Rancho Seco

Final Status Survey Summary Report

October 31, 2007

Switchyard Control Building - Exterior

Survey Unit F8510003

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

FSS Engineer

Reviewed By: [signature] Date: 11/2/07

Lead FSS Engineer

Approved By: [signature] Date: 11-12-07

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8510003, Switchyard Control Building - Exterior

Survey Unit Description:

Operating History: 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 45 m^2 were scanned for approximately 8% 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 - Exterior
Survey Unit:	0003	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	542.7	
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)**:**	42,412	Adjusted
Design Sigma (dpm/100 cm^2)**:**	196	
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)**:**	45	
Scan Coverage (%):	8%	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 F8510003. 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 1,892 dpm/100 cm^2 to 6,140 dpm/100 cm^2 for exterior 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)
F8510003-M0001BD	1,018
F8510003-M0002BD	920
F8510003-M0003BD	978
F8510003-M0004BD	981
F8510003-M0005BD	941
F8510003-M0006BD	1,178
F8510003-M0007BD	1,104
F8510003-M0008BD	907
F8510003-M0009BD	864
F8510003-M0010BD	834
F8510003-M0011BD	880
F8510003-M0012BD	760
F8510003-M0013BD	787
F8510003-M0014BD	831
Mean:	927
Median:	914
Standard Deviation:	118
Range:	760 – 1,178

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8510003M0001SM	3.58
F8510003M0002SM	1.01
F8510003M0003SM	6.14
F8510003M0004SM	2.29
F8510003M0005SM	1.01
F8510003M0006SM	8.7
F8510003M0007SM	4.86
F8510003M0008SM	-0.27
F8510003M0009SM	2.29
F8510003M0010SM	2.29
F8510003M0011SM	2.29
F8510003M0012SM	1.01
F8510003M0013SM	2.29
F8510003M0014SM	-2.83
Mean:	2.48
Median:	2.29
Standard Deviation:	2.79
Range:	-2.83 to 8.7

