Rancho Seco

Final Status Survey Summary Report

February 28, 2008

Retention Basin Out Buildings

Survey Unit F8480019

Prepared By: _____ **Date:** 2-28-2008

FSS Engineer

Reviewed By: _____ **Date:** 2/29/08

Lead FSS Engineer

Approved By: _____ **Date:** 7-29-08

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8480019, Retention Basin Out Buildings

Survey Unit Description:

Operating History: This area is located at the southwest corner of the site. The area surrounds the structures that were used for containment and final treatment of liquid effluents prior to their release from the site. Contaminated resin was reported to have been found in the basins. Operating records and the HSA document occurrences of radioactive material with the potential for a release of radioactivity associated with this survey area. Records confirmed the presence of radioactive material within the area and basin sediment/soil contamination levels up to ~290 pCi/g. In addition, soil contamination levels up to ~5 pCi/g prior to some decontamination activities.

Site Characterization: Soil samples were collected and showed Cs-137 at mean activity levels of 0.086 pCi/g and a maximum activity of 0.196 pCi/g. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the soil area around the asphalt was determined to be Class 3.

HSA Events: LER-8812.

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 75 m^2 were scanned for approximately 28% 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:	F848	Retention Basin Out Buildings
Survey Unit:	0019	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	272	
Evaluator:	Gary Frank	
DCGL (dpm/100 cm^2)**:**	43000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGLemc (dpm/100 cm^2)**:**	N/A	Class 3
LBGR (dpm/100 cm^2)**:**	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm^2)**:**	431	
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)**:**	75	
Scan Coverage (%):	28%	Class 3
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	49.8	
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 F8480019. 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 1566 to 5076 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)
F8480019-M0001BD	621
F8480019-M0002BD	658
F8480019-M0003BD	941
F8480019-M0004BD	618
F8480019-M0005BD	575
F8480019-C0006BD	1841
F8480019-C0007BD	1447
F8480019-M0008BD	609
F8480019-M0009BD	664
F8480019-M0010BD	637
F8480019-M0011BD	578
F8480019-C0012BD	1997
F8480019-M0013BD	766
F8480019-M0014BD	840
Mean:	914
Median:	661
Standard Deviation:	484
Range:	575 - 1997

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8480019M0001SM	-0.95
F8480019M0002SM	-3.53
F8480019M0003SM	1.64
F8480019M0004SM	-2.24
F8480019M0005SM	-3.53
F8480019M0006SM	-2.24
F8480019M0007SM	0.34
F8480019M0008SM	-0.95
F8480019M0009SM	-2.24
F8480019M0010SM	-3.53
F8480019M0011SM	-6.11
F8480019M0012SM	0.34
F8480019M0013SM	11.97
F8480019M0014SM	-4.82
Mean:	-1.13
Median:	-2.24
Standard Deviation:	4.32
Range:	-6.11 to 11.97

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 greater than the design standard deviation. Since both values of sigma resulted in a relative shift greater than three (3), 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):	661	
Mean (dpm/100 cm²):	914	
Direct Measurement Standard Deviation (dpm/100 cm²):	484	
Total Standard Deviation (dpm/100 cm²):	484	Based on samples and backgrounds.
Maximum (dpm/100 cm²):	1997	
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:	Investigate	All results <0.5 DCGL
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	Investigate	All results <0.5 DCGL - Survey Unit Passes

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 greater than the characterization data used for survey design. However, no additional samples were required. 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 F8480019 meets the release criteria of 10CFR20.1402.

