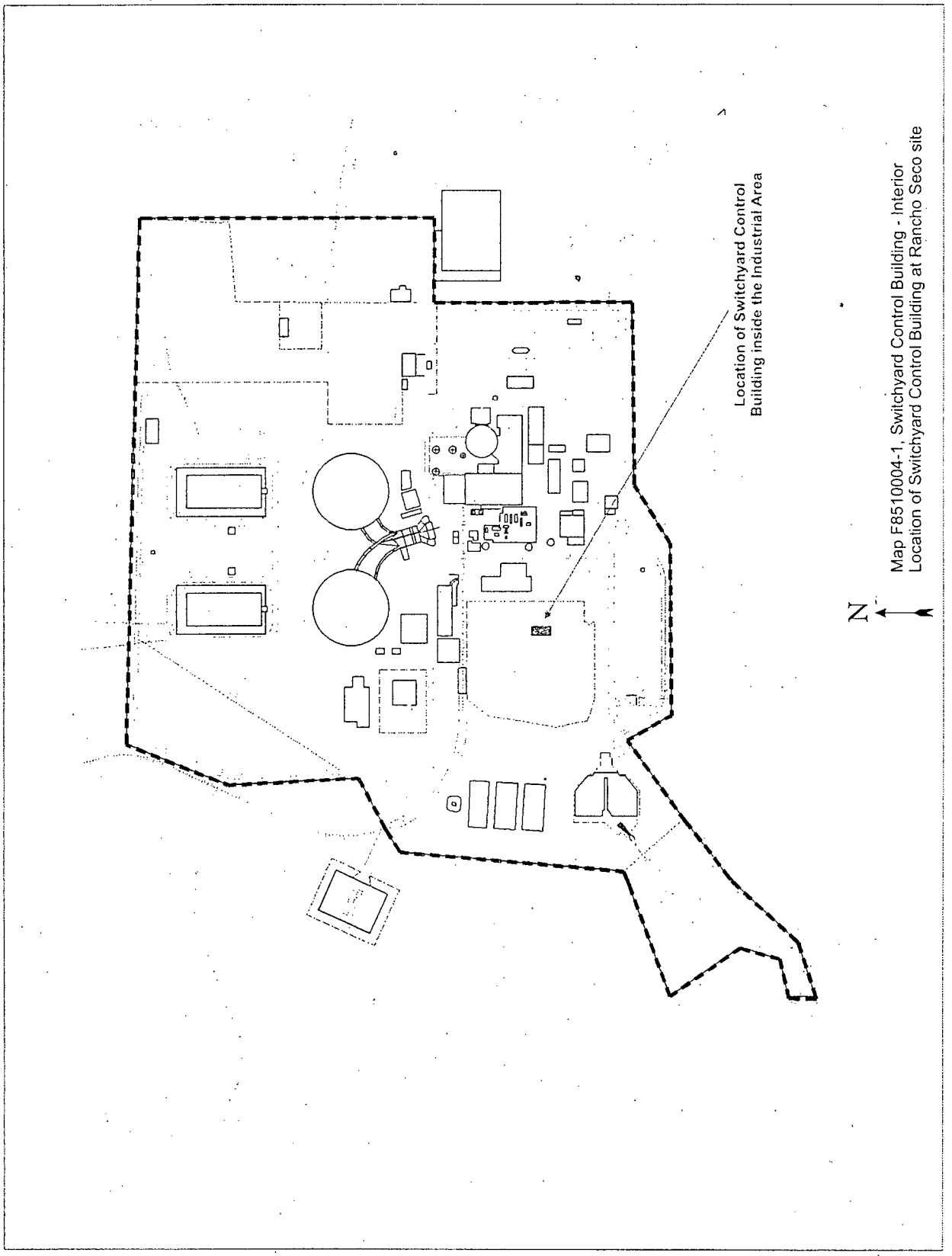
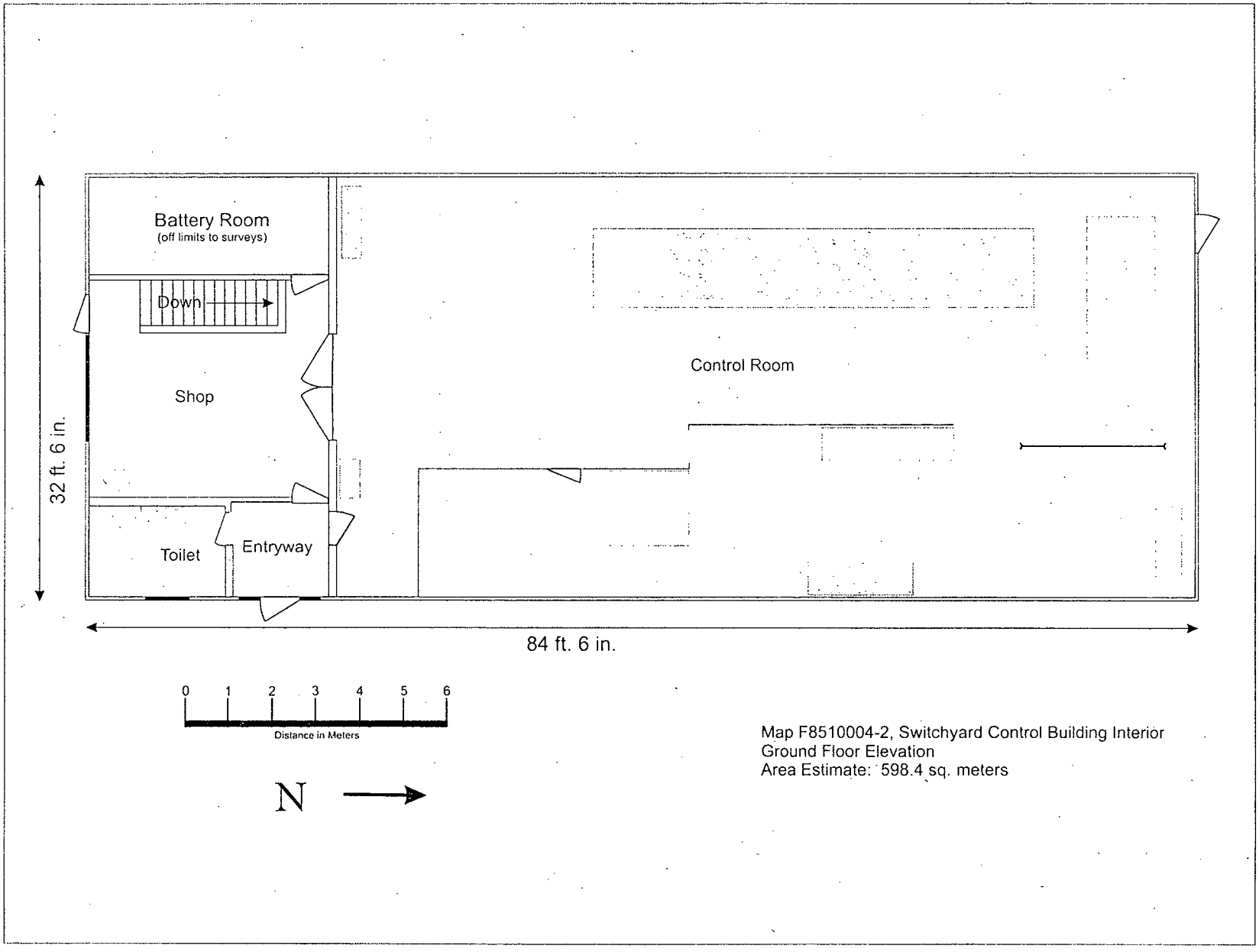
