Rancho Seco

Final Status Survey Summary Report

October 31, 2007

NSEB Exterior

Survey Unit F8150021

Prepared By: _____ Date: 10.31.2007

FSS Engineer

Reviewed By: _____ Date: 10/31/07

Lead FSS Engineer

Approved By: _____ Date: 11-13-07

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8150021, NSEB Exterior

Survey Unit Description:

Operating History: The multi-story structure provided safety-class electrical distribution to site systems. This area was not reported to have been used for the storage of radioactive material. Operating records and the HSA document two events (both associated with the building sump) 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 showed a mean gross activity level of 1,913 dpm/100 cm^2 and a maximum value of 2,669 dpm/100 cm^2. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the area was determined to be a Class 3 area.

HSA Events: PDQ-940025, 940083.

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 92 m^2 were scanned for approximately 6% 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:	F815	NSEB Exterior
Survey Unit:	0021	Structure Surface
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	1609	
Evaluator:	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)**:**	261	
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)**:**	92	
Scan Coverage (%):	6%	Class 3
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	82.3	
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 F8150021. 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 3763 dpm/100cm^2 to 6390 dpm/100cm^2 for roof and wall 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)
F8150021-C0001BD	2194
F8150021-C0002BD	2090
F8150021-C0003BD	1707
F8150021-C0004BD	2039
F8150021-C0005BD	1701
F8150021-C0006BD	1982
F8150021-C0007BD	1748
F8150021-C0008BD	1722
F8150021-C0009BD	1795
F8150021-C0010BD	2049
F8150021-C0011BD	1795
F8150021-C0012BD	2033
F8150021-C0013BD	1899
F8150021-Q0014BD	1598
Mean:	1882
Median:	1847
Standard Deviation:	182
Range:	1598 - 2194

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8150021C0001SM	4.86
F8150021C0002SM	2.29
F8150021C0003SM	2.29
F8150021C0004SM	6.14
F8150021C0005SM	3.58
F8150021C0006SM	3.58
F8150021C0007SM	2.29
F8150021C0008SM	-0.27
F8150021C0009SM	4.86
F8150021C0010SM	4.86
F8150021C0011SM	6.14
F8150021C0012SM	-0.27
F8150021C0013SM	3.58
F8150021Q0014SM	4.86
Mean:	3.48
Median:	3.58
Standard Deviation:	2.04
Range:	-0.27 to 6.14

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):	1847	
Mean (dpm/100 cm²):	1882	
Direct Measurement Standard Deviation (dpm/100 cm²):	182	
Total Standard Deviation (dpm/100 cm²):	182	Based on samples and backgrounds.
Maximum (dpm/100 cm²):	2194	
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.

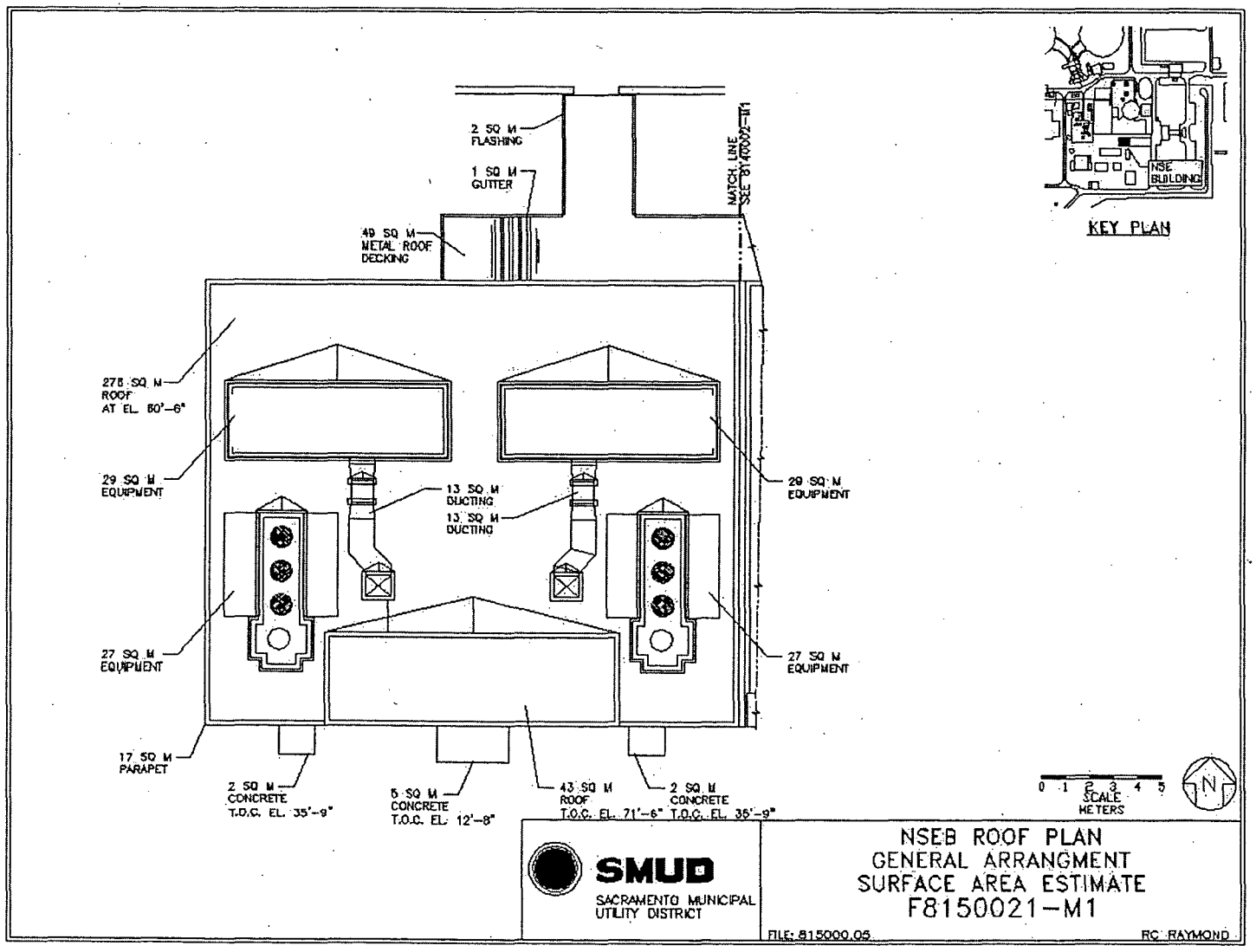
It is concluded that survey unit F8150021 meets the release criteria of 10CFR20.1402.