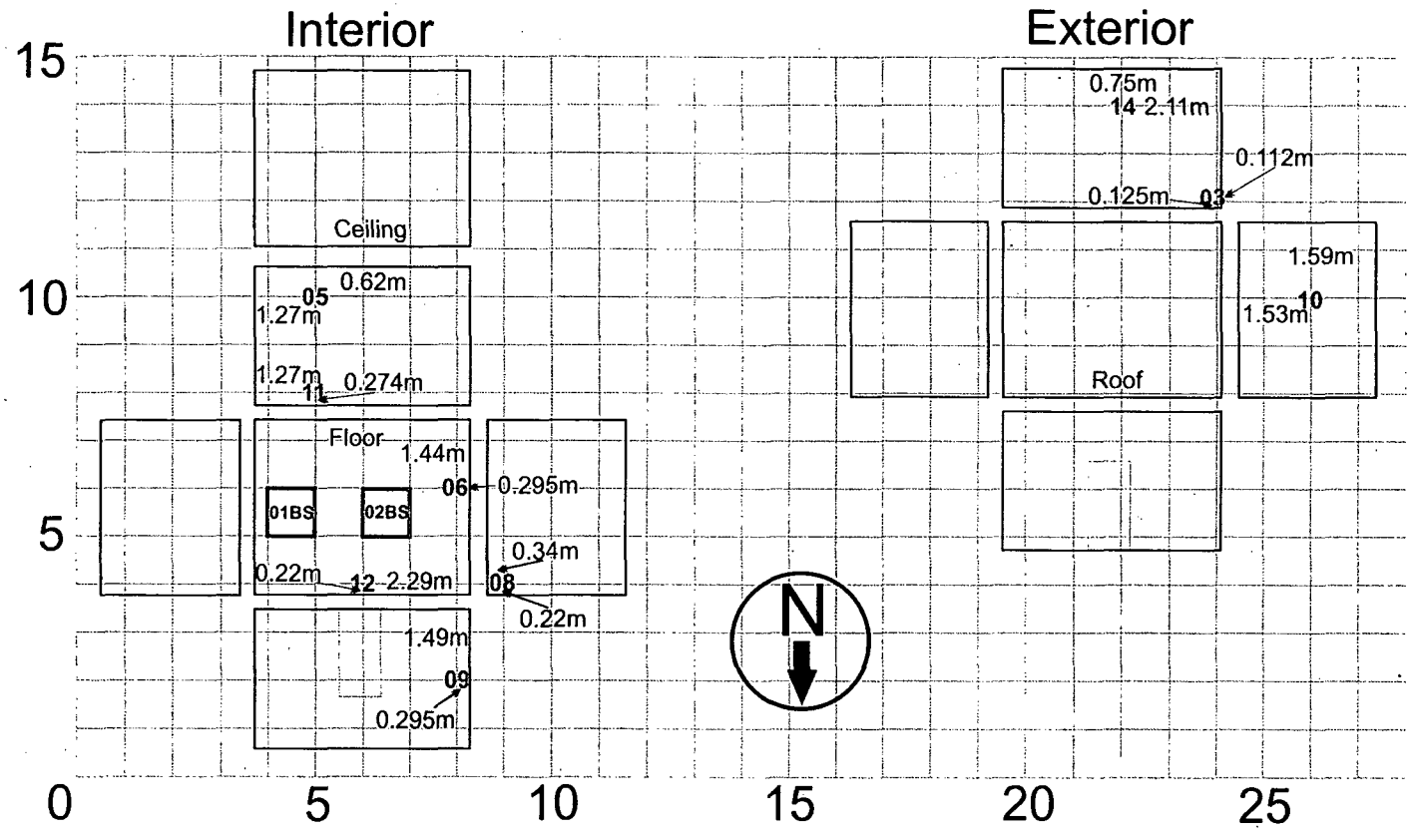
Attachment 1

Maps

February 28, 2008

Survey Unit F8480019

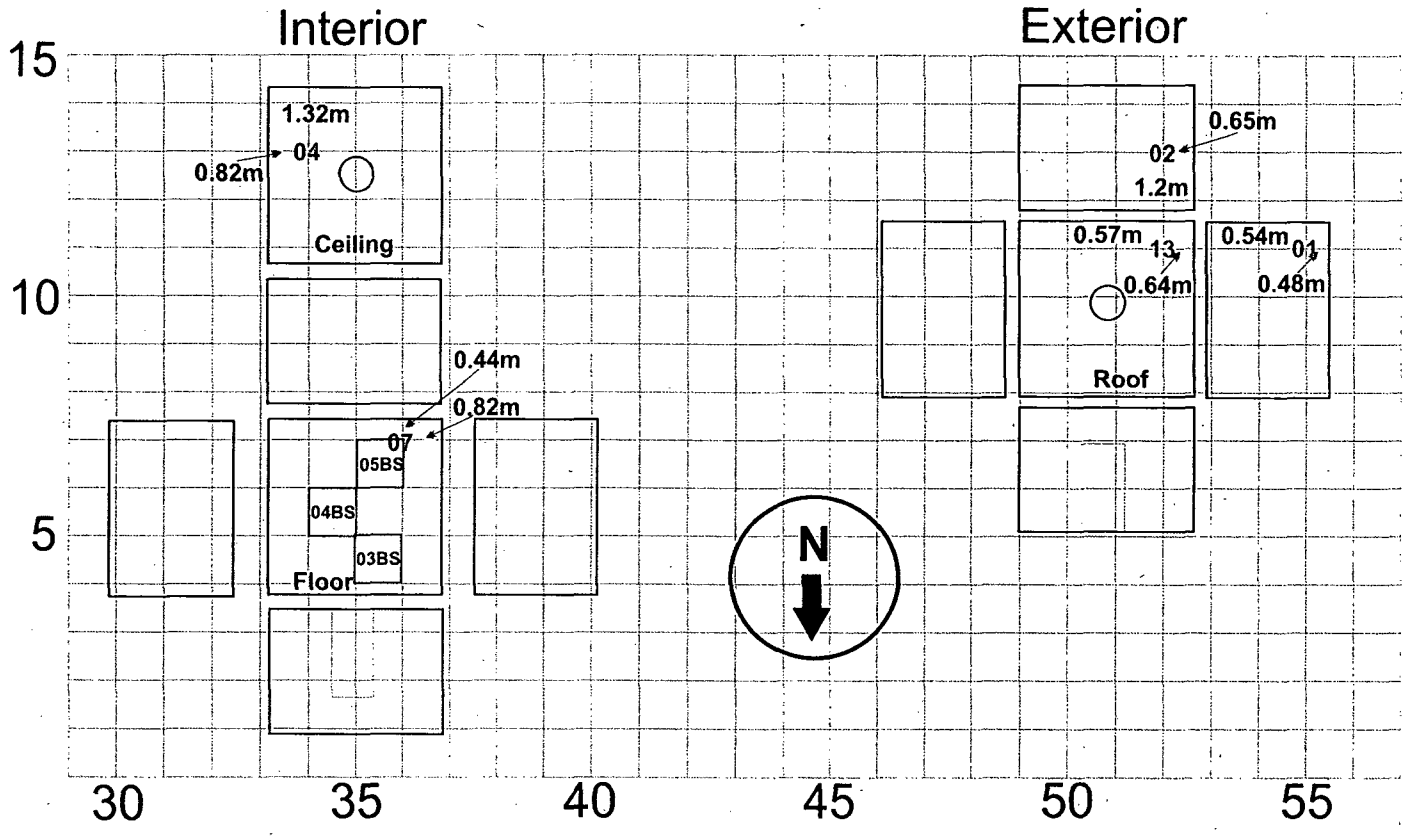
Retention Basin East Butler Building



Beta Directs and Floor Scans

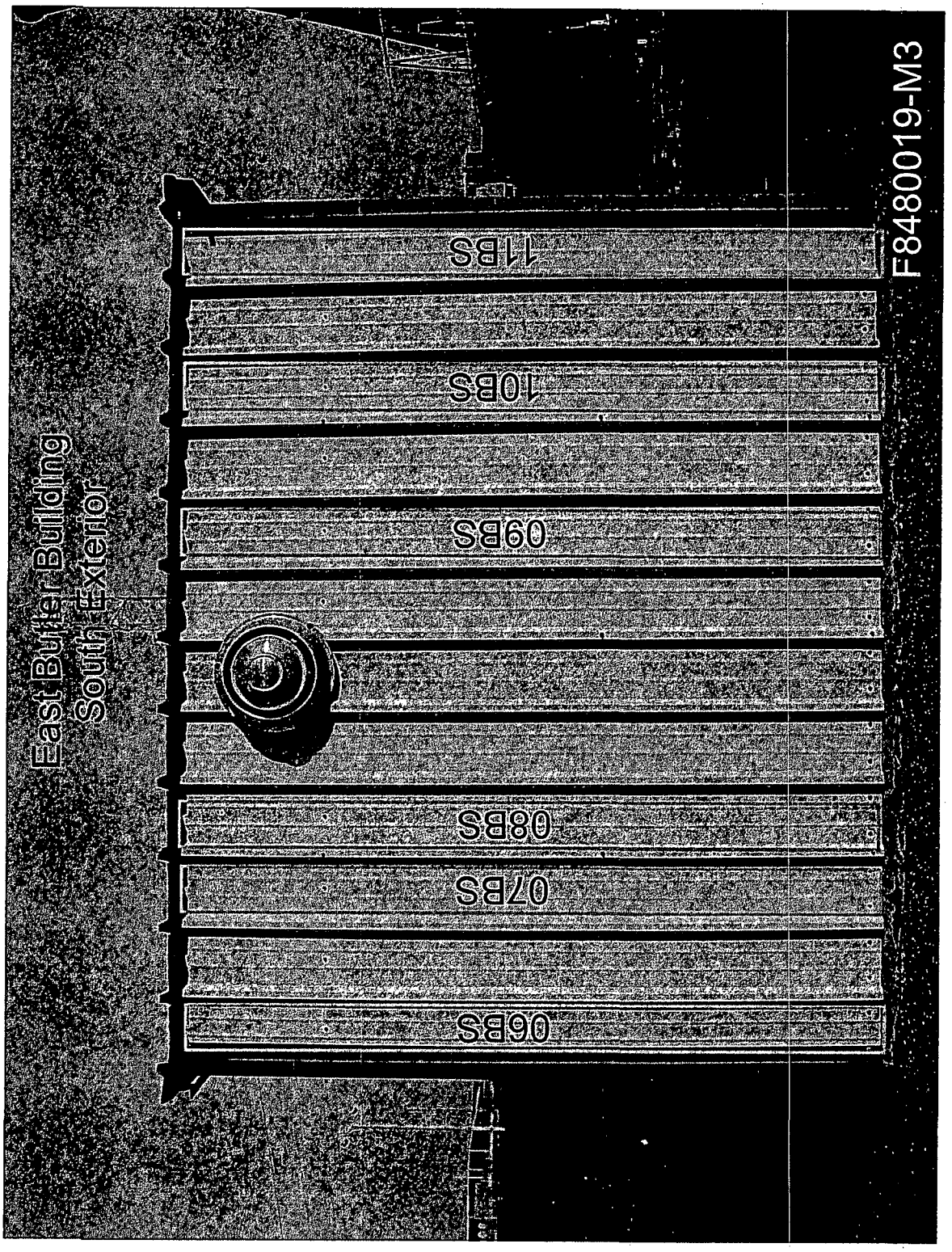