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):	914	
Mean (dpm/100 cm²):	927	
Direct Measurement Standard Deviation (dpm/100 cm²):	118	
Total Standard Deviation (dpm/100 cm²):	118	Based on samples and backgrounds.
Maximum (dpm/100 cm²):	1,178	
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 43,000 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 F8510003 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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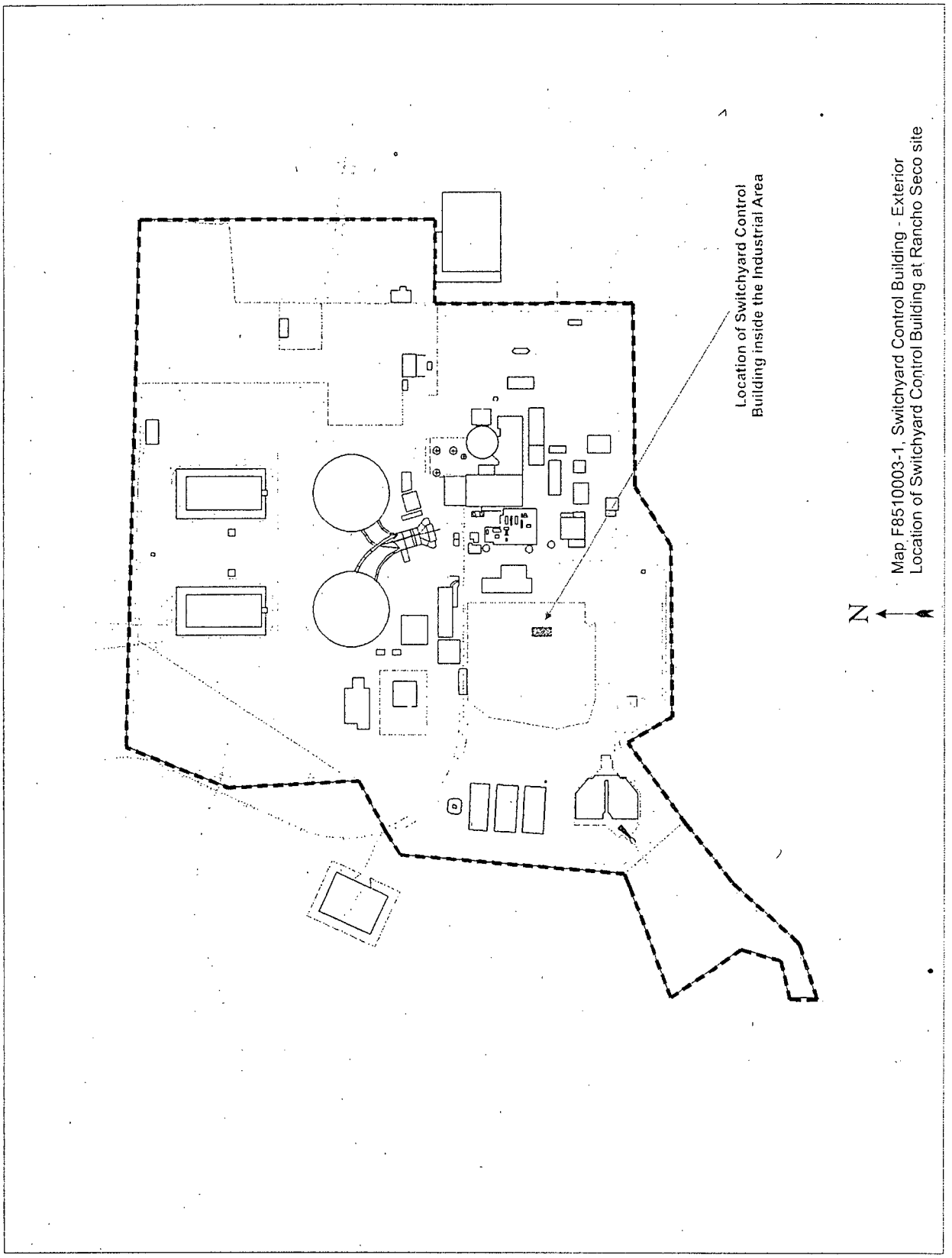
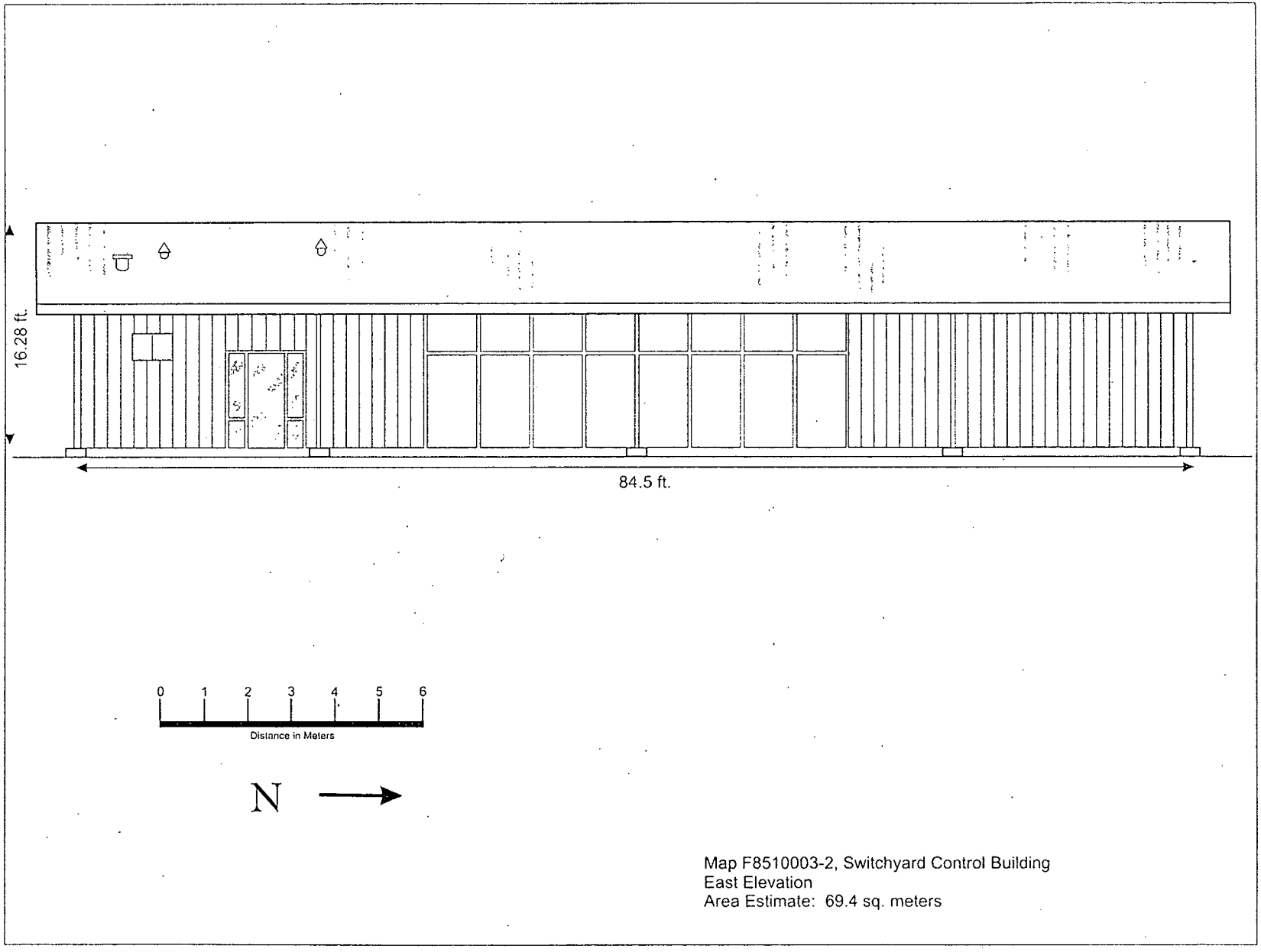
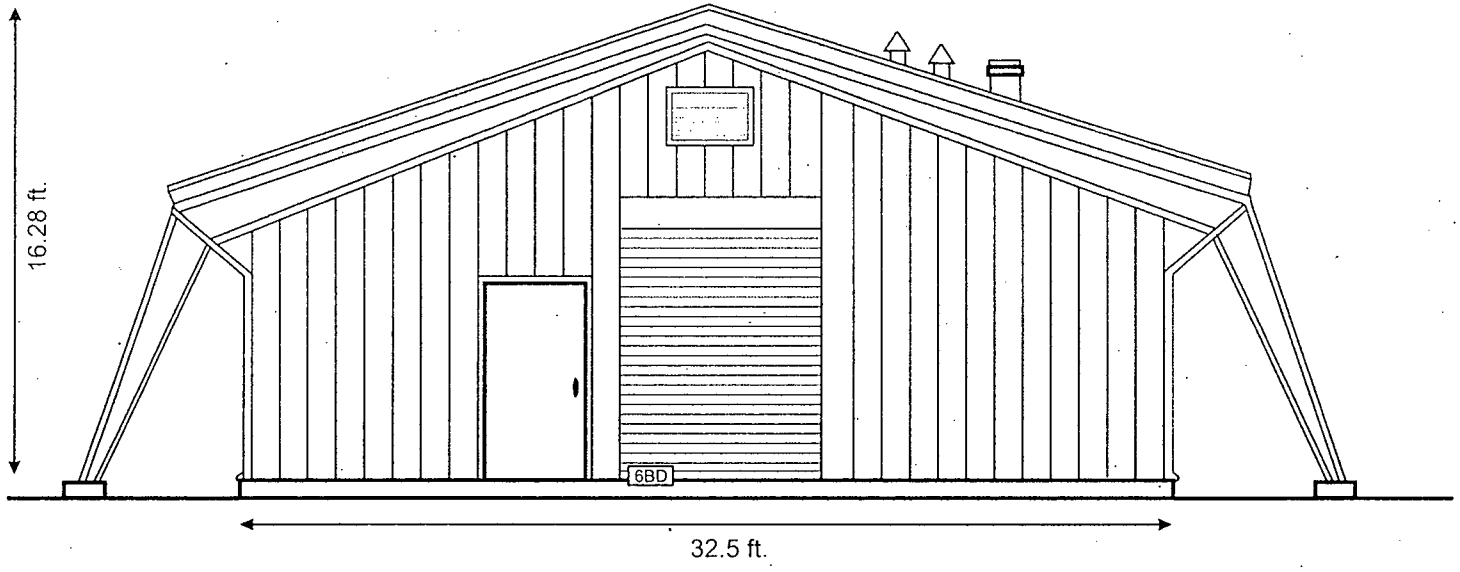
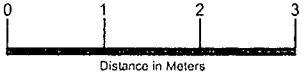
Survey Unit F8510003


Location of Switchyard Control
Building inside the Industrial Area
N
Map F8510003-1, Switchyard Control Building - Exterior
Location of Switchyard Control Building at Rancho Seco site