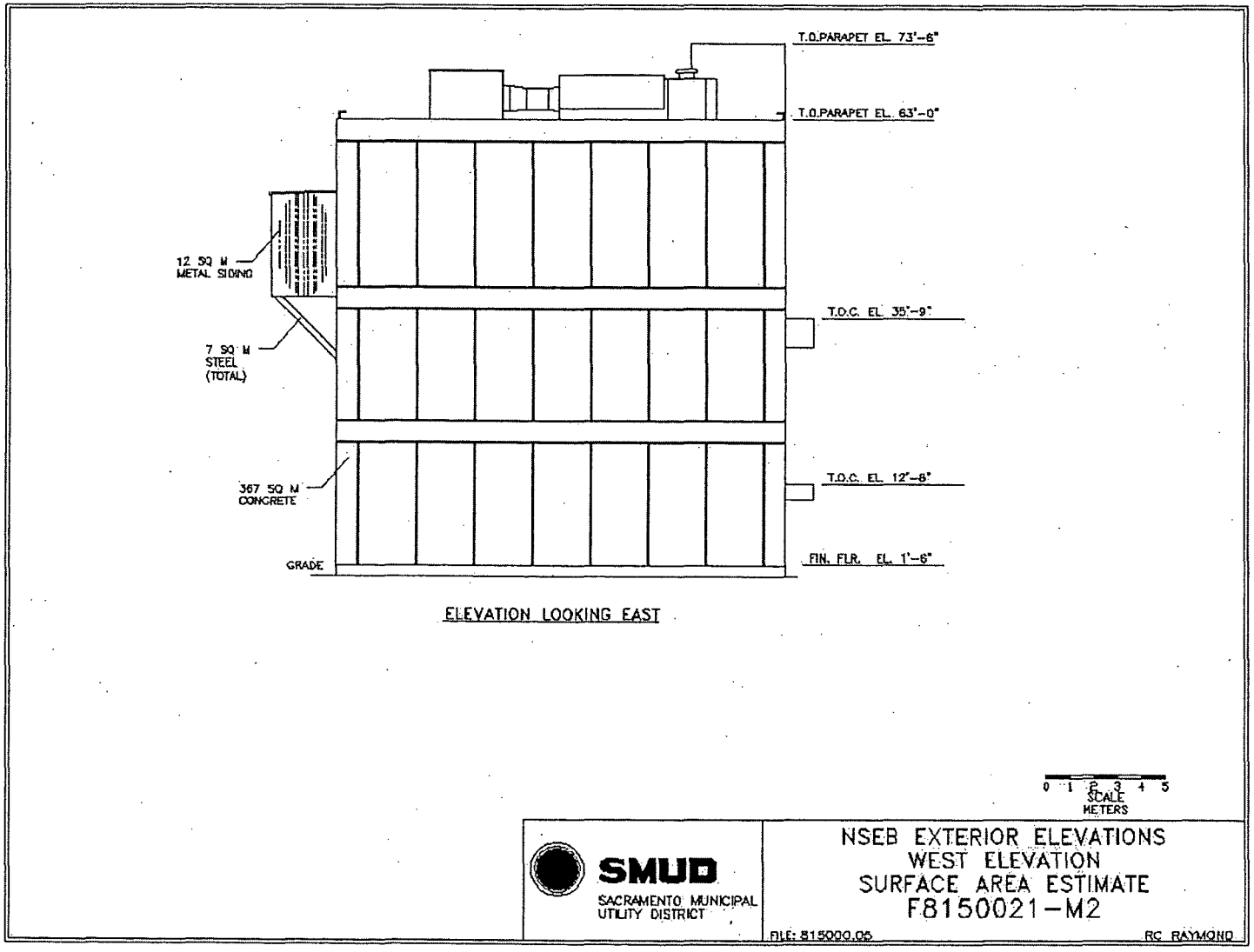
Attachment 1

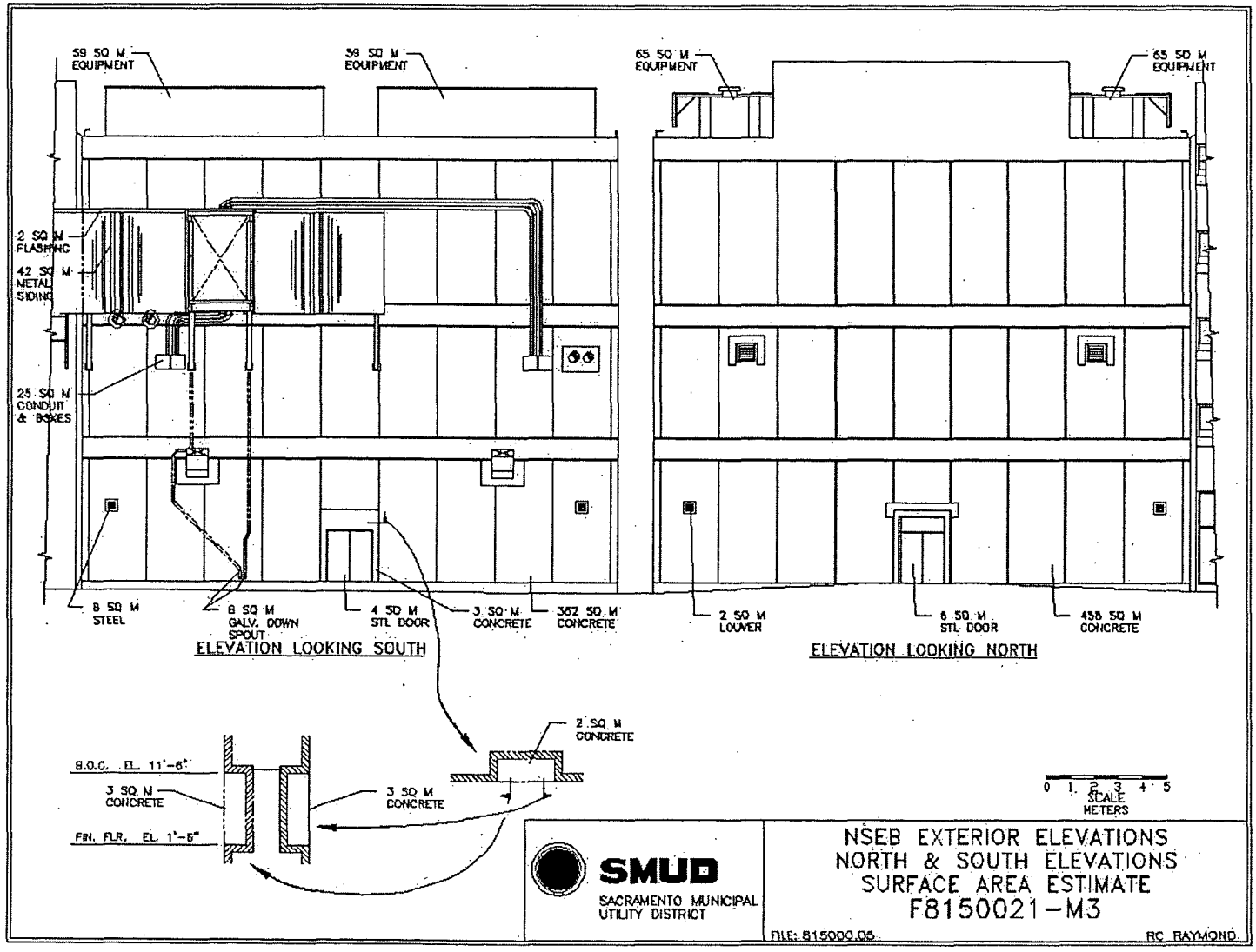
Maps

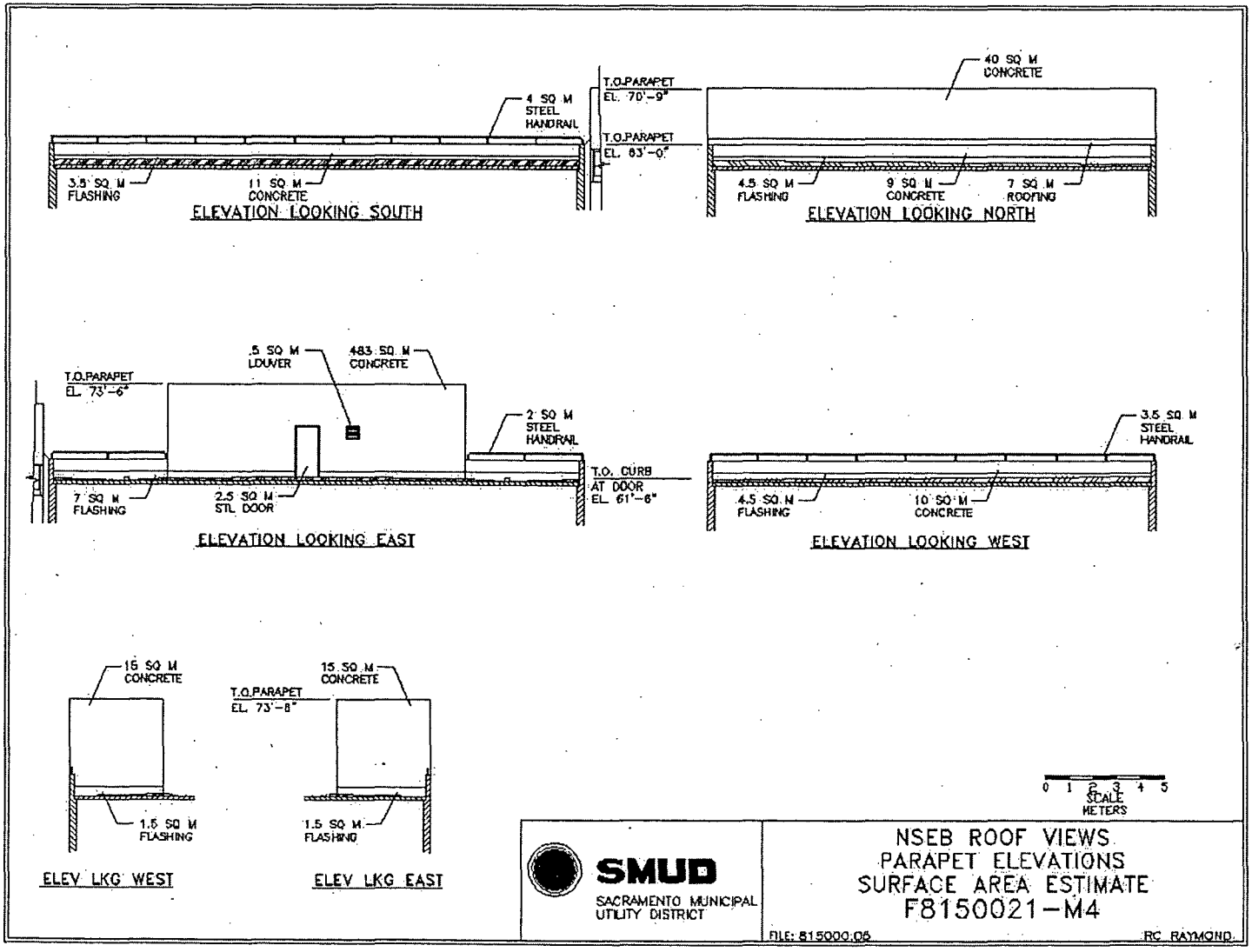
October 31, 2007

Survey Unit F8150021

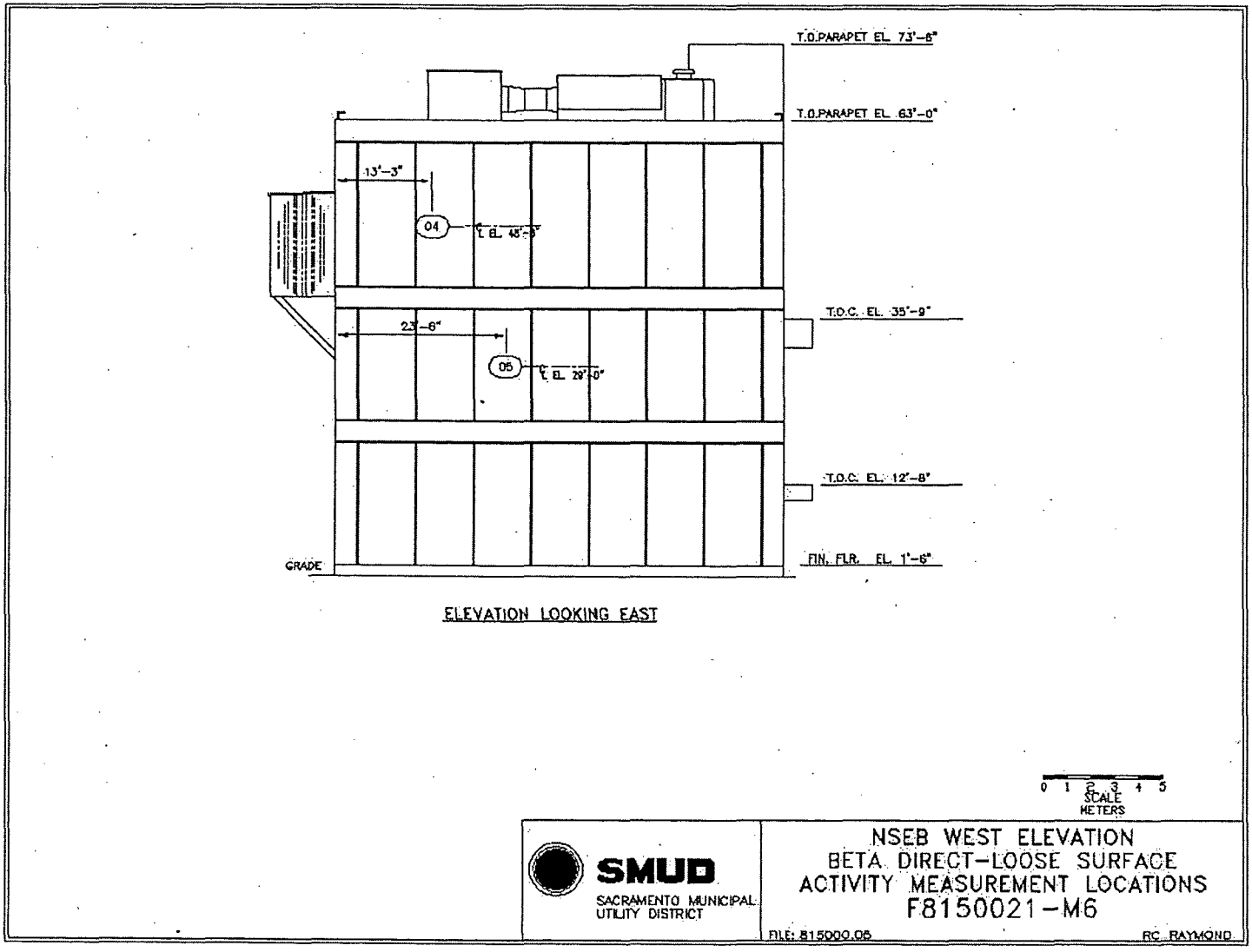

2 SQ M
FLASHING
1 SQ M
GUTTER
MATCH LINE
SEE F8150021-M1
49 SQ M
METAL ROOF
DECKING
278 SQ M
ROOF
AT EL. 60'-6"
29 SQ M
EQUIPMENT
13 SQ M
DUCTING
13 SQ M
DUCTING