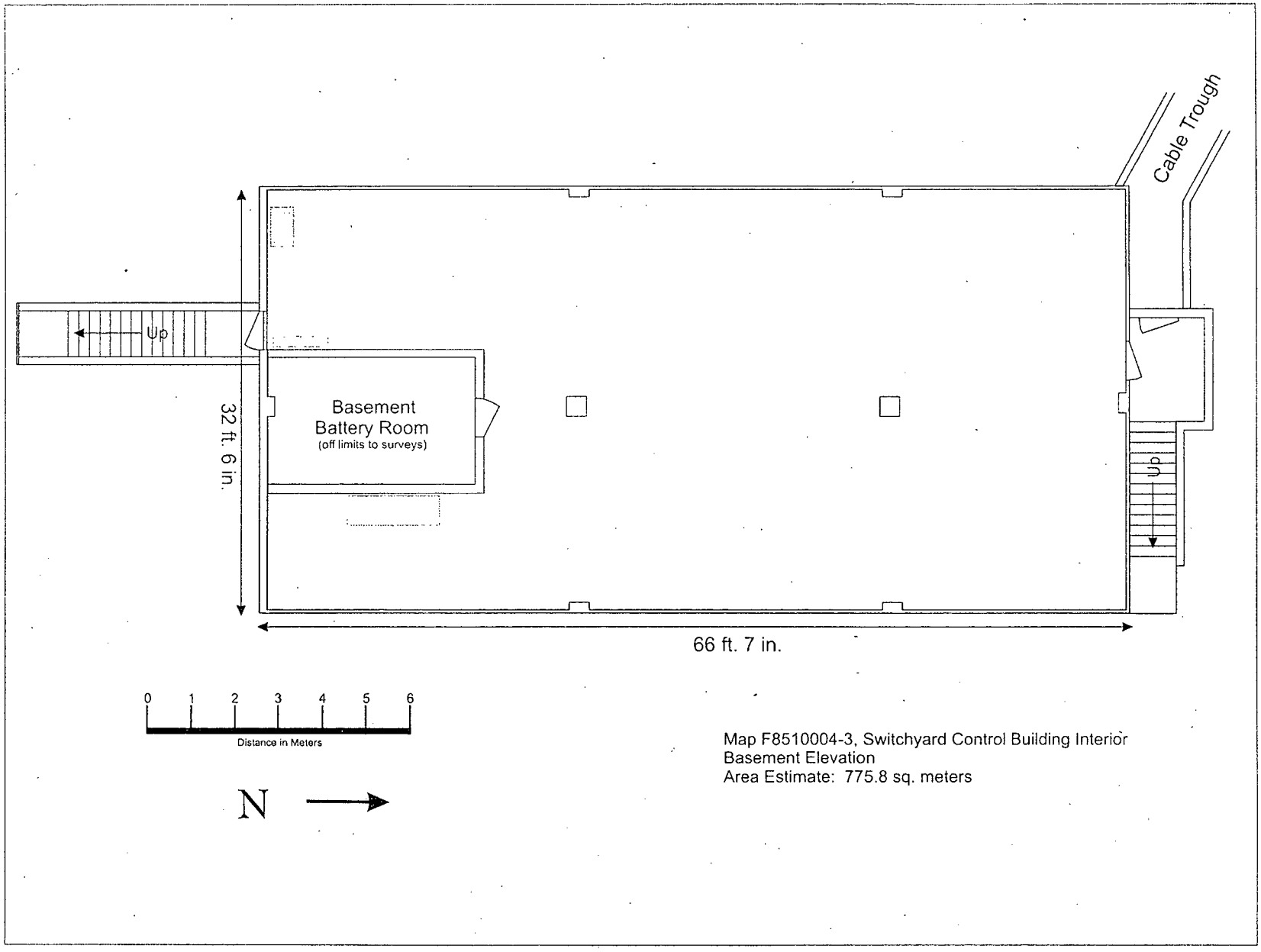
Survey Unit F8510004