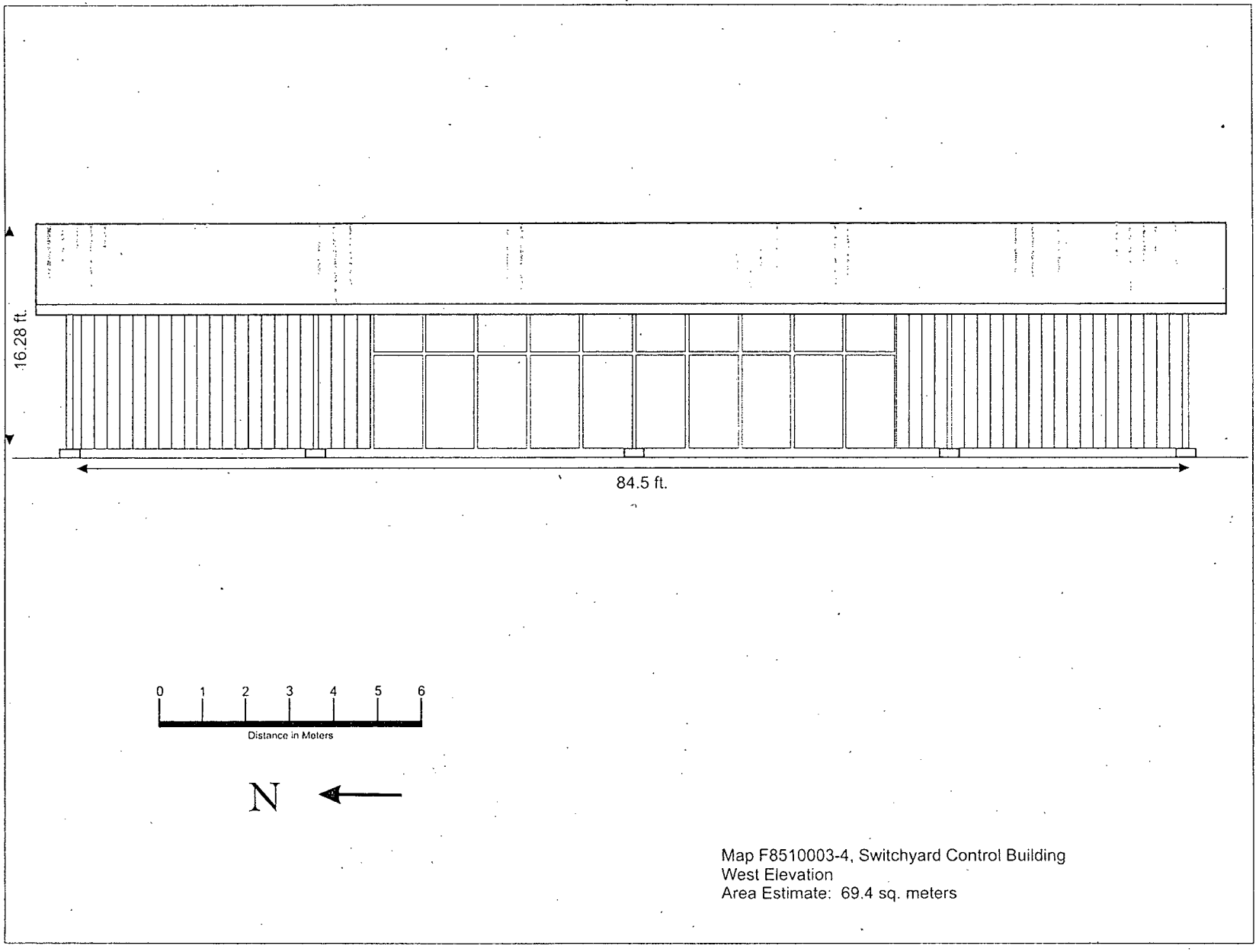
Map F8510003-2, Switchyard Control Building
East Elevation
Area Estimate: 69.4 sq. meters



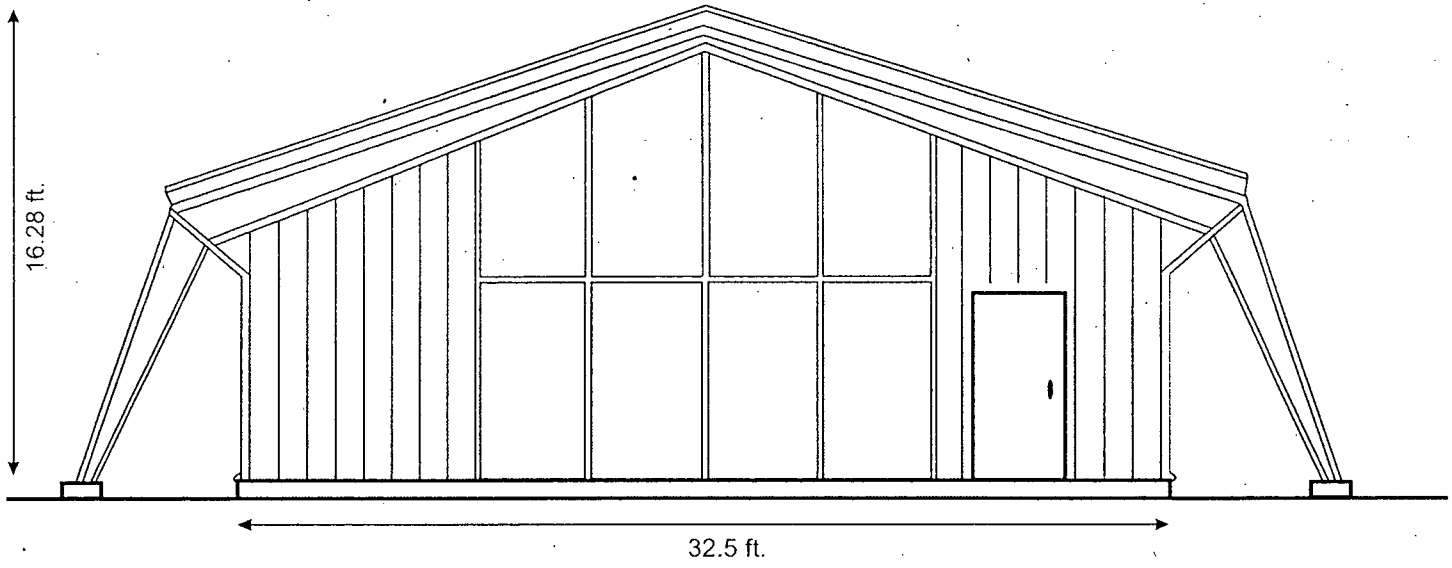


E

Map F8510003-3, Switchyard Control Building
South Elevation
Area Estimate: 37.95 sq. meters