F8480019 - M1

Retention Basin West Butler Building

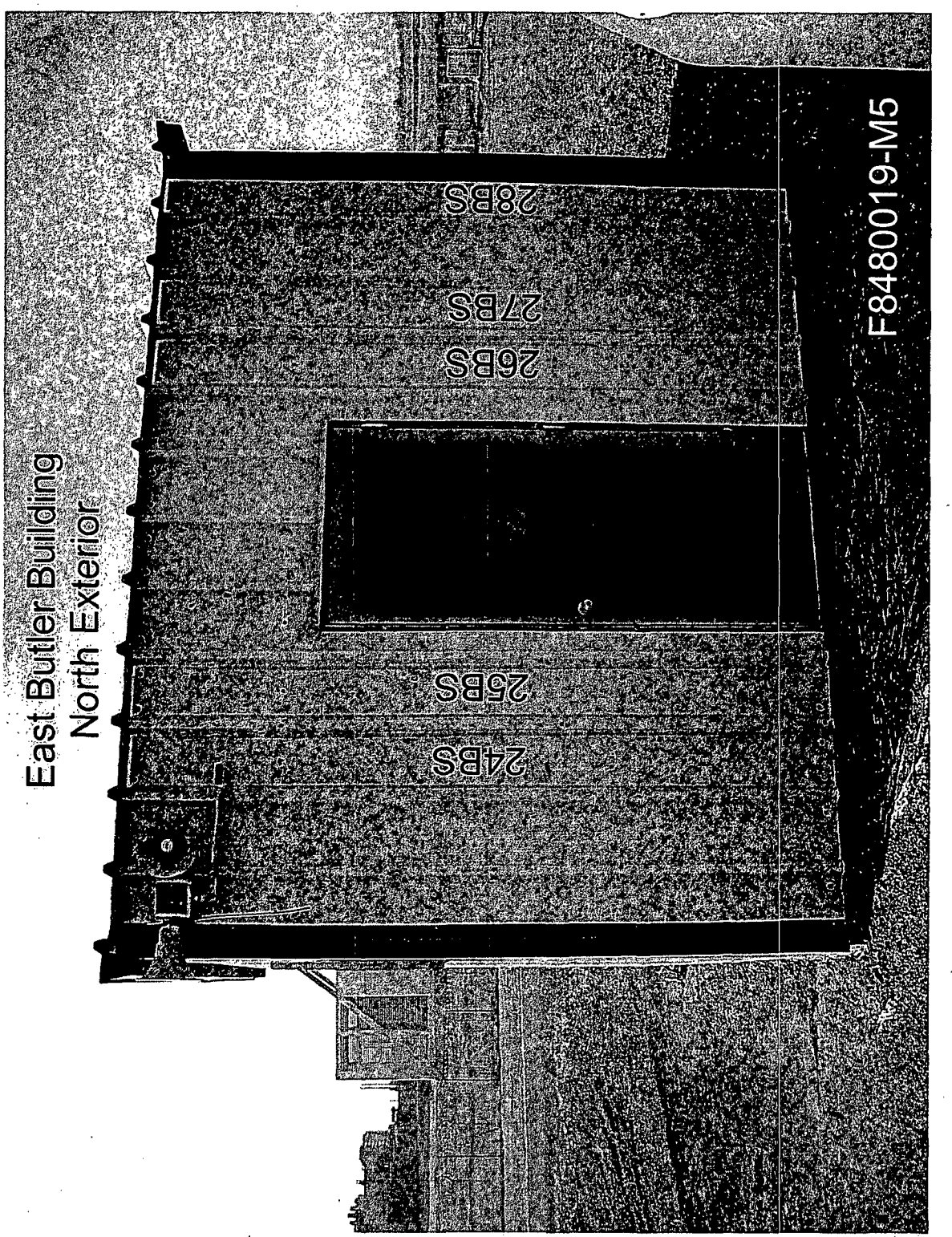


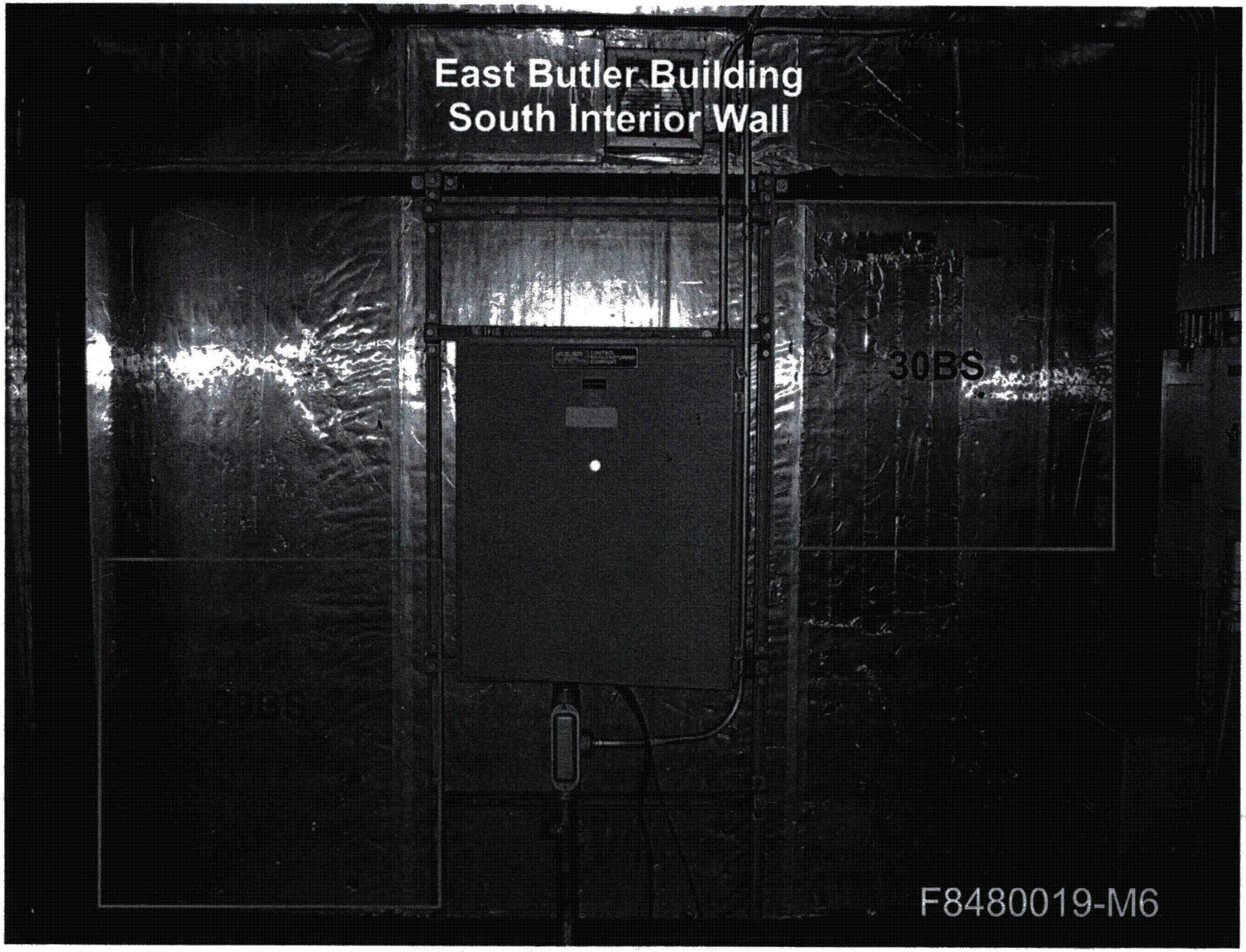
F8480019 - M1A

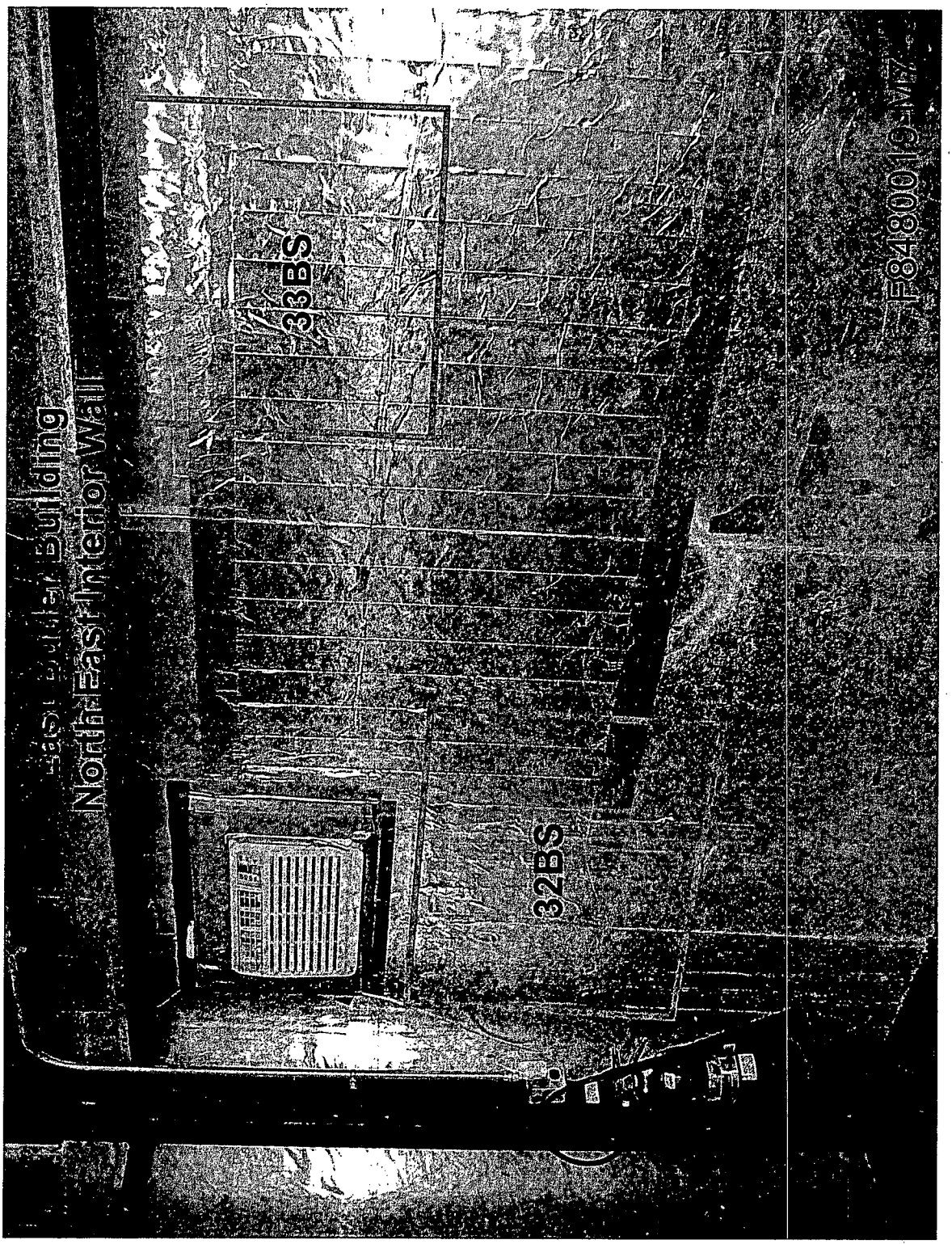
East Butler Building
East Side
12BS
13BS
14BS
15BS
16B
F8480019 - M2