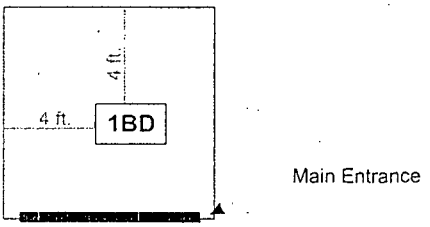

Location of Switchyard Control
Building inside the Industrial Area
N
Map F85100004-1, Switchyard Control Building - Interior
Location of Switchyard Control Building at Rancho Seco site



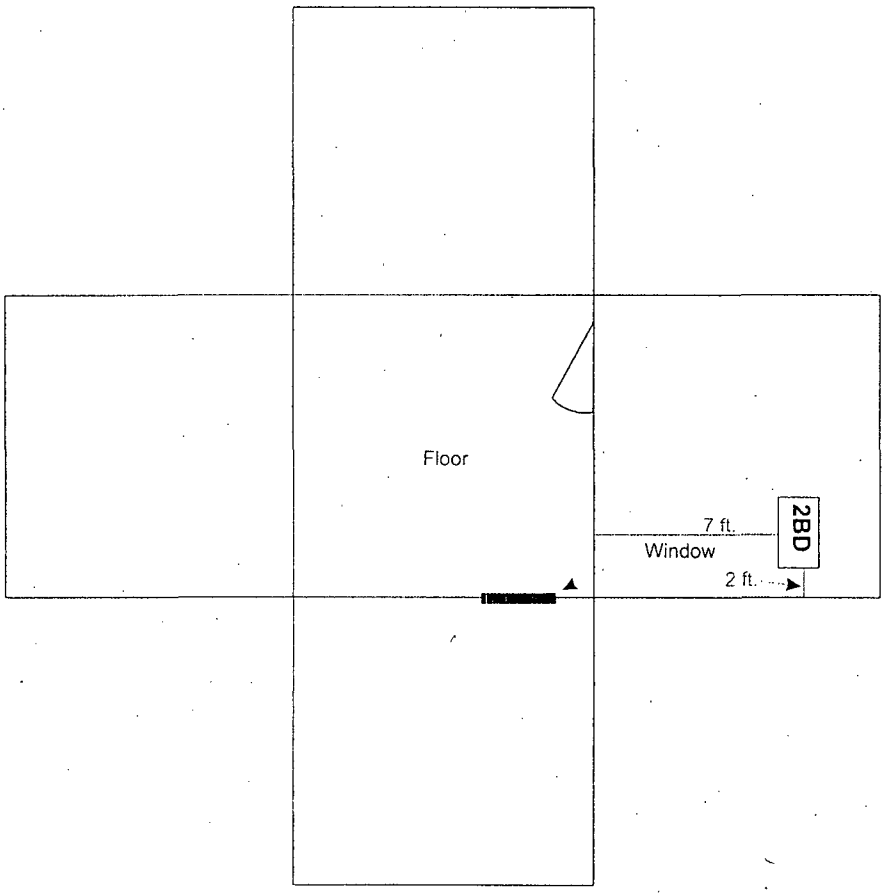
Map F8510004-2, Switchyard Control Building Interior
Ground Floor Elevation
Area Estimate: 598.4 sq. meters



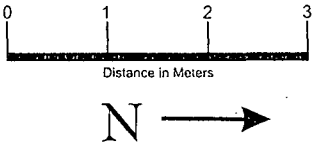
Map F8510004-3, Switchyard Control Building Interior
Basement Elevation
Area Estimate: 775.8 sq. meters



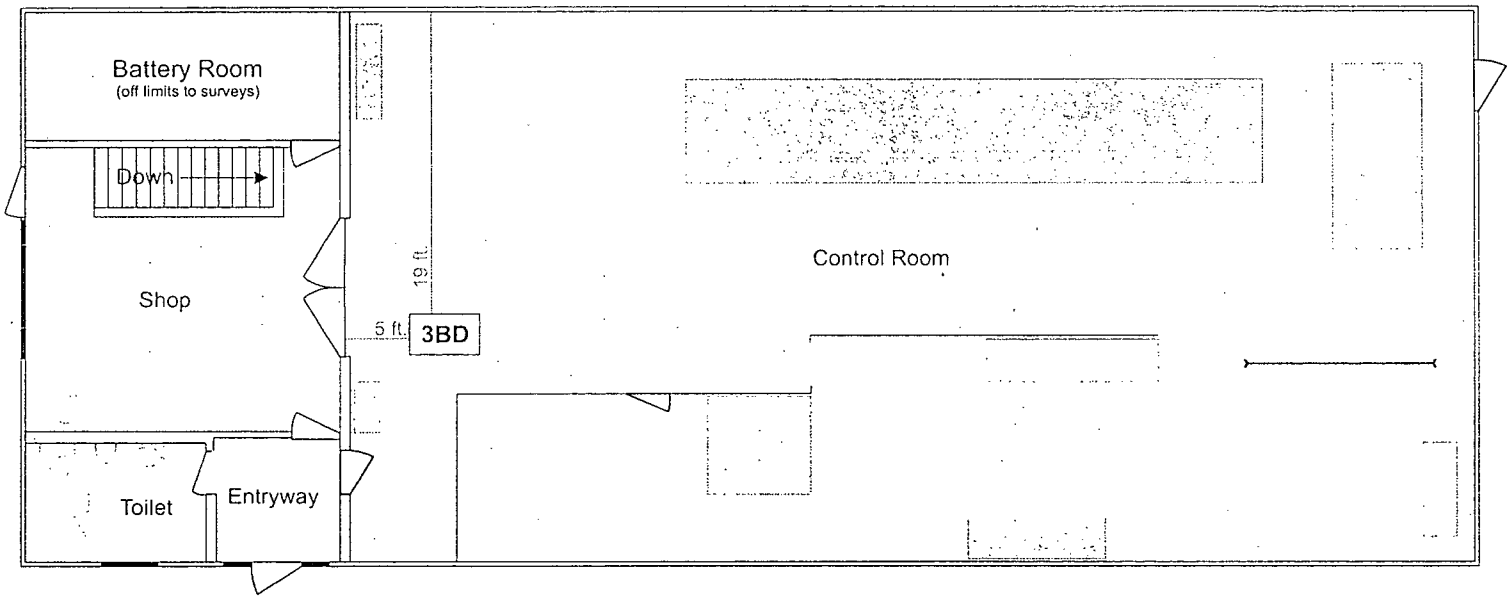
Entryway Interior Ceiling, Ground Floor El.

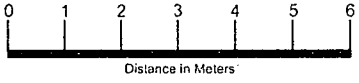


Toilet, Floors and Walls, Ground Floor El.