29 SQ M
EQUIPMENT
27 SQ M
EQUIPMENT
27 SQ M
EQUIPMENT
17 SQ M
PARAPET
2 SQ M
CONCRETE
T.O.C. EL. 35'-9"
5 SQ M
CONCRETE
T.O.C. EL. 12'-8"
43 SQ M
ROOF
T.O.C. EL. 71'-6"
2 SQ M
CONCRETE
T.O.C. EL. 35'-9"
KEY PLAN
NSE
BUILDING
0 1 2 3 4 5
SCALE
METERS
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB ROOF PLAN
GENERAL ARRANGMENT
SURFACE AREA ESTIMATE
F8150021-M1
FILE: 815000.05
RC RAYMOND

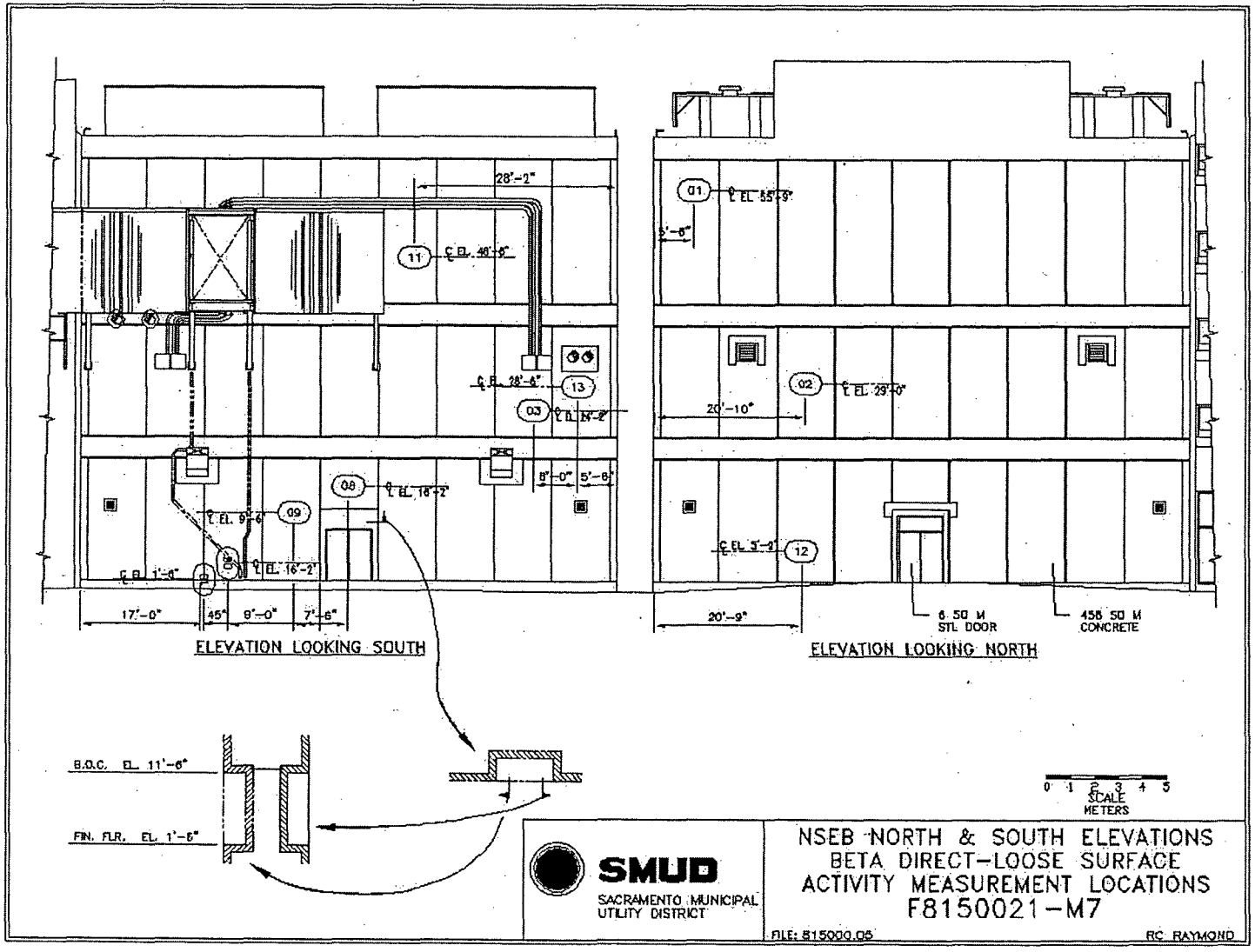

T.O.PARAPET EL. 73'-6"
T.O.PARAPET EL. 63'-0"
12 SQ M
METAL SIDING
7 SQ M
STEEL
(TOTAL)
T.O.C. EL. 35'-9"
367 SQ M
CONCRETE
T.O.C. EL. 12'-8"
GRADE
FIN. FLR. EL. 1'-6"
ELEVATION LOOKING EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB EXTERIOR ELEVATIONS
WEST ELEVATION
SURFACE AREA ESTIMATE
F8150021-M2
FILE: 815000.05
RC RAYMOND