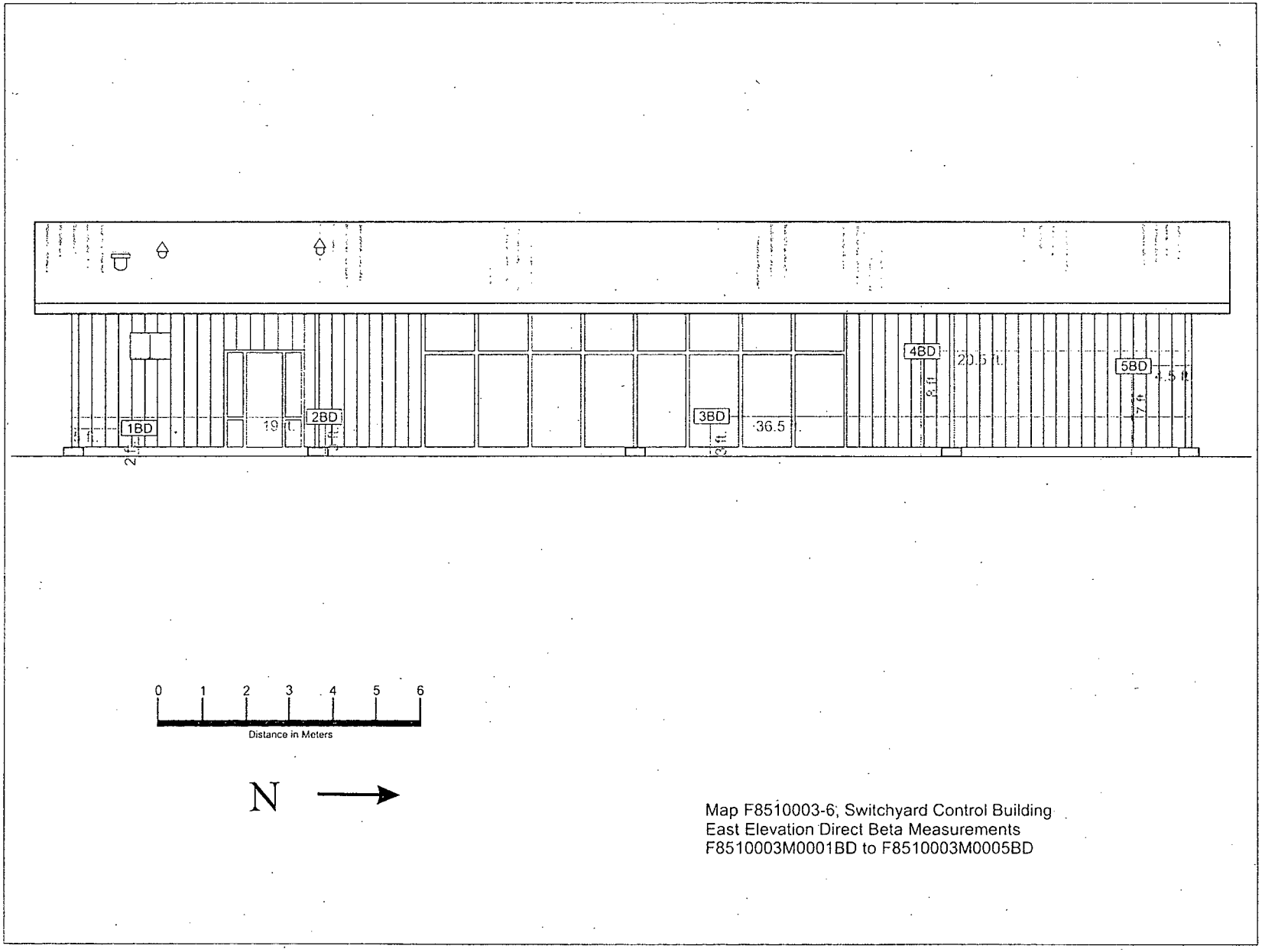


Map F8510003-4, Switchyard Control Building
West Elevation
Area Estimate: 69.4 sq. meters

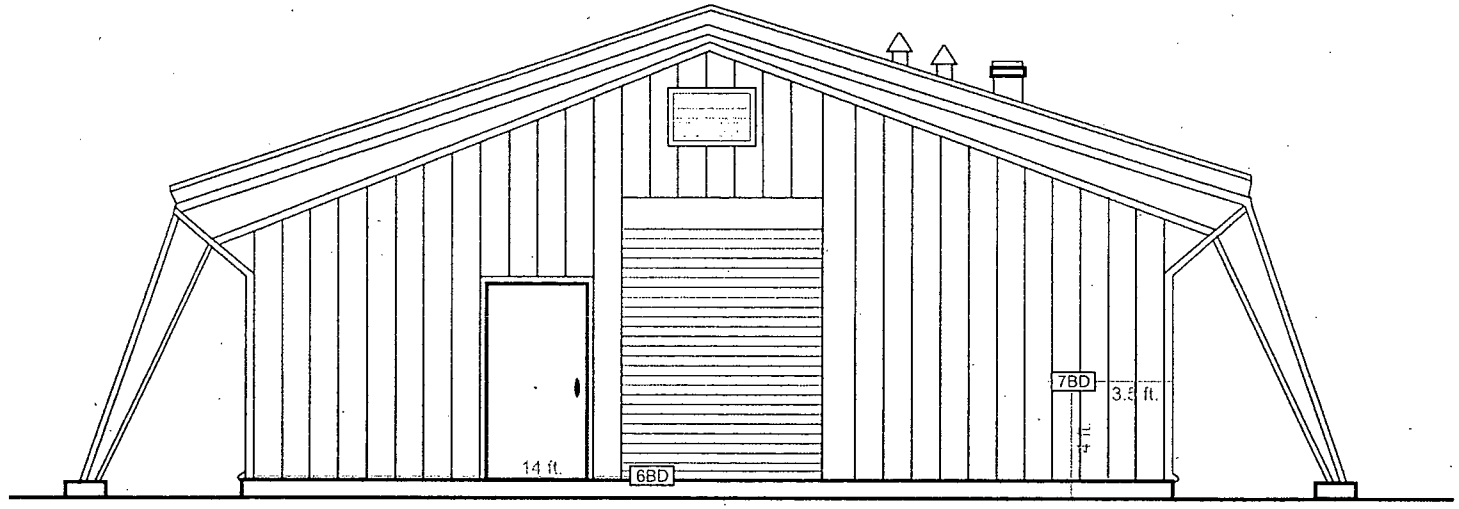


E

Map F8510003-5, Switchyard Control Building
North Elevation
Area Estimate: 37.95 sq. meters.