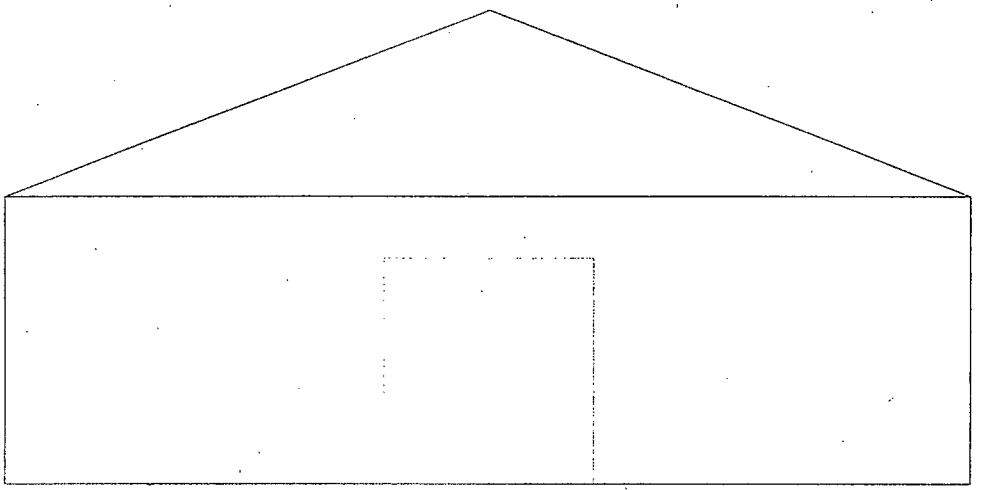
Map F8510004-4, Switchyard Control Building Interior Ground Floor Elevation Beta Direct Measurements F8510004U0001BD to F8510004U0002BD





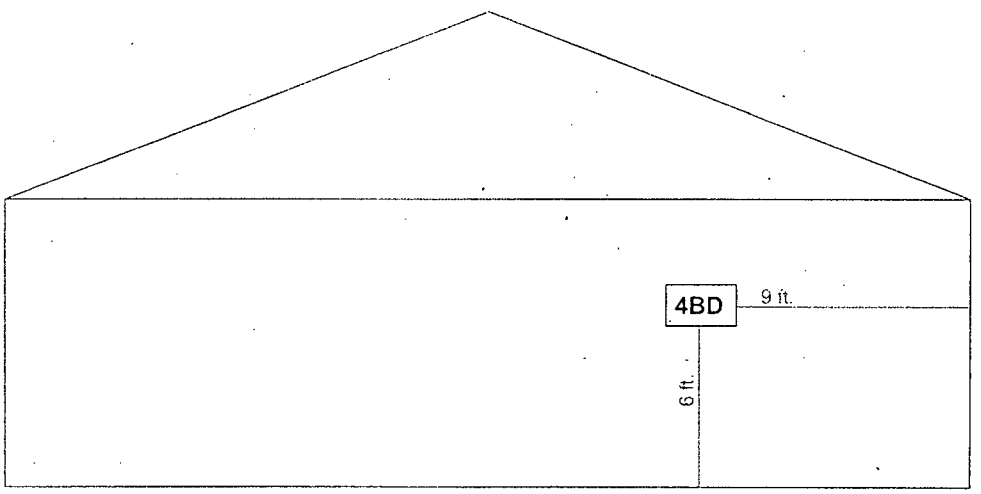
N

Map F8510004-5, Switchyard Control Building Interior
Ground Floor Elevation Beta Direct Measurement
F8510004F0003BD



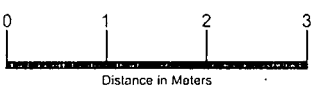
Control Room, South Interior Wall

E ←

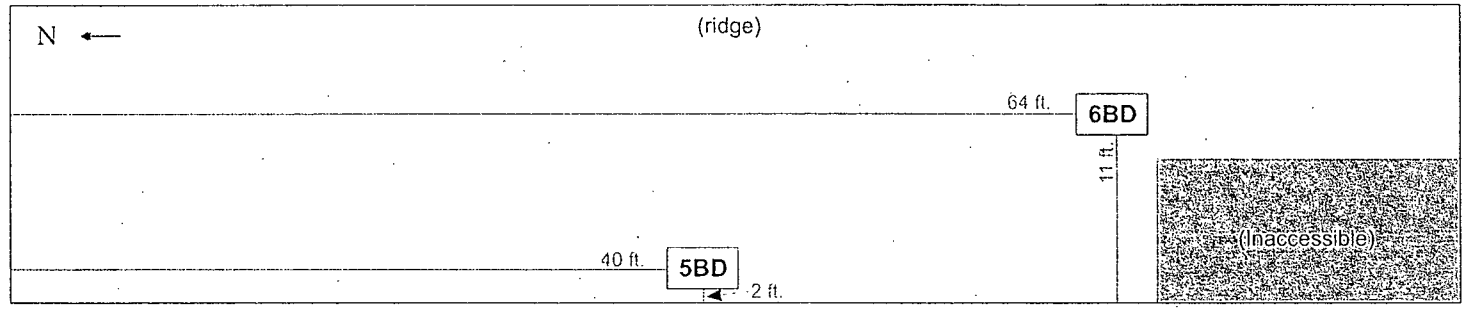


Control Room, North Interior Wall

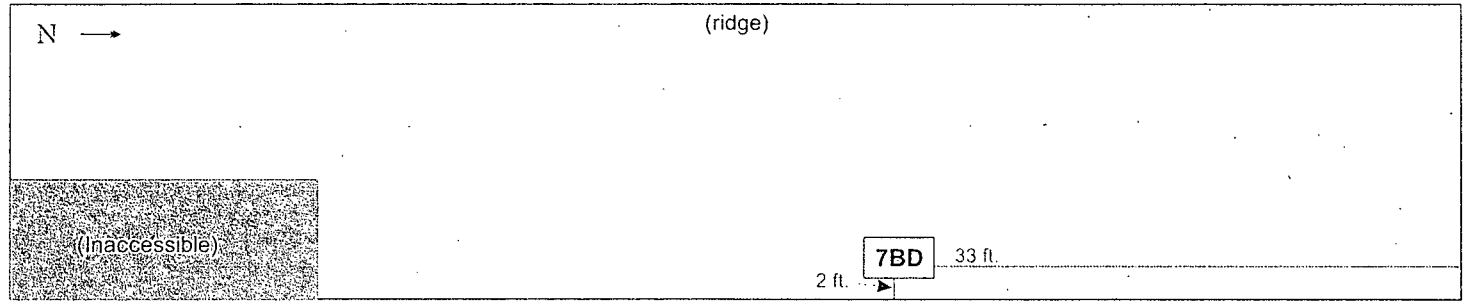
E →



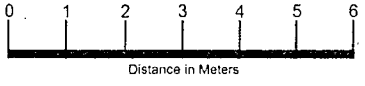
Map F8510004-6, Switchyard Control Building Interior Ground Floor Elevation Beta Direct Measurements F8510004M0004BD