59 SQ M EQUIPMENT
59 SQ M EQUIPMENT
65 SQ M EQUIPMENT
65 SQ M EQUIPMENT
2 SQ M FLASHING
42 SQ M METAL SIDING
25 SQ M CONDUIT & BOXES
8 SQ M STEEL
8 SQ M GALV. DOWN SPOUT
4 SQ M STL DOOR
3 SQ M CONCRETE
362 SQ M CONCRETE
2 SQ M LOUVER
6 SQ M STL DOOR
458 SQ M CONCRETE
ELEVATION LOOKING SOUTH
ELEVATION LOOKING NORTH
2 SQ M CONCRETE
B.O.C. EL. 11'-6"
3 SQ M CONCRETE
3 SQ M CONCRETE
FIN. FLR. EL. 1'-6"
0 1 2 3 4 5
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
NSEB EXTERIOR ELEVATIONS
NORTH & SOUTH ELEVATIONS
SURFACE AREA ESTIMATE
F8150021-M3
FILE: 815000.05
RC RAYMOND


4 SQ M
STEEL
HANDRAIL
T.O.PARAPET
EL. 70'-9"
T.O.PARAPET
EL. 63'-0"
3.5 SQ M
FLASHING
11 SQ M
CONCRETE
ELEVATION LOOKING SOUTH
40 SQ M
CONCRETE
4.5 SQ M
FLASHING
9 SQ M
CONCRETE
7 SQ M
ROOFING
ELEVATION LOOKING NORTH
.5 SQ M
LOUVER
483 SQ M
CONCRETE
T.O.PARAPET
EL. 73'-6"
2 SQ M
STEEL
HANDRAIL
T.O. CURB
AT DOOR
EL. 61'-6"
7 SQ M
FLASHING
2.5 SQ M
STL DOOR
ELEVATION LOOKING EAST
3.5 SQ M
STEEL
HANDRAIL
4.5 SQ M
FLASHING
10 SQ M
CONCRETE
ELEVATION LOOKING WEST
15 SQ M
CONCRETE
1.5 SQ M
FLASHING
ELEV LKG WEST
T.O.PARAPET
EL. 73'-8"
15 SQ M
CONCRETE
1.5 SQ M
FLASHING
ELEV LKG EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB ROOF VIEWS
PARAPET ELEVATIONS
SURFACE AREA ESTIMATE
F8150021-M4
FILE: 815000.05
RC RAYMOND

PARAPET LOOKING NORTH
PARAPET LOOKING SOUTH
PARAPET LOOKING WEST
PARAPET LOOKING EAST
ROOF PLAN
ELEV LKG WEST
ELEV LKG EAST
ELEVATION LOOKING SOUTH
ELEVATION LOOKING NORTH
ELEVATION LOOKING EAST
FIN. FL.
0 1 2 3 4 5
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
NUC SERV ELEC BLDG
BETA DIRECT-LOOSE SURFACE
ACTIVITY MEASUREMENTS
F8150021-M5
FILE: 815000.05
RC RAYMOND


T.O.PARAPET EL. 73'-6"
T.O.PARAPET EL. 63'-0"
13'-3"
04
℄ EL. 45'-9"
T.O.C. EL. 35'-9"
23'-6"
05
℄ EL. 29'-0"
T.O.C. EL. 12'-8"
GRADE
FIN. FLR. EL. 1'-6"
ELEVATION LOOKING EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB WEST ELEVATION
BETA DIRECT-LOOSE SURFACE
ACTIVITY MEASUREMENT LOCATIONS
F8150021-M6
FILE: 815000.06
RC RAYMOND