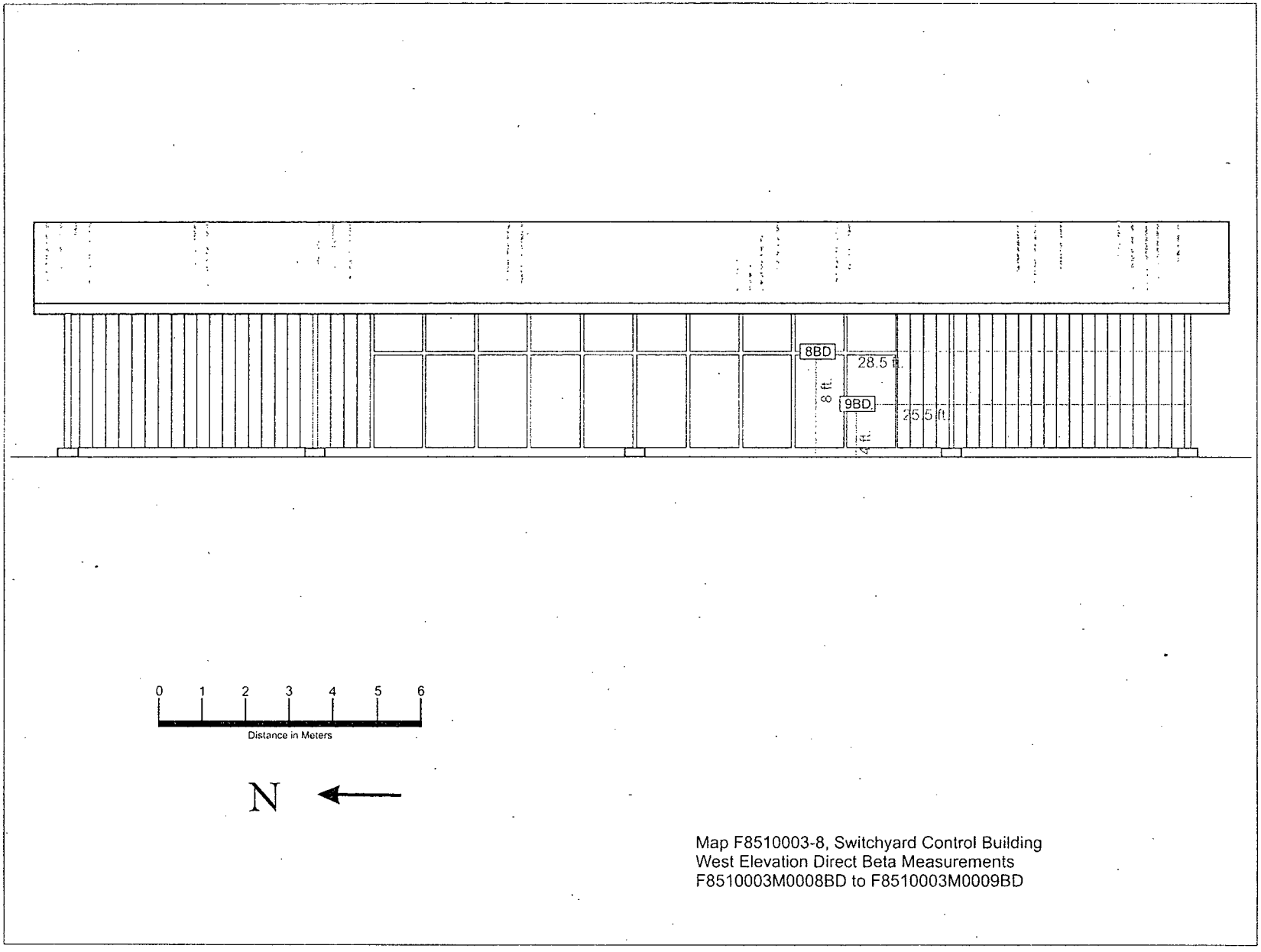


Map F8510003-6; Switchyard Control Building
East Elevation Direct Beta Measurements
F8510003M0001BD to F8510003M0005BD

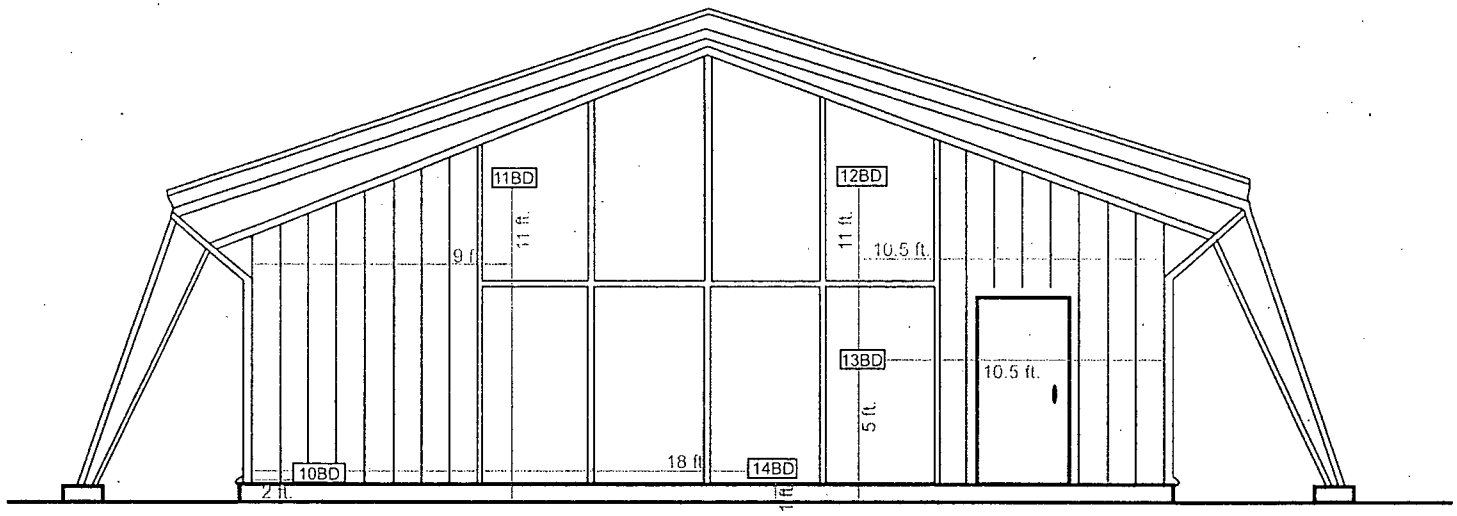


E →

Map F8510003-7, Switchyard Control Building
South Elevation Direct Beta Measurements
F8510003M0006BD to F8510003M0007BD

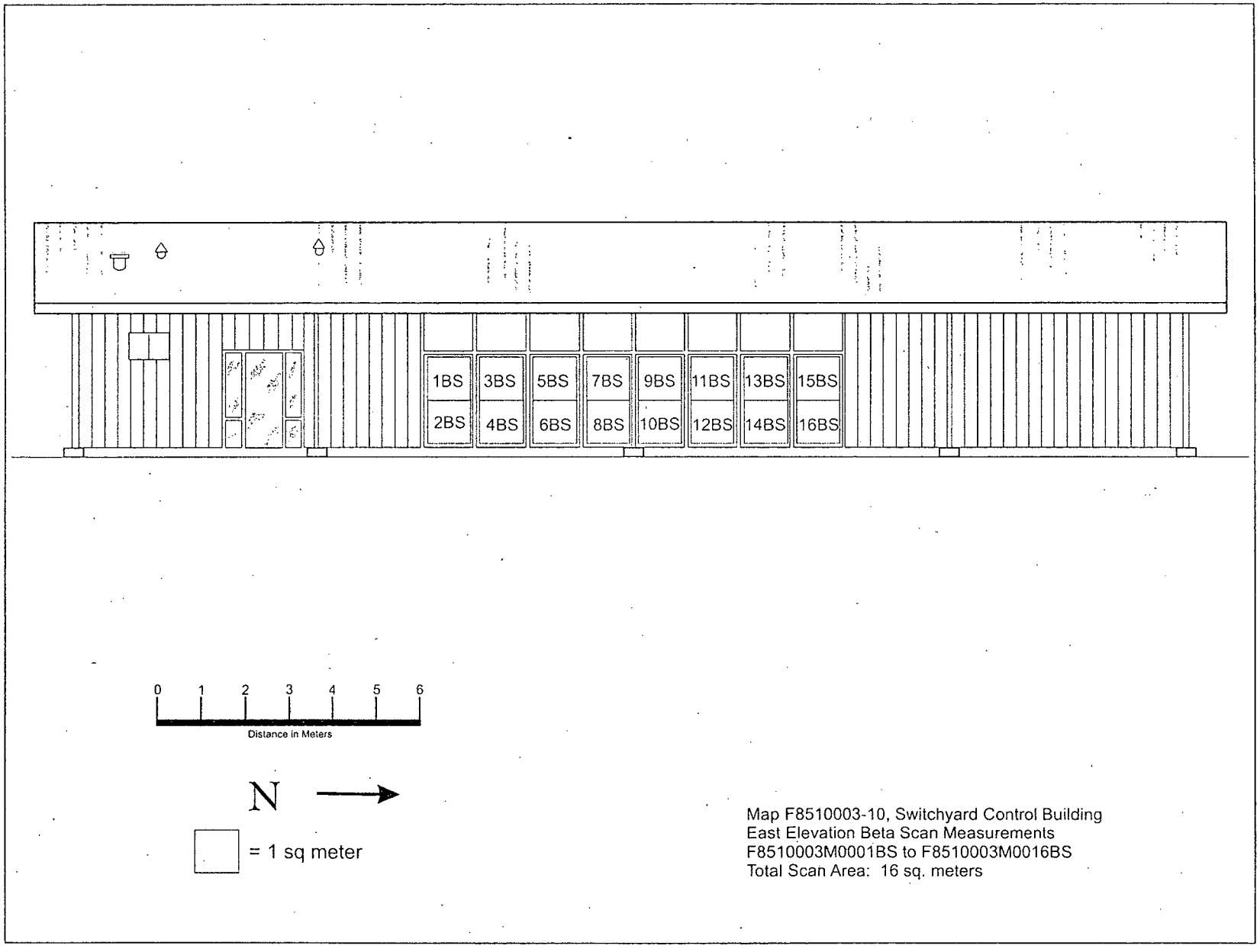


Map F8510003-8, Switchyard Control Building
West Elevation Direct Beta Measurements
F8510003M0008BD to F8510003M0009BD