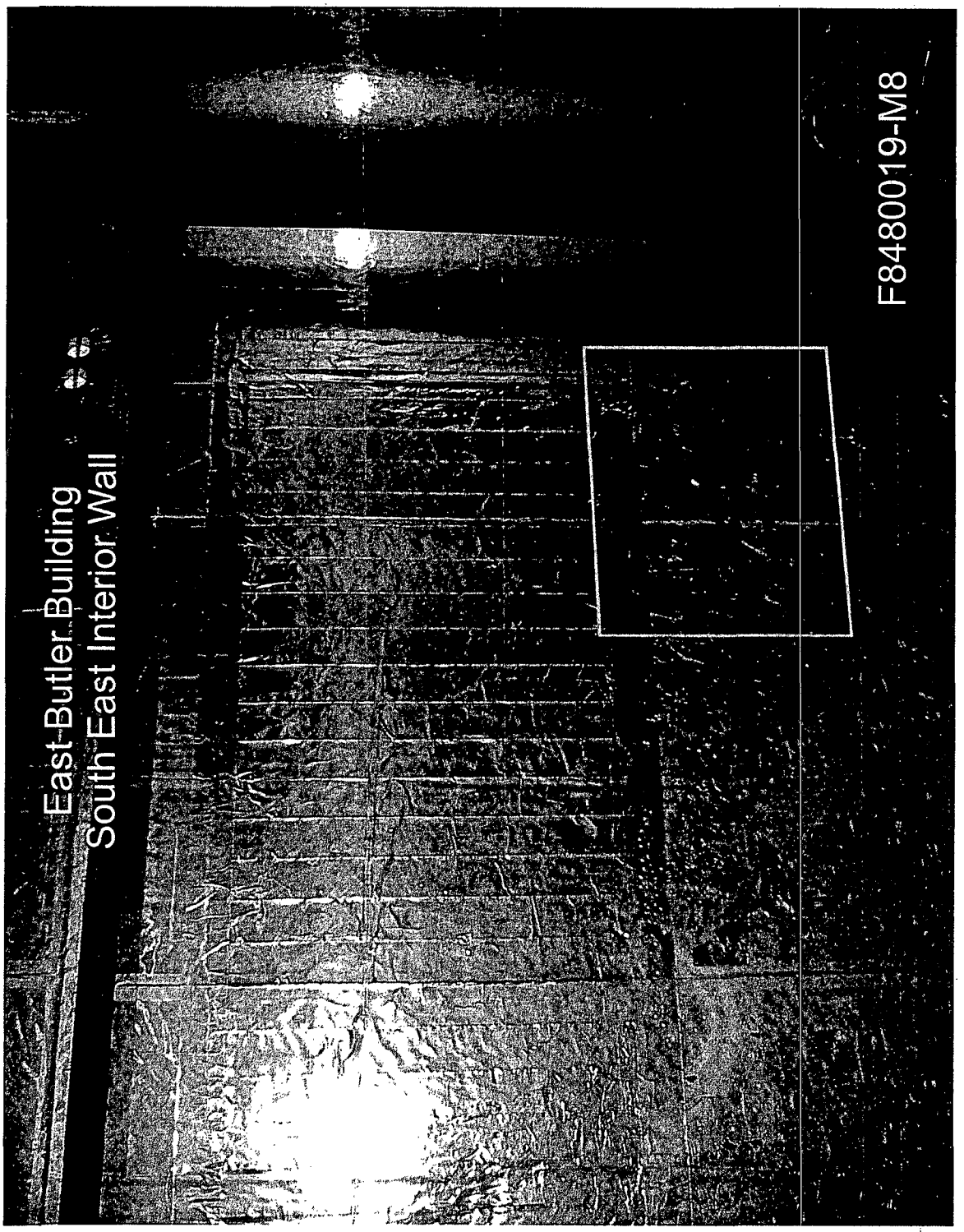

F8480019-M3
East Butler Building
South Exterior
11BS
10BS
09BS
08BS
07BS
06BS

East Butler Building
West Exterior


East Butler Building
North Exterior
28BS
27BS
26BS
25BS
24BS
F8480019-M5

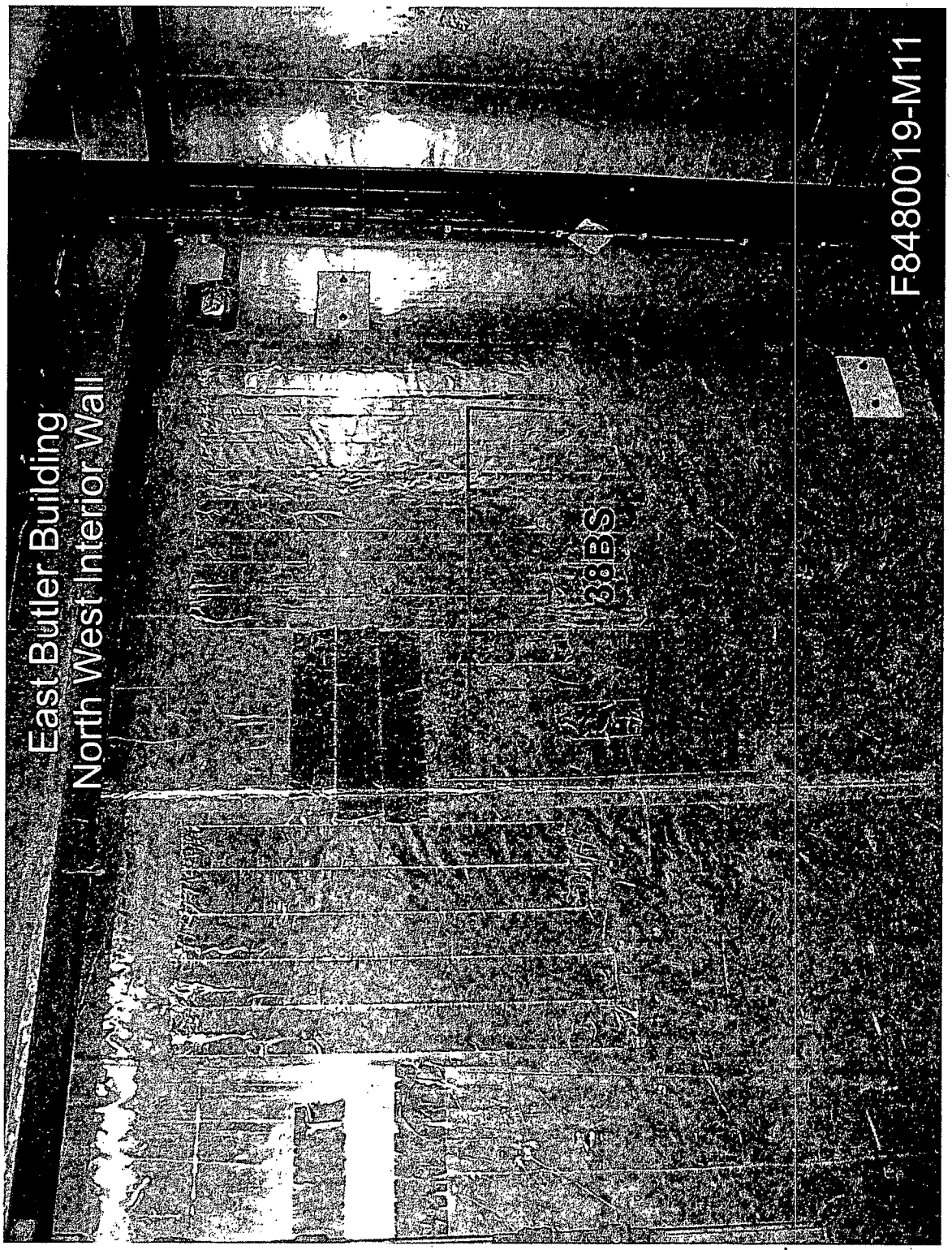

East Butler Building
South Interior Wall
30BS
F8480019-M6