28'-2"
11
℄ EL. 40'-9"
℄ EL. 28'-6"
13
03
℄ EL. 14'-2"
8'-0"
5'-6"
08
℄ EL. 16'-2"
℄ EL. 9'-6"
09
℄ EL. 1'-6"
16'-2"
17'-0"
45"
9'-0"
7'-6"
ELEVATION LOOKING SOUTH
01
℄ EL. 55'-6"
5'-6"
02
℄ EL. 29'-0"
20'-10"
℄ EL. 5'-9"
12
20'-9"
6.50 M
STL DOOR
458.50 M
CONCRETE
ELEVATION LOOKING NORTH
B.O.C. EL. 11'-6"
FIN. FLR. EL. 1'-6"
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB NORTH & SOUTH ELEVATIONS
BETA DIRECT-LOOSE SURFACE
ACTIVITY MEASUREMENT LOCATIONS
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FILE: 815000.05
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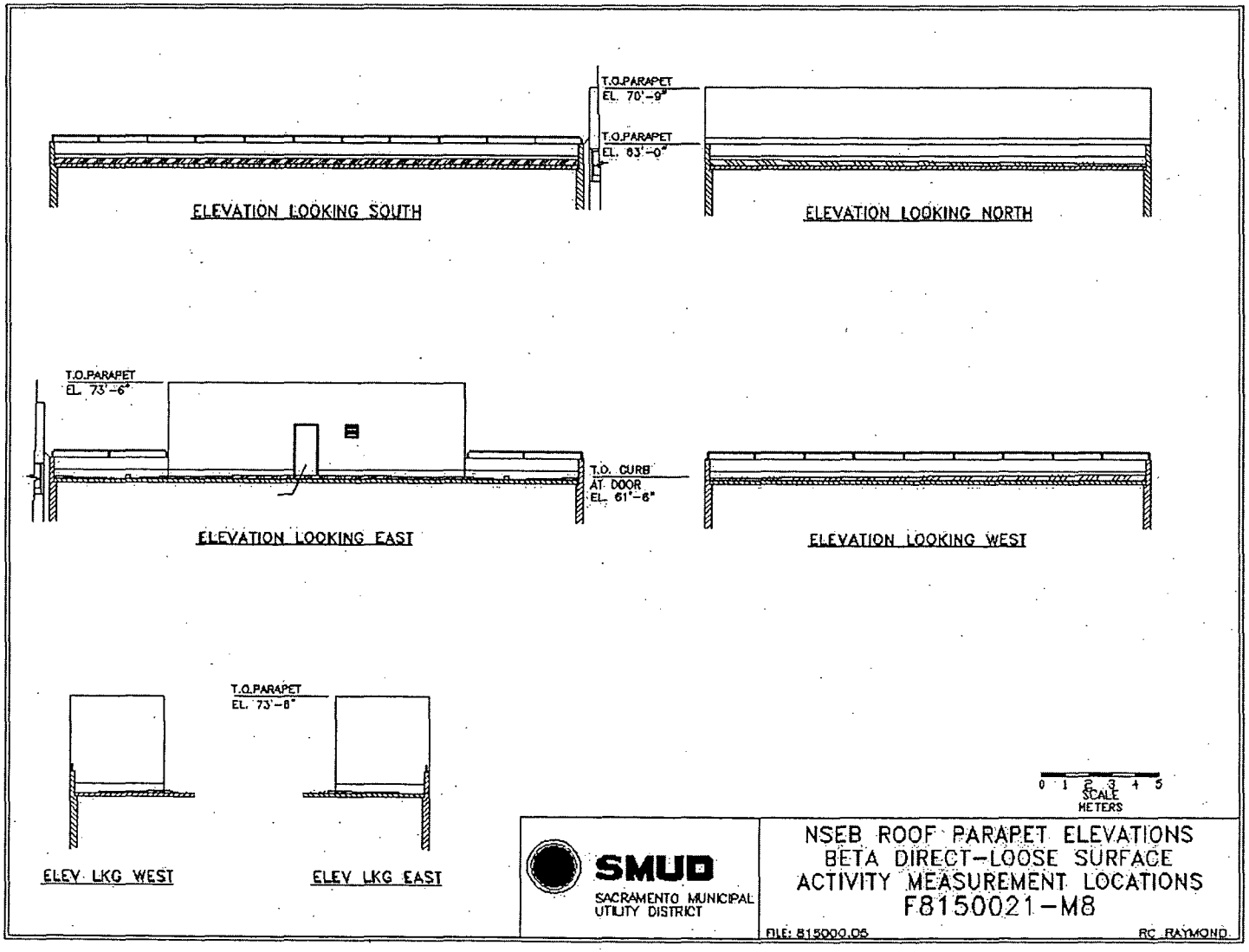
T.O.PARAPET
EL. 70'-9"
T.O.PARAPET
EL. 63'-0"
ELEVATION LOOKING SOUTH
ELEVATION LOOKING NORTH
T.O.PARAPET
EL. 73'-6"
T.O. CURB
AT DOOR