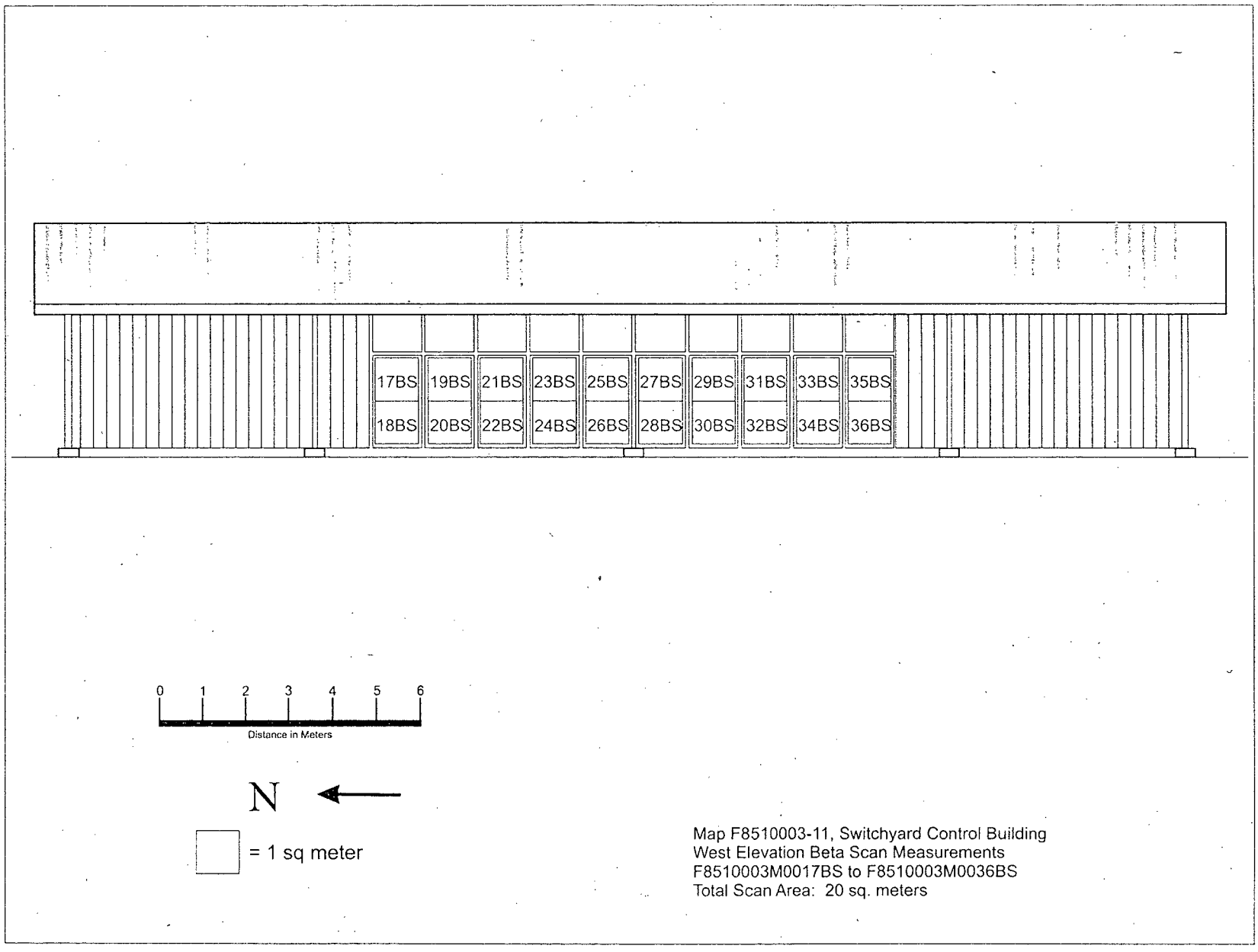


E

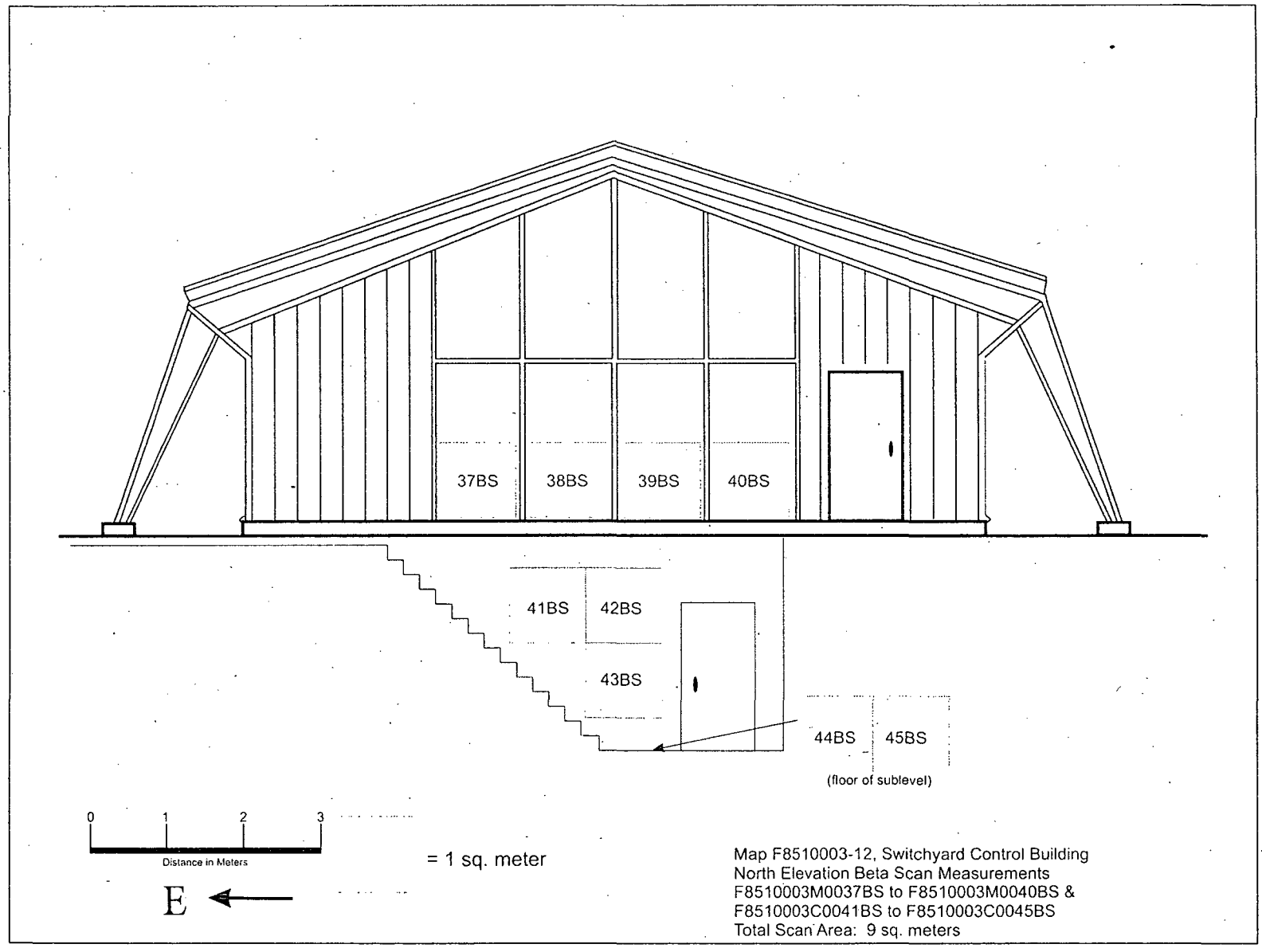
Map F8510003-9, Switchyard Control Building
North Elevation Direct Beta Measurements
F8510003M0010BD to F8510003M0014BD