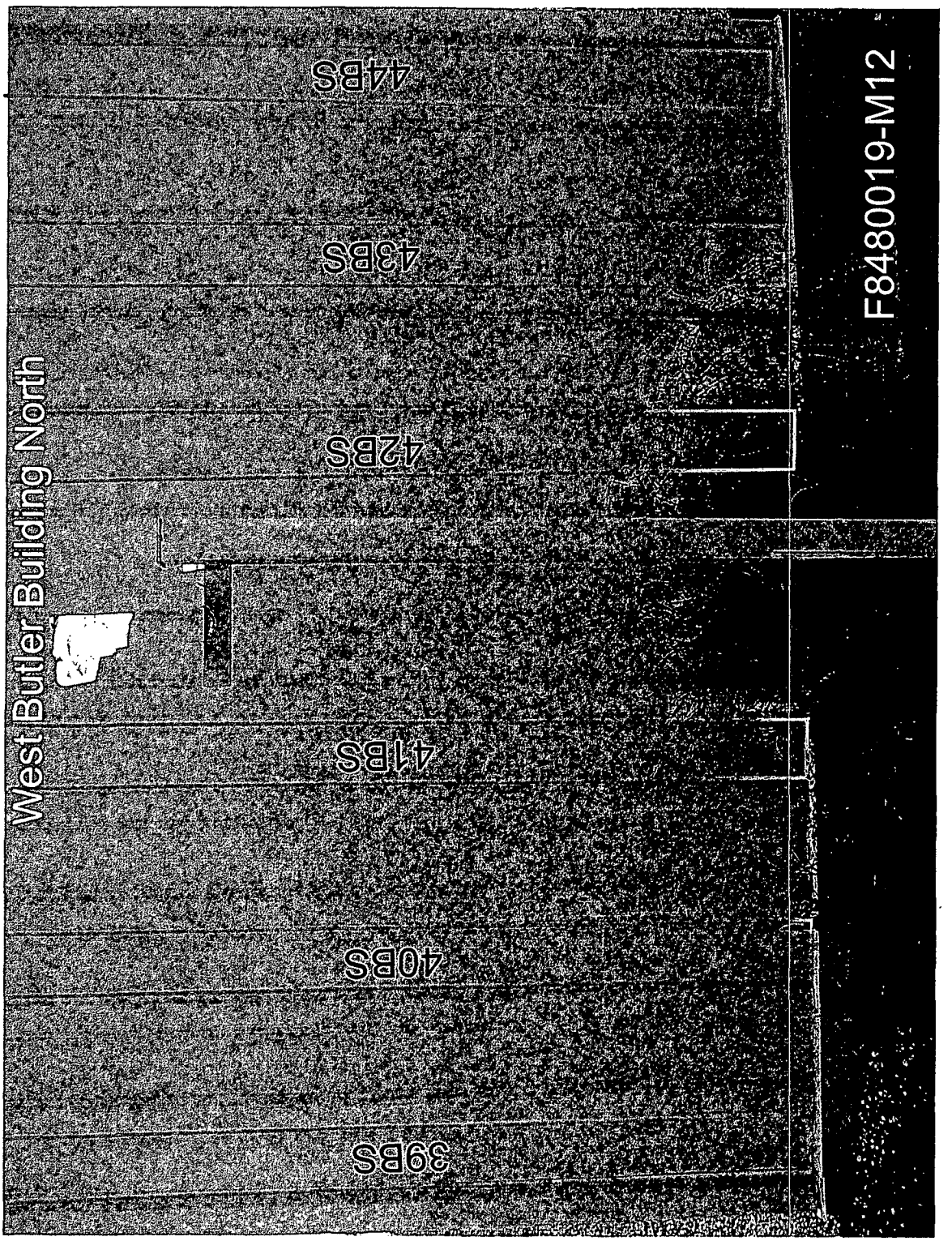

East Bunker Building
North East Interior Wall
3BS
3BS
32BS
F8480019-NW


East Butler Building
South East Interior Wall
F8480019-M8

East Butler Building
North Interior Wall
37BS
F8480019-M9

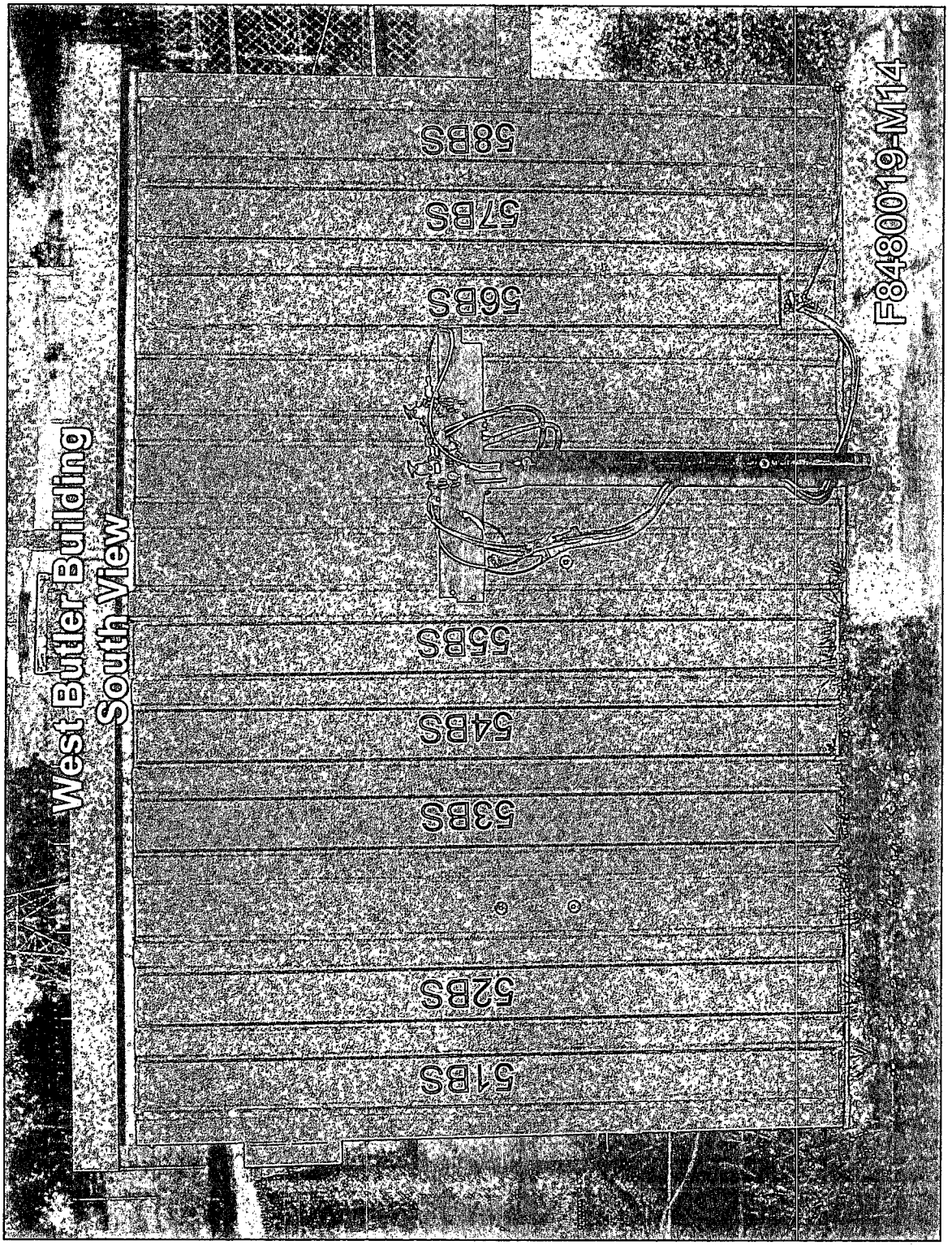
East Butler Building
South West Wall
F8480019-M10