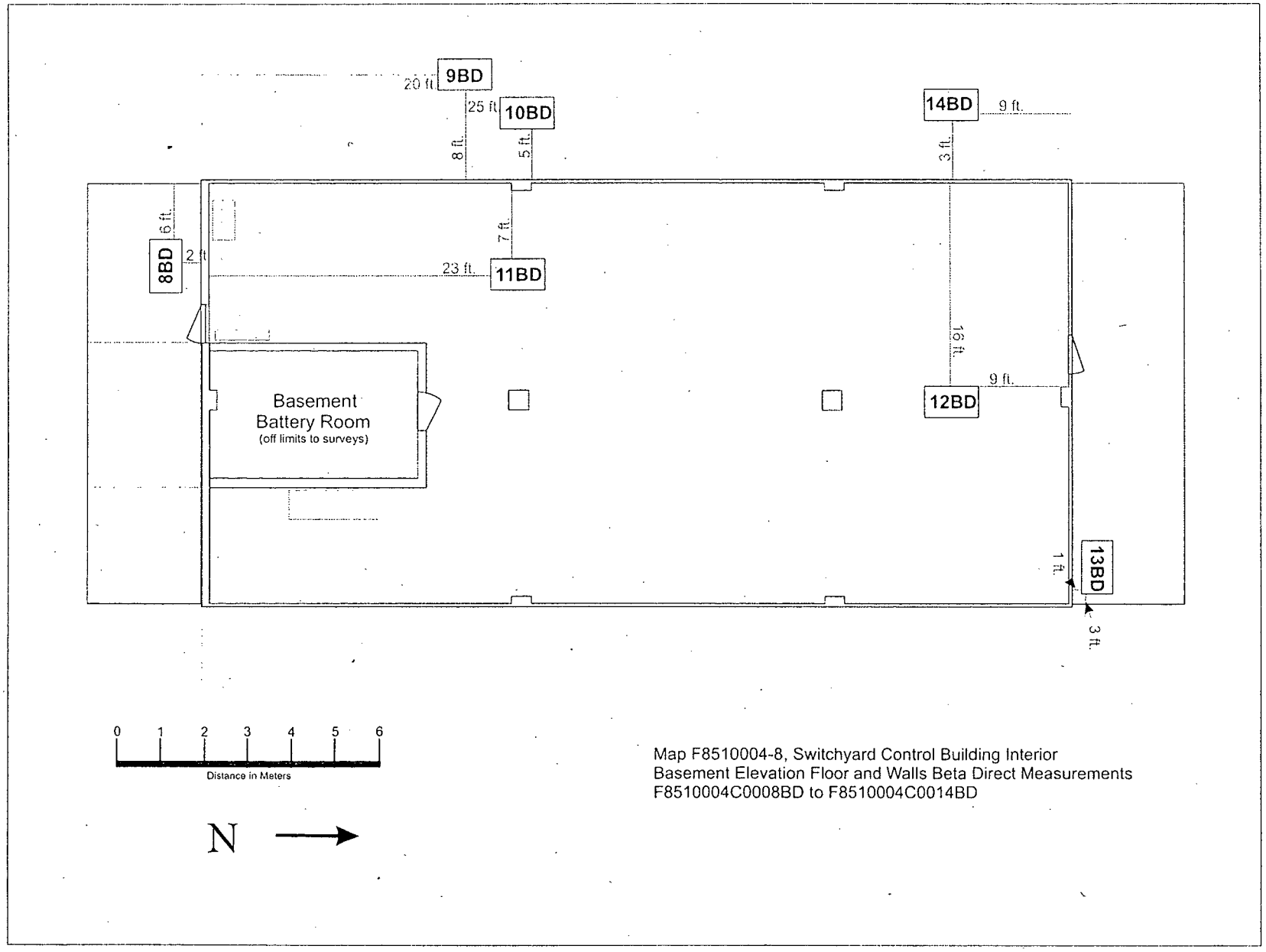
West Interior Ceiling, Ground Floor El.



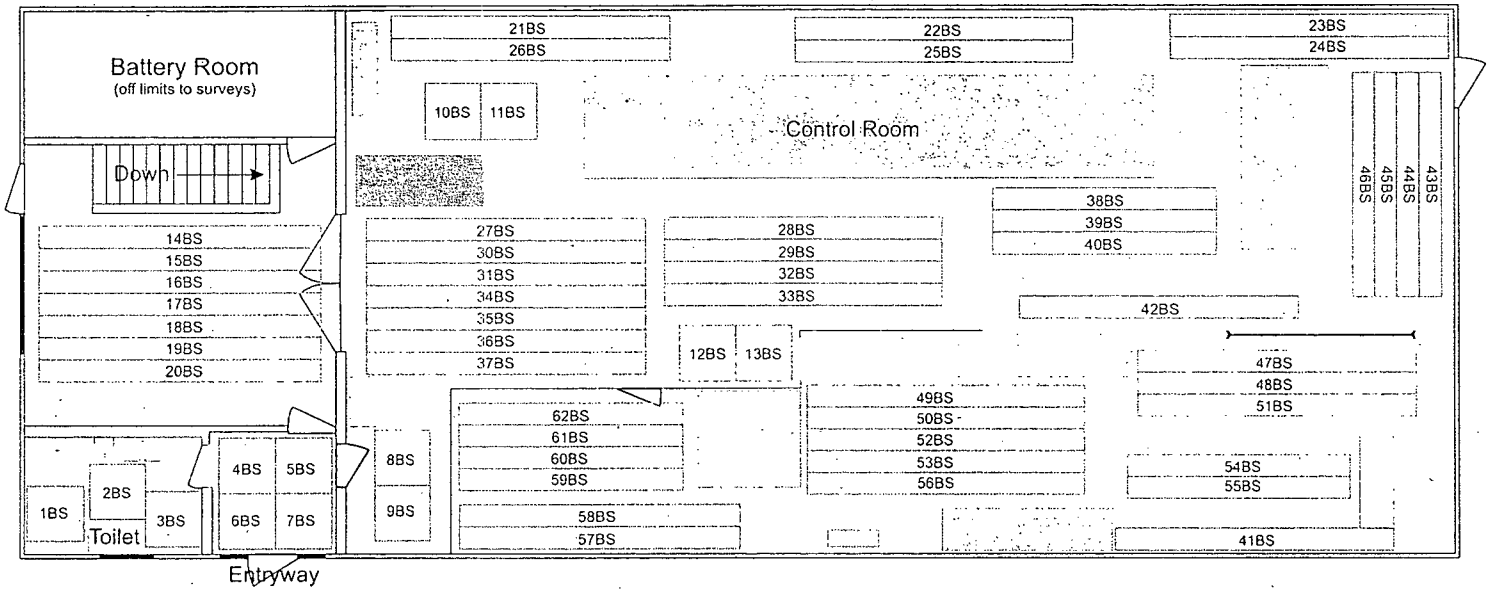
East Interior Ceiling, Ground Floor El.