EL. 61'-6"
ELEVATION LOOKING EAST
ELEVATION LOOKING WEST
T.O.PARAPET
EL. 73'-8"
ELEV LKG WEST
ELEV LKG EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB ROOF PARAPET ELEVATIONS
BETA DIRECT-LOOSE SURFACE
ACTIVITY MEASUREMENT LOCATIONS
F8150021-M8
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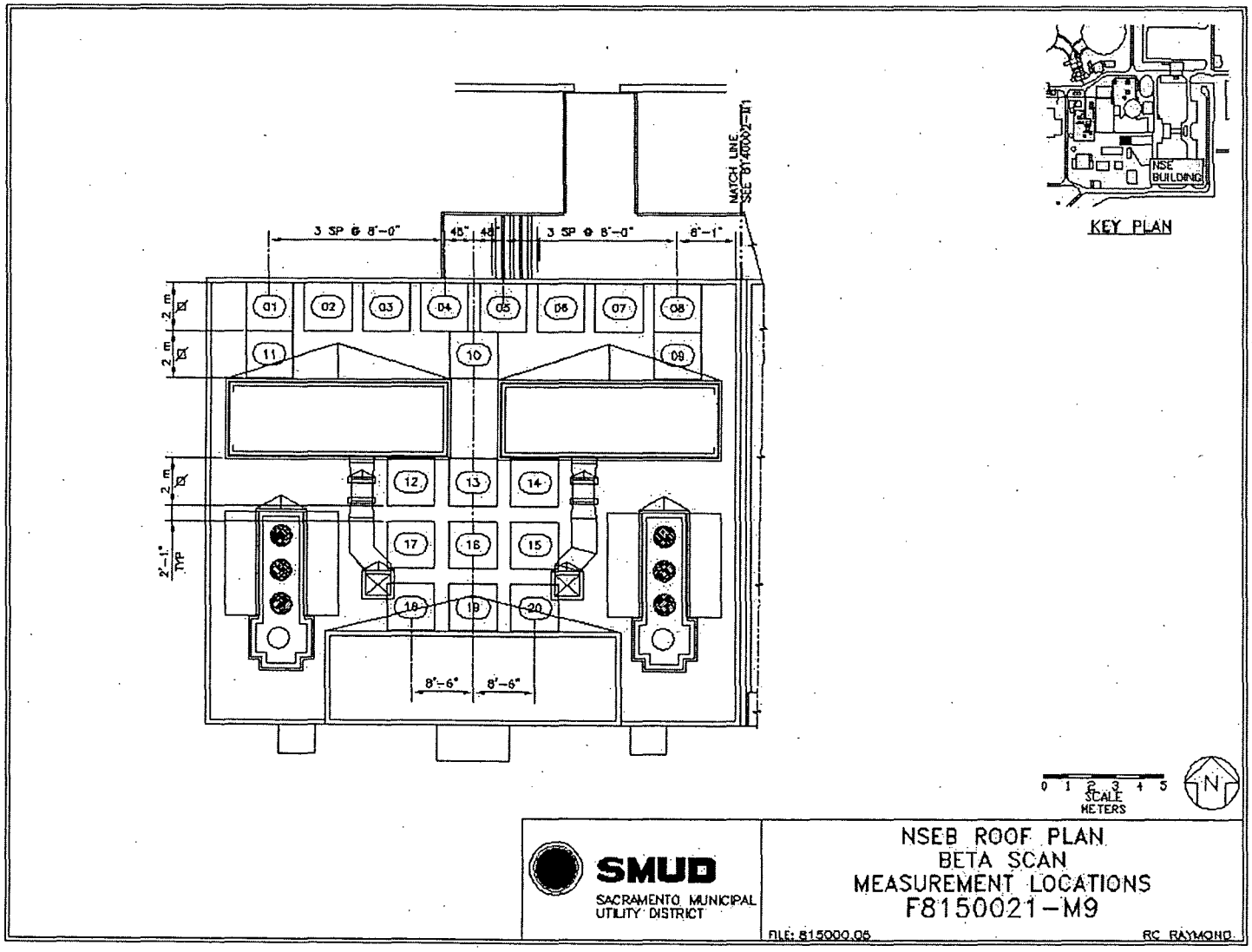
KEY PLAN
NSE BUILDING
MATCH LINE SEE B140002-M1
3 SP @ 8'-0"
45°
45°
3 SP @ 8'-0"
8'-1"
2 m
2 m
2 m
2'-1" TYP
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
8'-6"
8'-6"
0 1 2 3 4 5
SCALE METERS
N
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
NSEB ROOF PLAN
BETA SCAN
MEASUREMENT LOCATIONS
F8150021-M9
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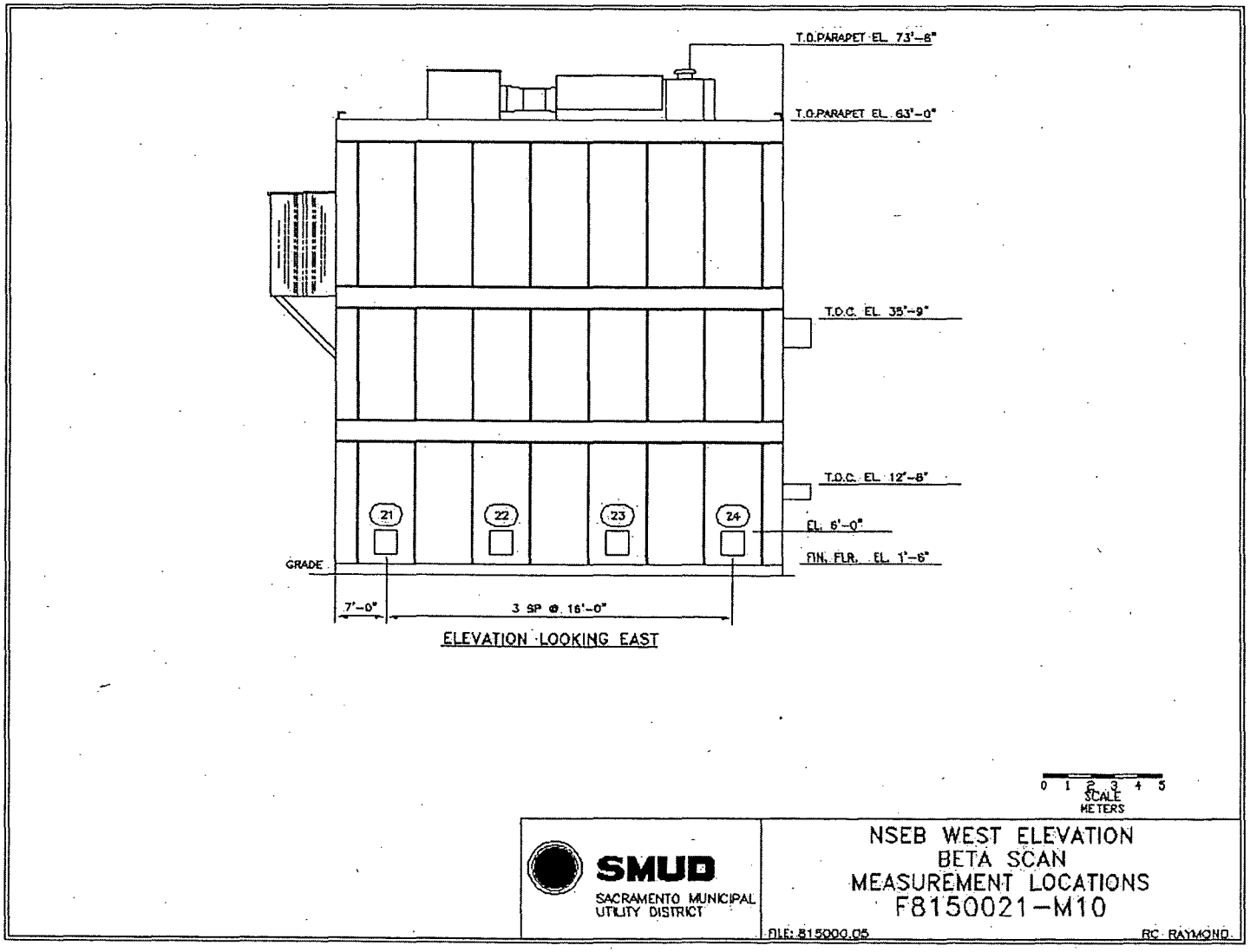
RC RAYMOND