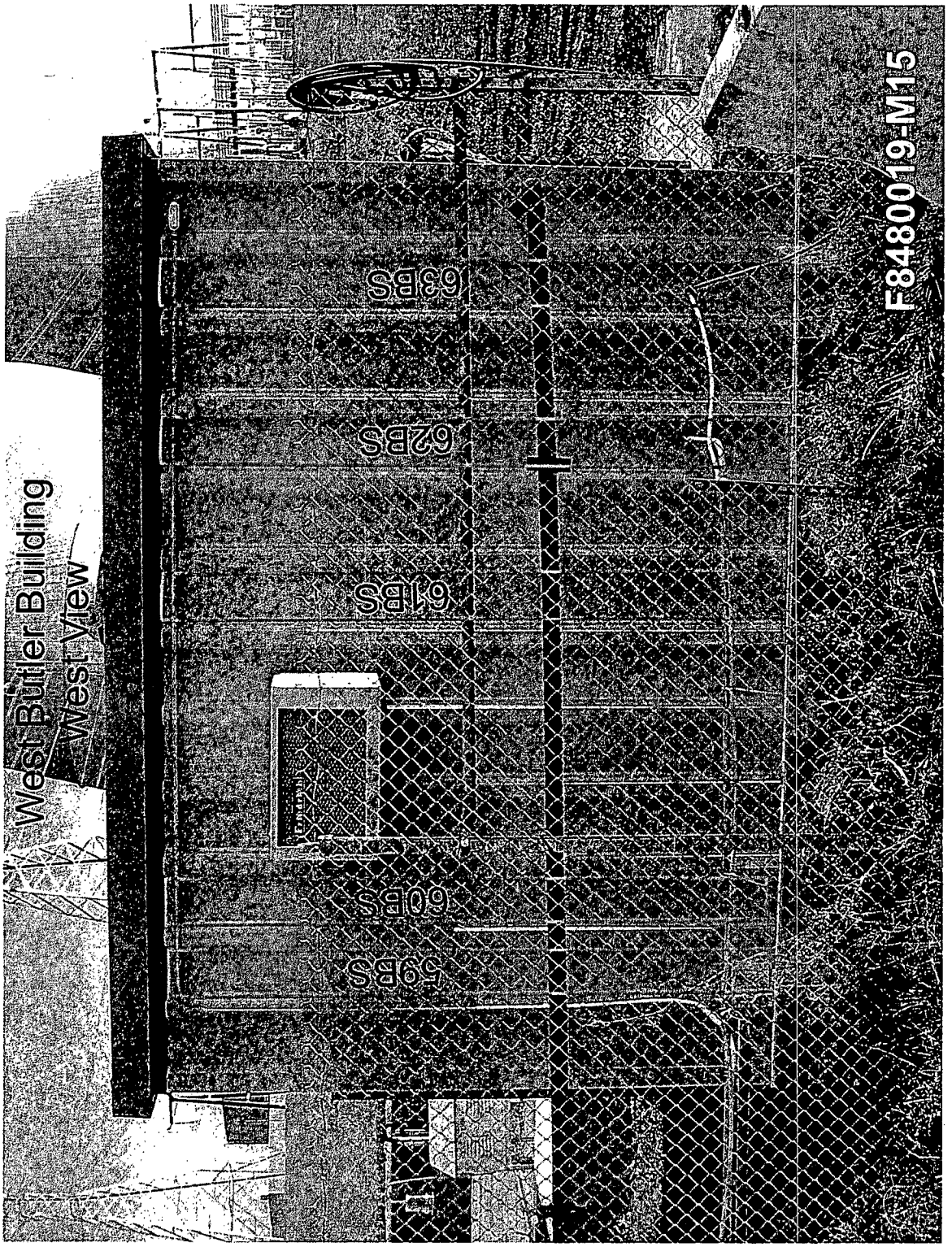

East Butler Building
North West Interior Wall
38 BS
F8480019-M11


F8480019-M12
West Butler Building North
44BS
43BS
42BS
41BS
40BS
39BS

West Butler Building

East Exterior View

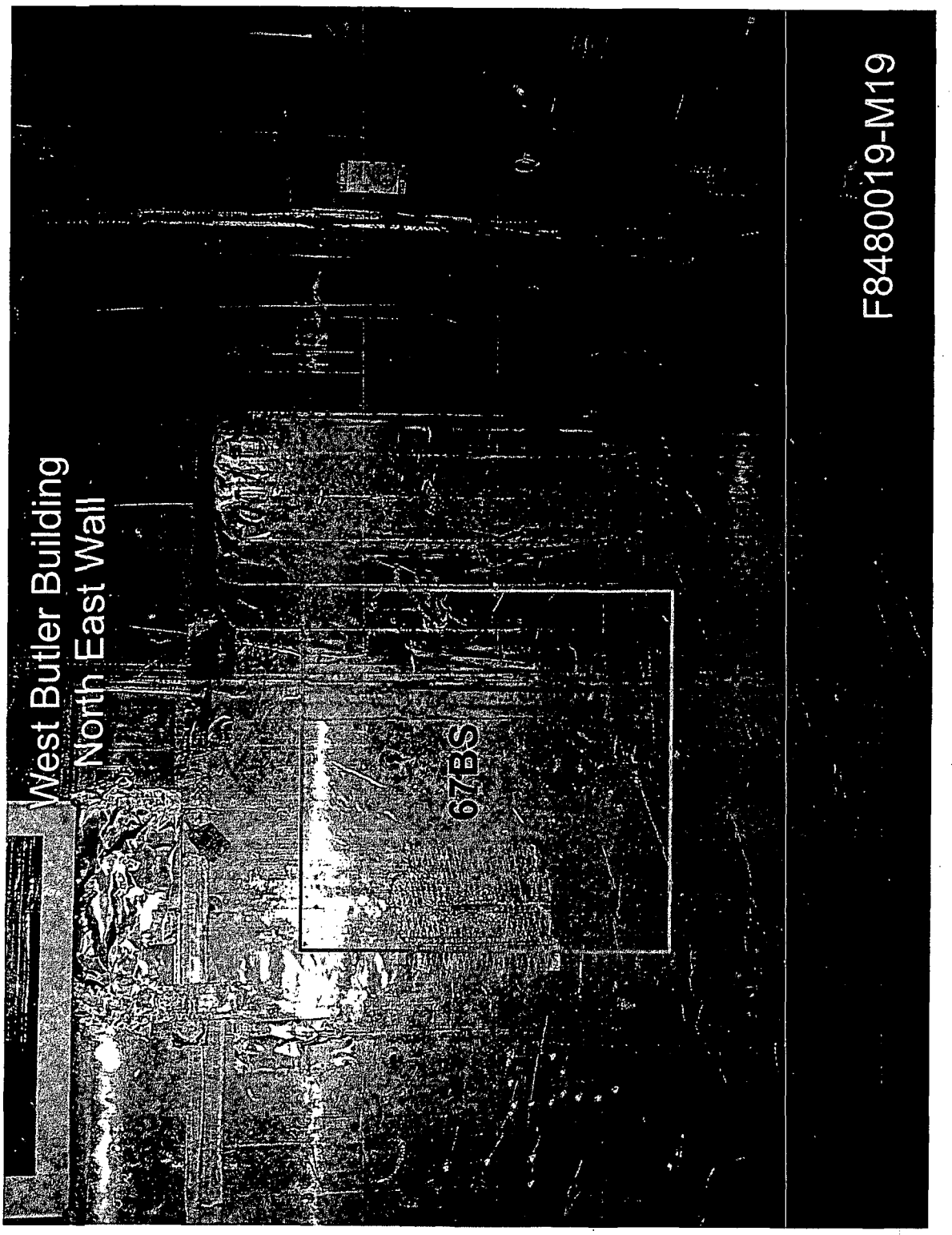

West Butler Building
South View
F8480019-M14
51BS
52BS
53BS
54BS
55BS
56BS
57BS
58BS