Map F8510004-7, Switchyard Control Building Interior Ground Floor Elevation, Ceiling Beta Direct Measurements F8510004I0005BD to F8510004I0007BD



Map F8510004-8, Switchyard Control Building Interior
Basement Elevation Floor and Walls Beta Direct Measurements
F8510004C0008BD to F8510004C0014BD

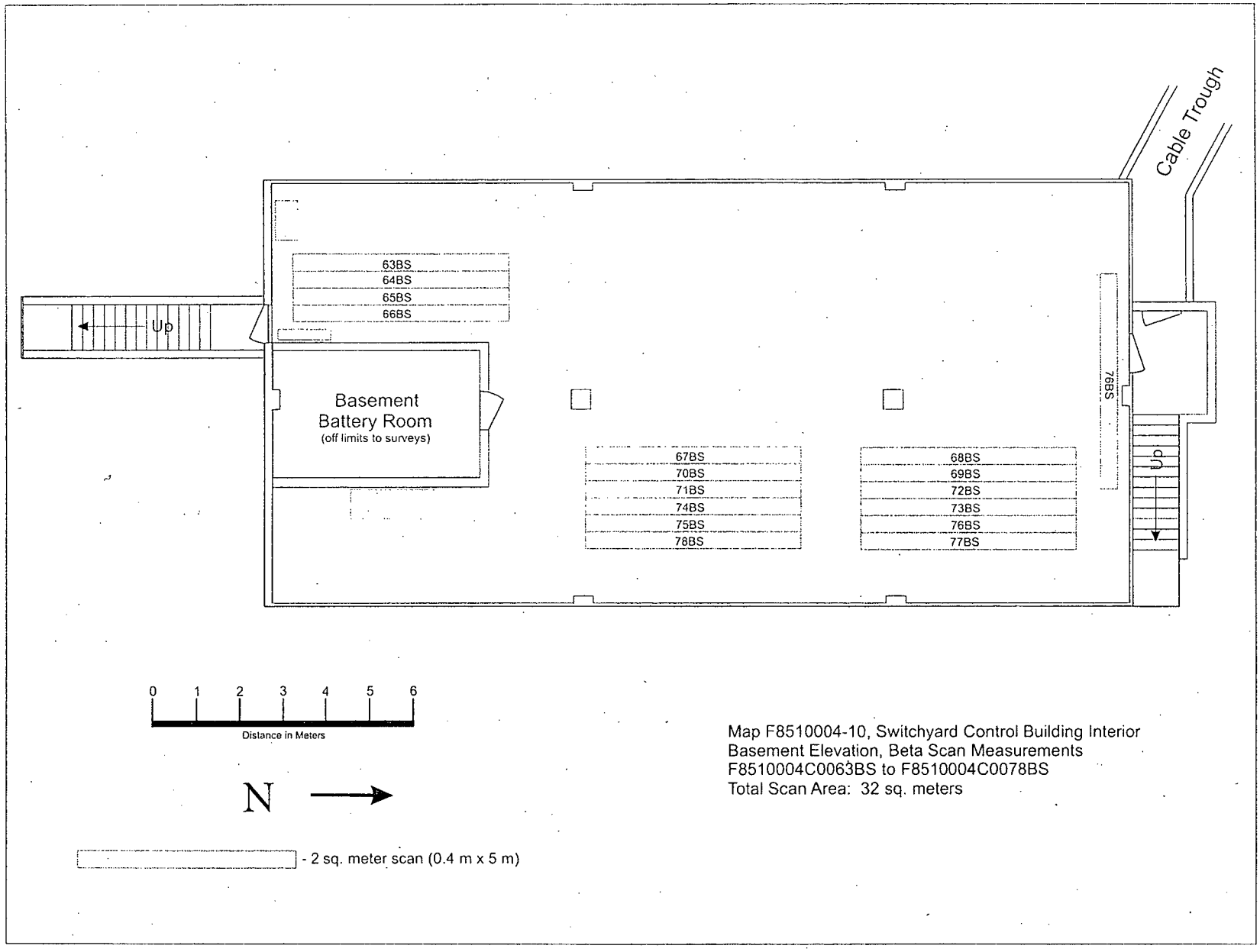


- 1 sq. meter scan (1 m x 1 m)

- 1.6 sq. meter scan (0.4 m x 4 m)

- 2 sq. meter scan (0.4 m x 5 m)

Map F8510004-9, Switchyard Control Building Interior
Ground Floor Elevation, Beta Scan Measurements
F8510004F0001BS to F8510004F0013BS,
F8510004C0014BS to F8510004C0020BS, and
F8510004F0021BS to F8510004F0062BS
Total Scan Area: 105.8 sq. meters



Map F8510004-10, Switchyard Control Building Interior
Basement Elevation, Beta Scan Measurements
F8510004C0063BS to F8510004C0078BS
Total Scan Area: 32 sq. meters

Attachment 2

Instrumentation

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Survey Unit F8510004

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; 189089	43-68B; 148460[1]	433	1,033
M2350; 189089	43-68B; 148460[2]	257	612
M2350; 142499	43-37; 148502	198	616
Tennelec; 0401171	N/A	5 dpm α, 11 dpm β	N/A