Map F8510003-10, Switchyard Control Building
East Elevation Beta Scan Measurements
F8510003M0001BS to F8510003M0016BS
Total Scan Area: 16 sq. meters



Map F8510003-11, Switchyard Control Building
West Elevation Beta Scan Measurements
F8510003M0017BS to F8510003M0036BS
Total Scan Area: 20 sq. meters


37BS
38BS
39BS
40BS
41BS
42BS
43BS
44BS
45BS
(floor of sublevel)
0
1
2
3
Distance in Meters
= 1 sq. meter
E
Map F8510003-12, Switchyard Control Building
North Elevation Beta Scan Measurements
F8510003M0037BS to F8510003M0040BS &
F8510003C0041BS to F8510003C0045BS
Total Scan Area: 9 sq. meters

Attachment 2

Instrumentation

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Survey Unit F8510003

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
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 cm^2)
Investigation Criteria - Direct	21,500
Investigation Criteria – Scan	21,500
$DCGL_W$	43,000
$DCGL_{EMC}$	N/A

Attachment 3

Investigation

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Survey Unit F8510003

(none required)

Attachment 4

Data Assessment

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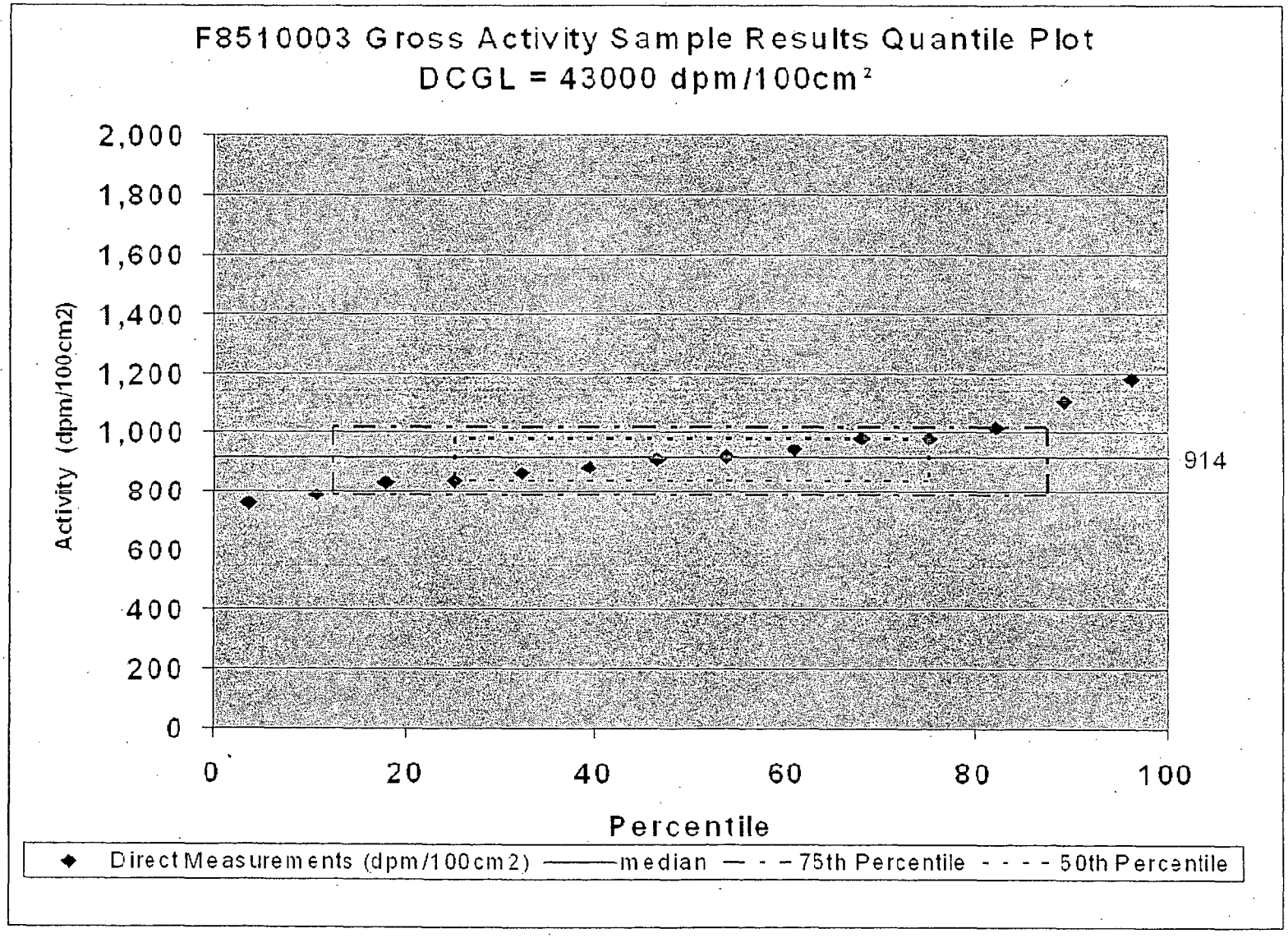
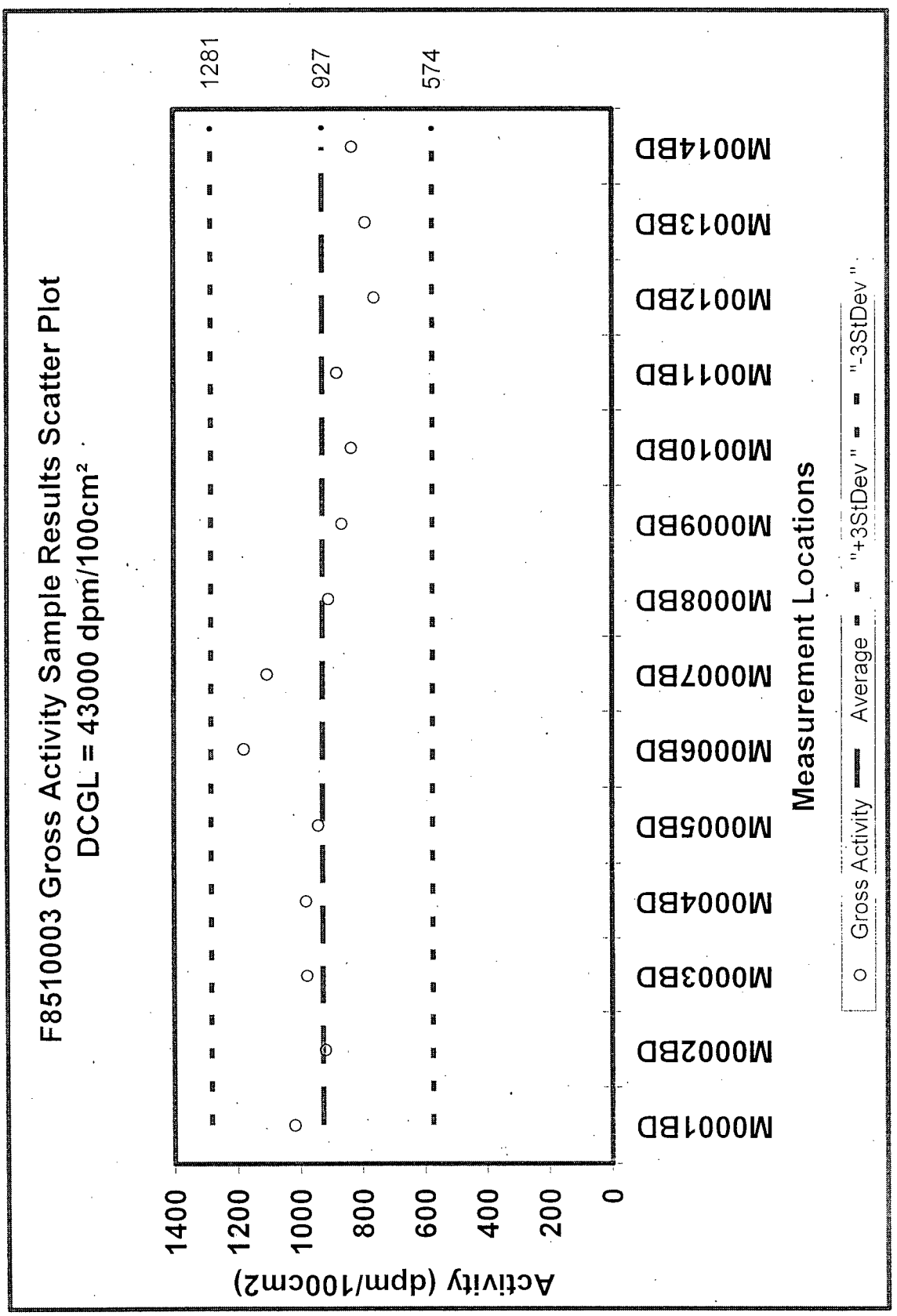
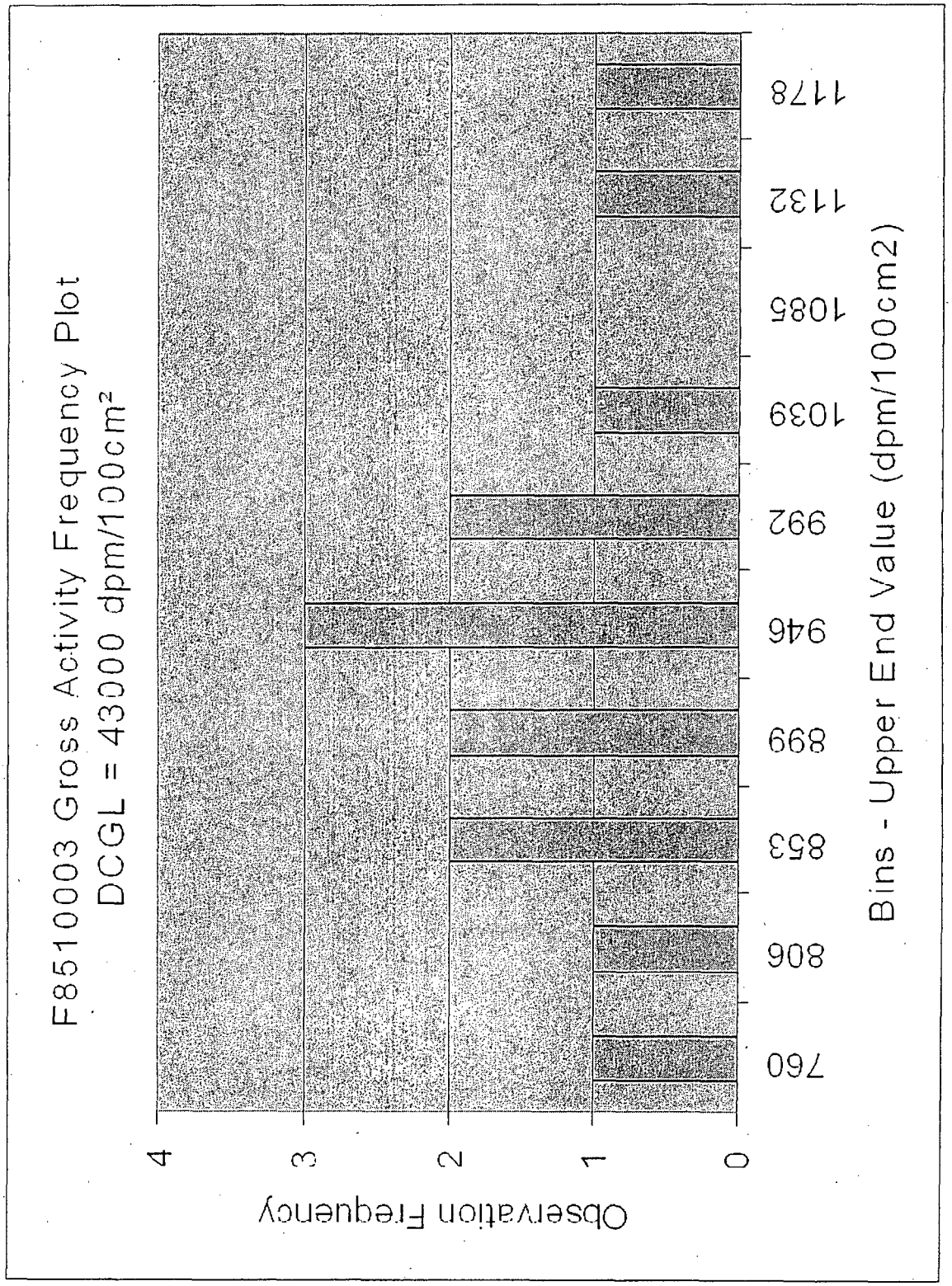
Survey Unit F8510003


F8510003 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
914
0
20
40
60
80
100
Percentile
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8510003 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
1281
927
574
1400
1200
1000
800
600
400
200
0
Activity (dpm/100cm2)
M0001BD
M0002BD
M0003BD
M0004BD
M0005BD
M0006BD
M0007BD
M0008BD
M0009BD
M0010BD
M0011BD
M0012BD
M0013BD
M0014BD
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8510003 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
1
2
3
4
760
806
853
899
946
992
1039
1085
1132
1178
Bins - Upper End Value (dpm/100cm2)