West Butler Building
West View
F8480019-M15
63BS
62BS
61BS
60BS
59BS

West Butler Building
West Interior Wall
64BS
4230
F8480019-M16

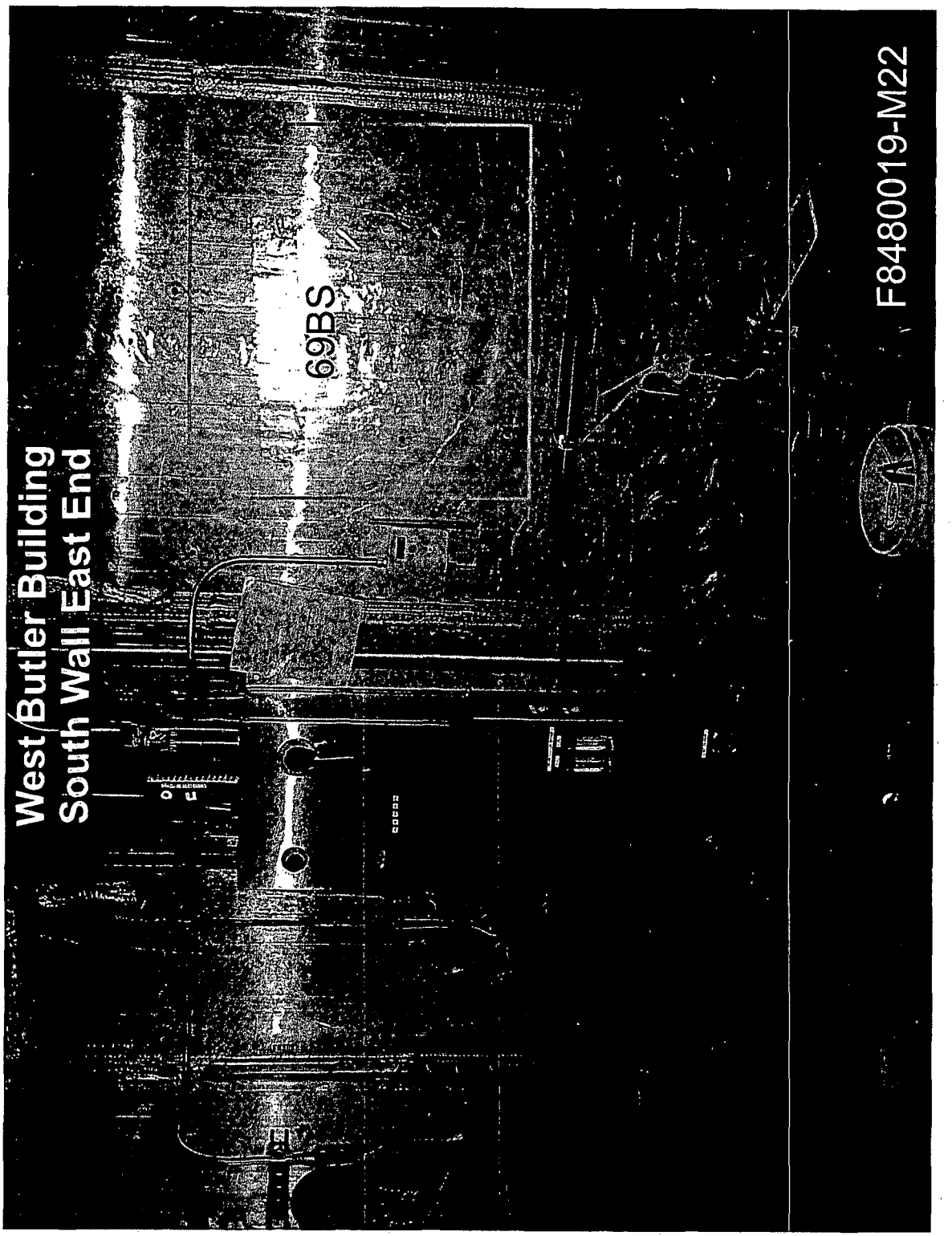
West Butler Building
North West Wall
65BS
F8480019-M17

West Butler Building
North West Wall
67BS
F8480019-M18


West Butler Building
North East Wall
SET 9
F8480019-M19

West Butler Building
East Wall Doorway
F8480019-M20

West Butler Building
East Wall South Side of Doorway
68BS
F8480019-M21


West Butler Building
South Wall East End
69BS
F8480019-M22

West Butler Building
South Wall West End
69BS
F8480019-M23

Attachment 2

Instrumentation

February 28, 2008

Survey Unit F8480019

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; 193700	43-68B; 190294	433	1033
Tennelec; 0401171	N/A	5 dpm α, 11 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	21500
Investigation Criteria – Scan	43000
$DCGL_W$	43000
$DCGL_{EMC}$	N/A

Attachment 3

Investigation

February 28, 2008

Survey Unit F8480019

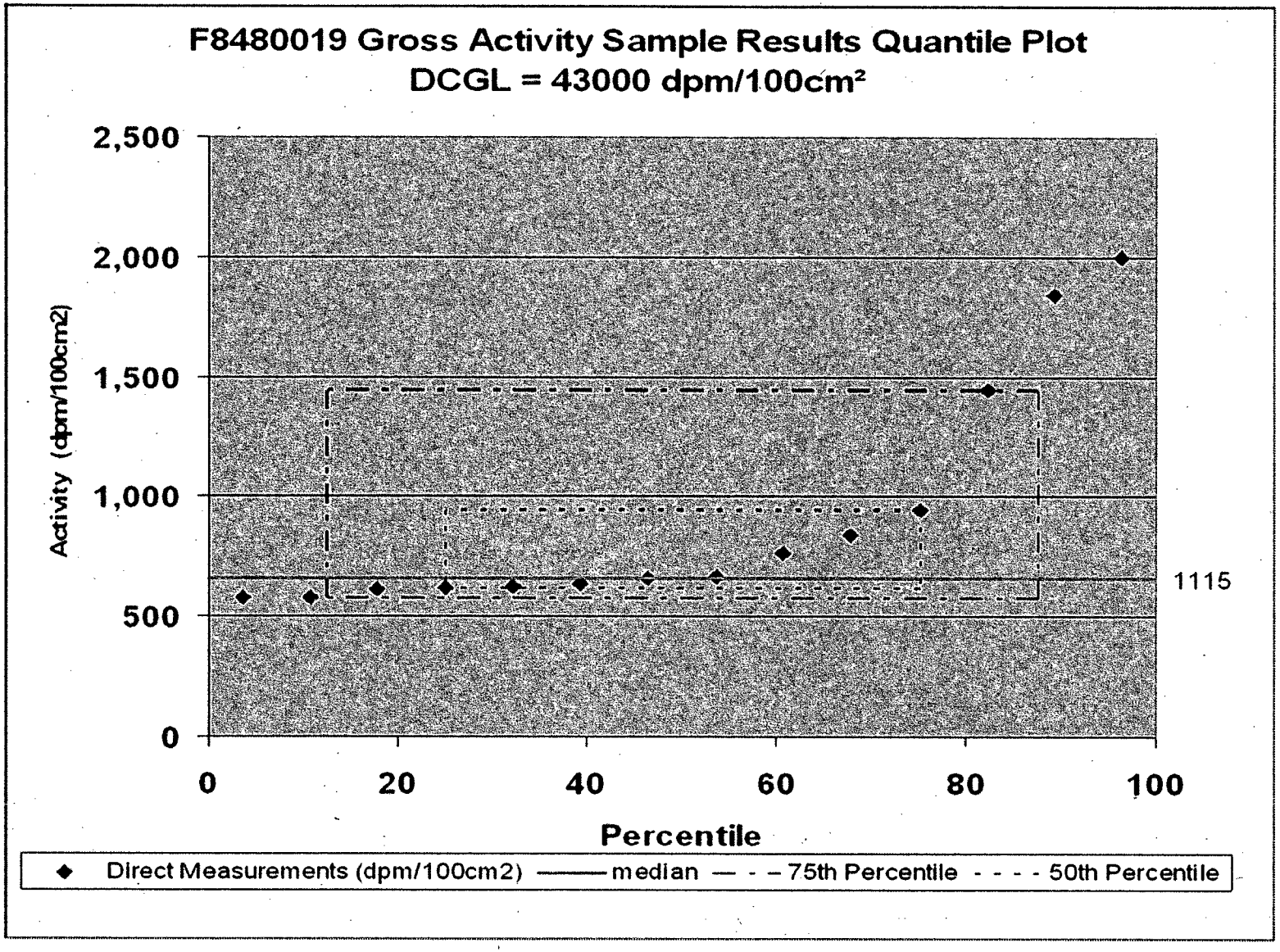
(none required)