[1]43-68B Concrete surfaces
[2]43-68B Metal surfaces

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	21,500
Investigation Criteria – Scan	21,500
$DCGL_W$	43,000
$DCGL_{EMC}$	N/A

Attachment 3

Investigation

October 24, 2007

Survey Unit F8510004

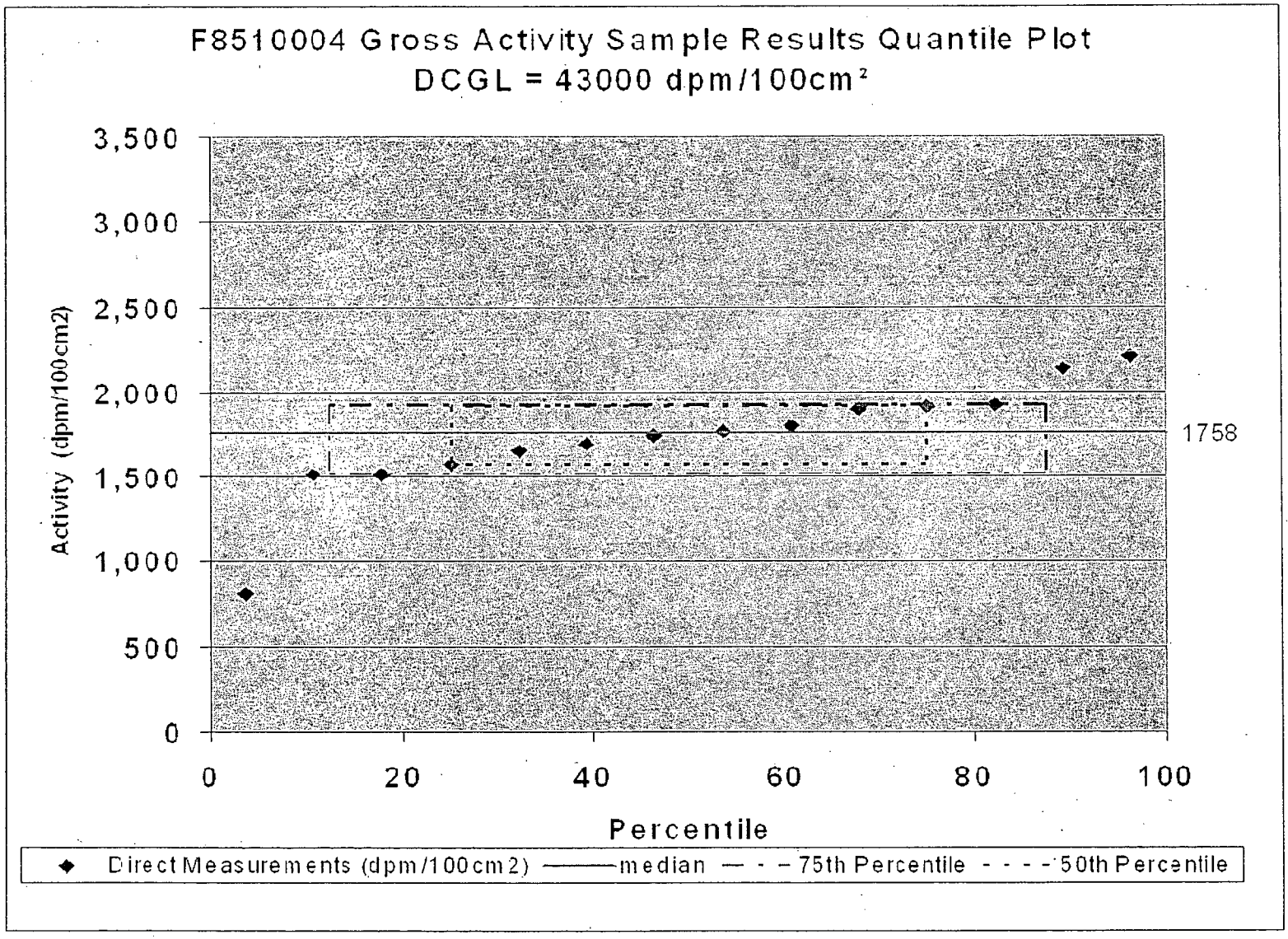
(none required)

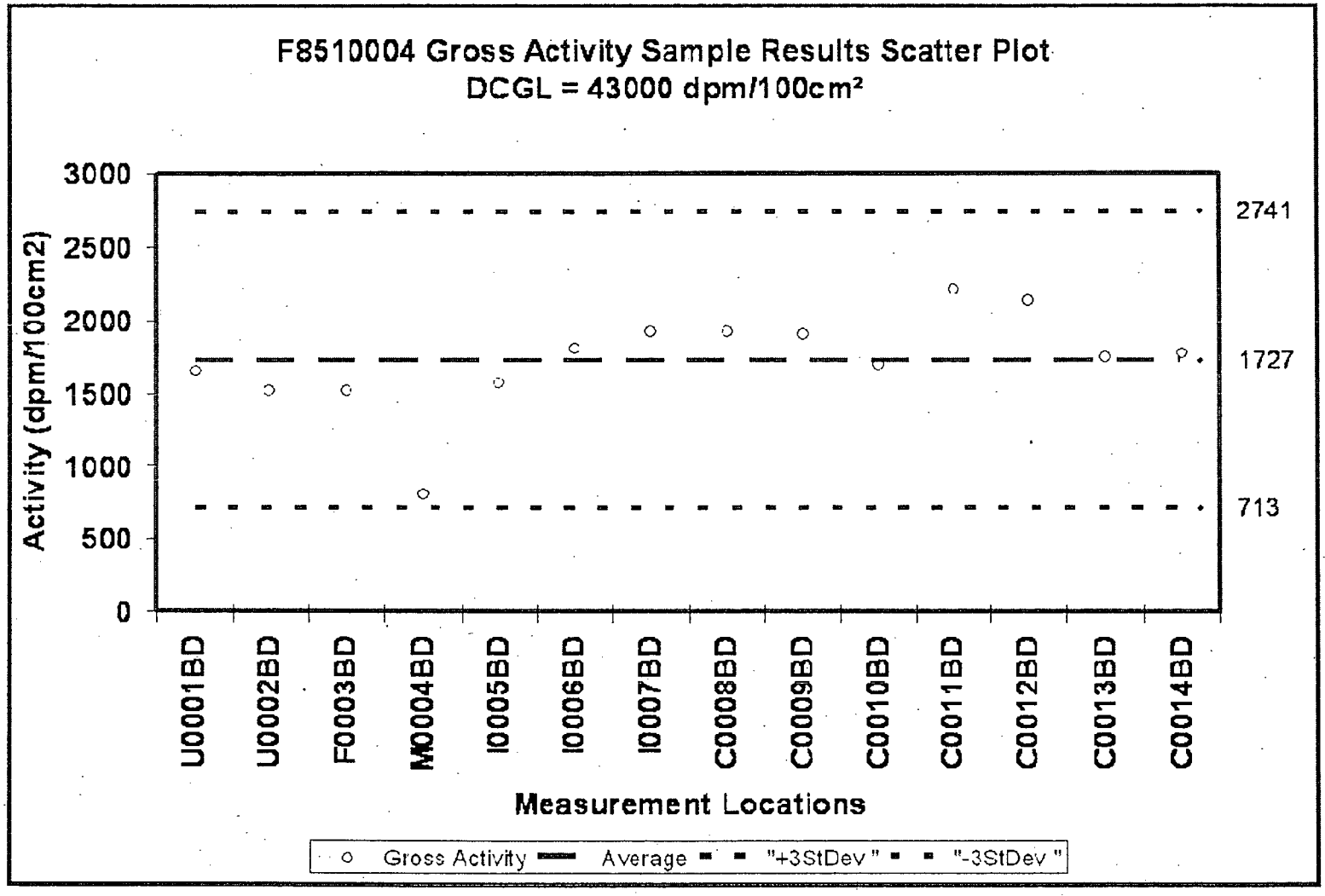
Attachment 4

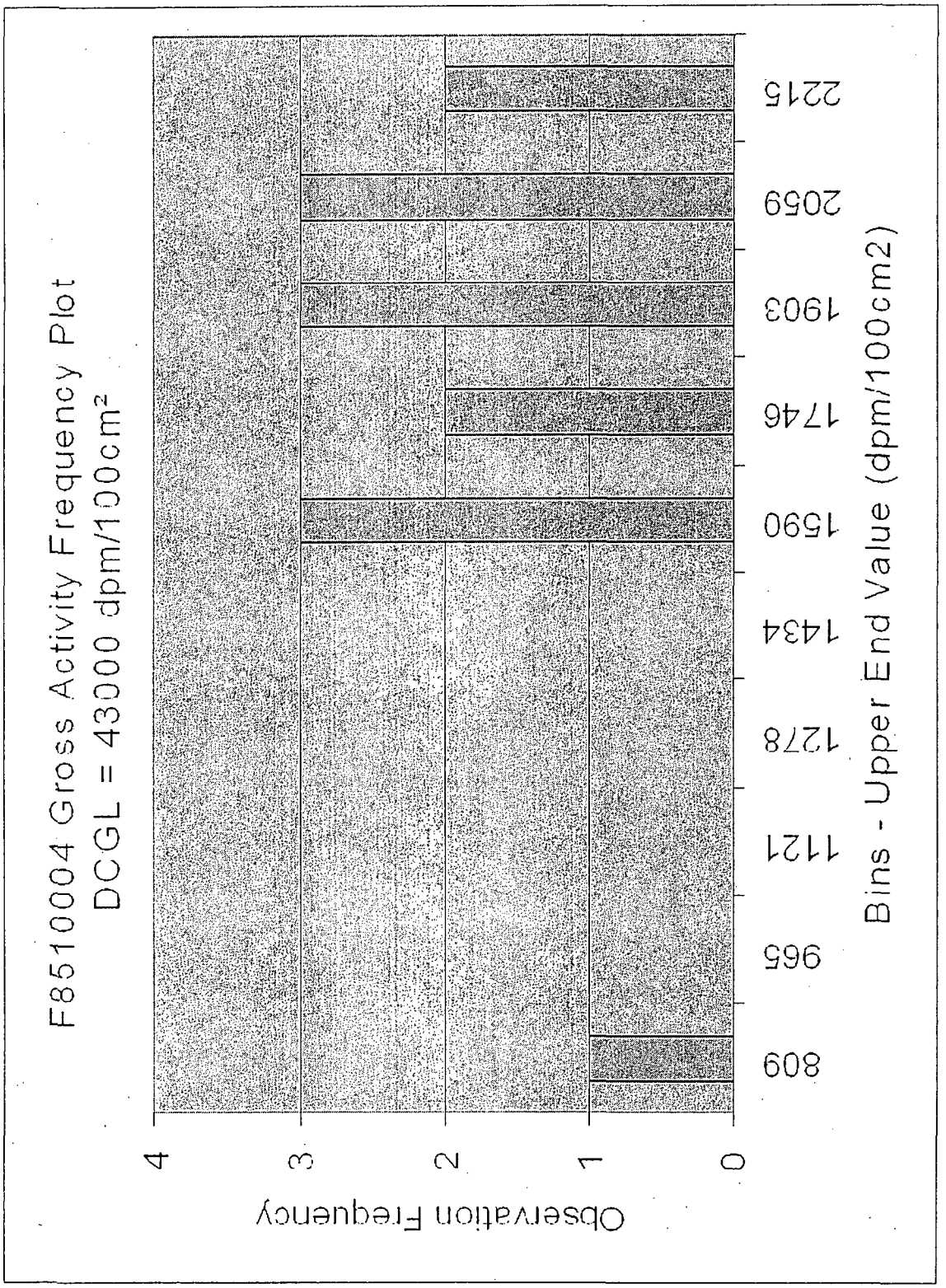
Data Assessment

October 24, 2007

Survey Unit F8510004


F8510004 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1758
0
20
40
60
80
100
Percentile
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8510004 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
3000
2500
2000
1500
1000
500
0
2741
1727
713
U0001BD
U0002BD
F0003BD
M0004BD
I0005BD
I0006BD
I0007BD
C0008BD
C0009BD
C0010BD
C0011BD
C0012BD
C0013BD
C0014BD
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8510004 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
1
2
3
4
809
965
1121
1278
1434
1590
1746
1903
2059
2215
Bins - Upper End Value (dpm/100cm2)