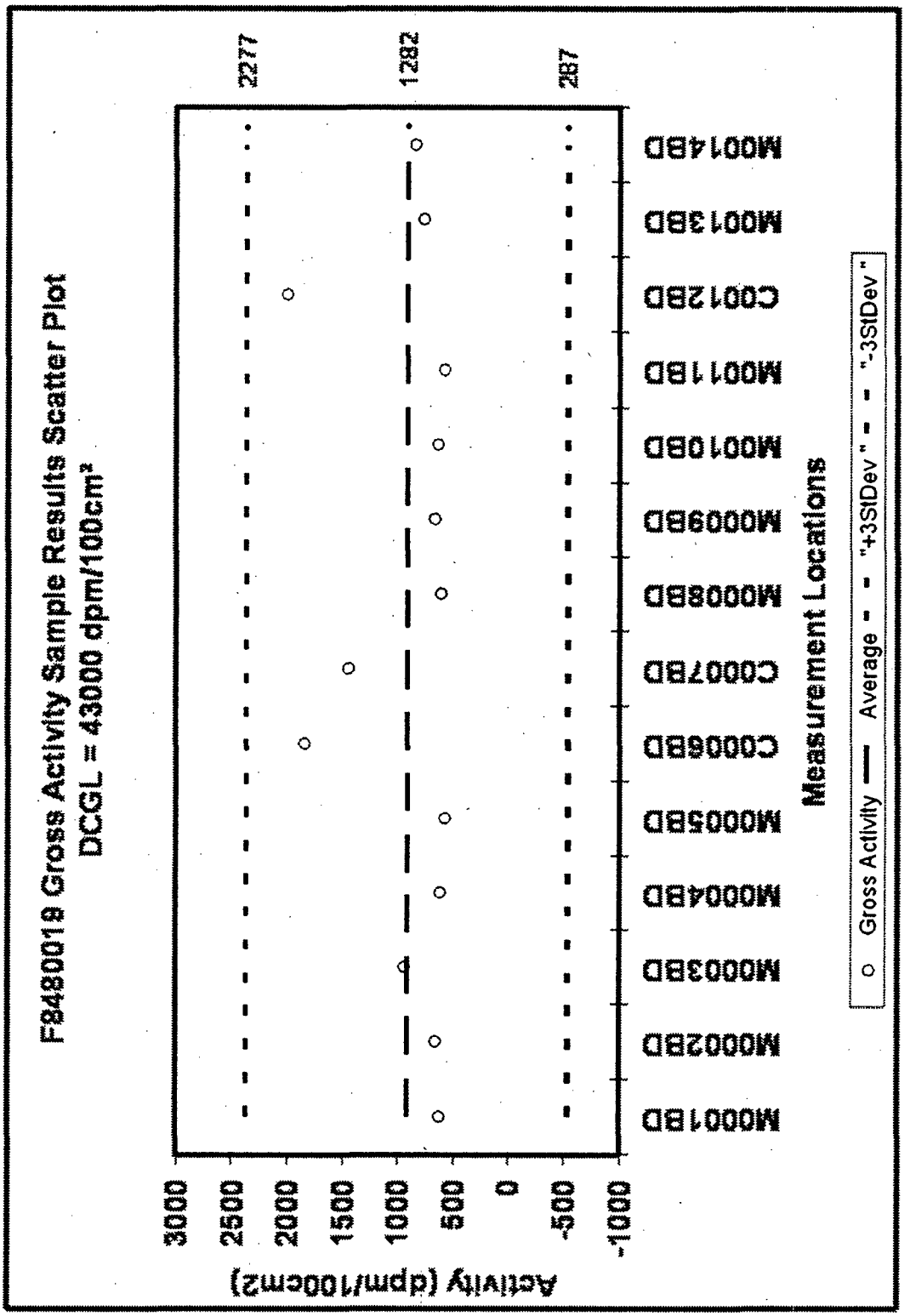
Attachment 4

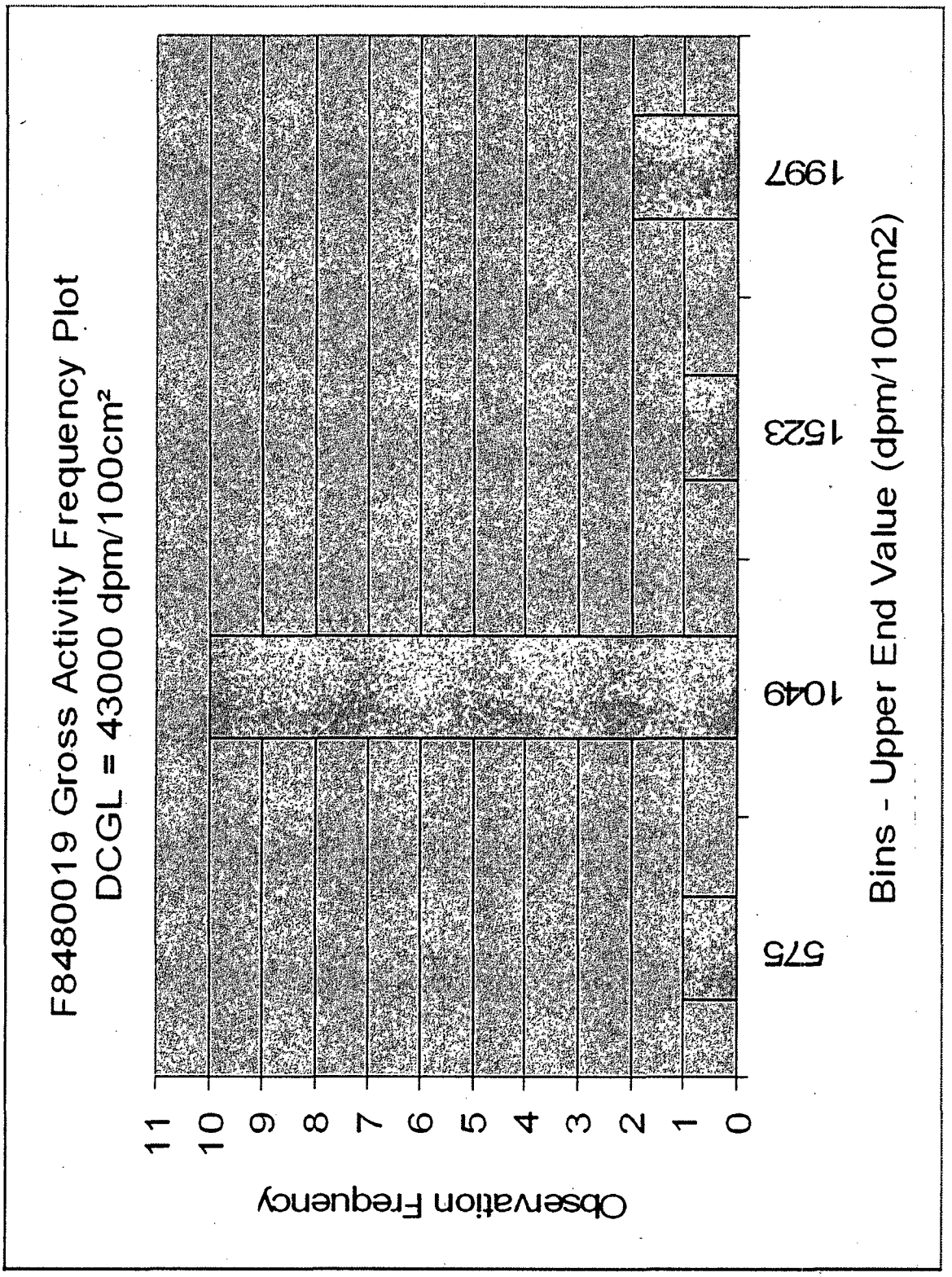
Data Assessment

February 28, 2008

Survey Unit F8480019


F8480019 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
2,500
2,000
1,500
1,000
500
0
1115
0
20
40
60
80
100
Percentile
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8480019 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
2277
1282
287
M0014BD
M0013BD
C0012BD
M0011BD
M0010BD
M0009BD
M0008BD
C0007BD
C0006BD
M0005BD
M0004BD
M0003BD
M0002BD
M0001BD
3000
2500
2000
1500
1000
500
0
-500
-1000
Activity (dpm/100cm2)
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8480019 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
1
2
3
4
5
6
7
8
9
10
11
575
1049
1523
1997
Bins - Upper End Value (dpm/100cm2)