T.O.PARAPET EL. 73'-6"
T.O.PARAPET EL. 63'-0"
T.O.C. EL. 35'-9"
T.O.C. EL. 12'-6"
EL. 6'-0"
FIN. FLR. EL. 1'-6"
GRADE
21
22
23
24
7'-0"
3 SP @ 16'-0"
ELEVATION LOOKING EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB WEST ELEVATION
BETA SCAN
MEASUREMENT LOCATIONS
F8150021-M10
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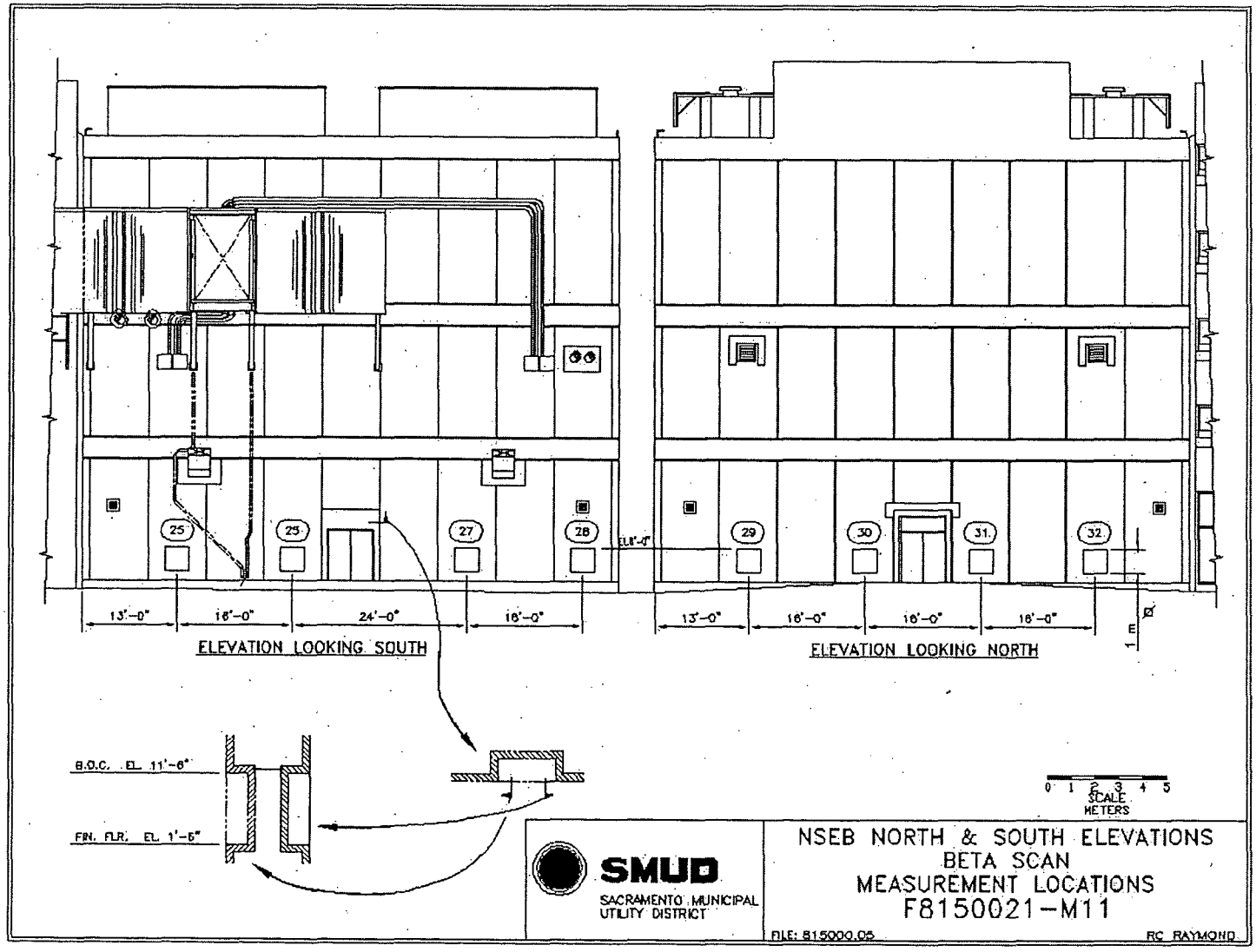
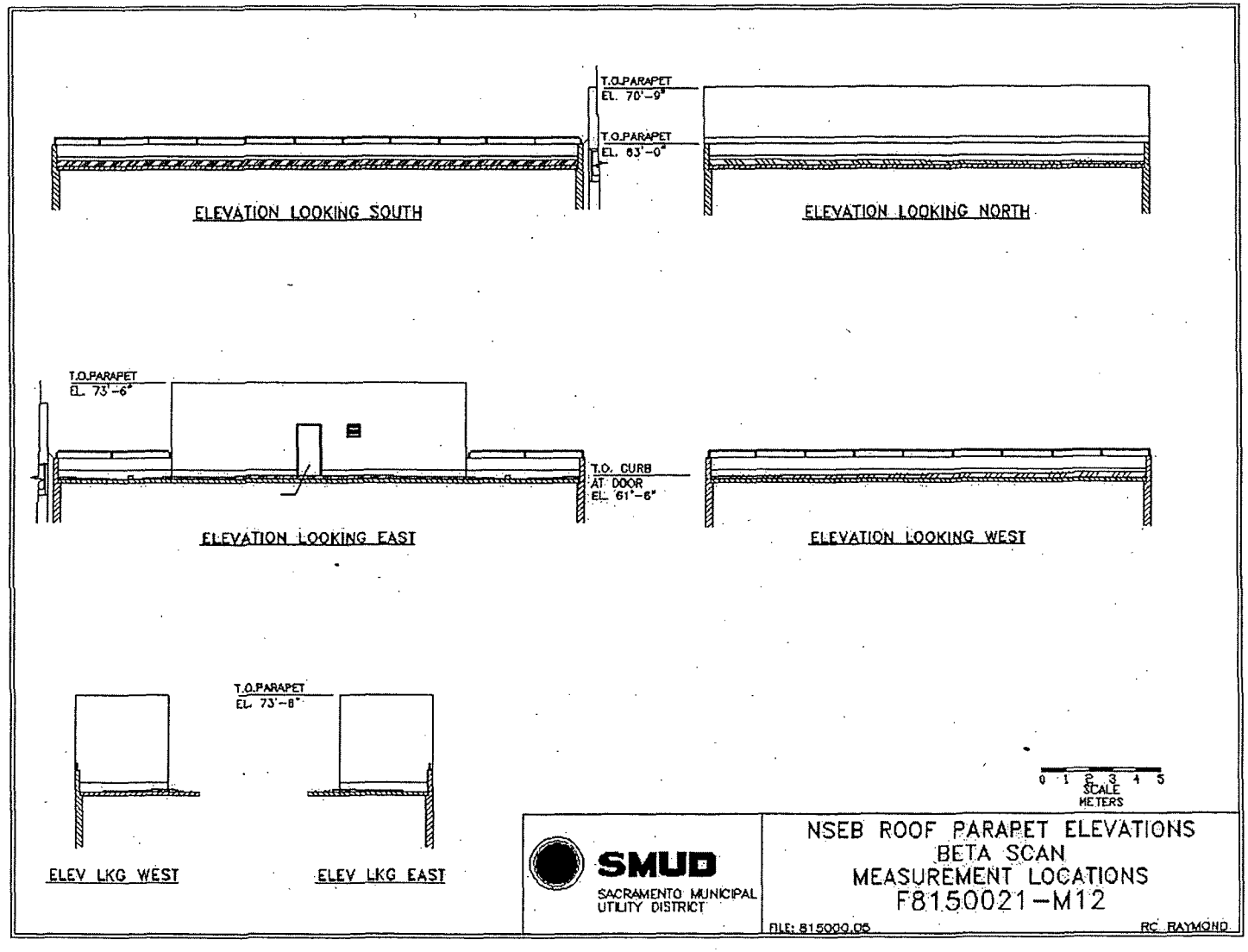
RC RAYMOND


25
26
27
28
29
30
31
32
13'-0"
16'-0"
24'-0"
16'-0"
13'-0"
16'-0"
16'-0"
16'-0"
ELEVATION LOOKING SOUTH
ELEVATION LOOKING NORTH
B.O.C. EL. 11'-6"
FIN. FLR. EL. 1'-6"
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB NORTH & SOUTH ELEVATIONS
BETA SCAN
MEASUREMENT LOCATIONS
F8150021-M11
FILE: B15000.05
RC RAYMOND


T.O.PARAPET
EL. 70'-9"
T.O.PARAPET
EL. 63'-0"
ELEVATION LOOKING SOUTH
ELEVATION LOOKING NORTH
T.O.PARAPET
EL. 73'-6"
T.O. CURB
AT DOOR
EL. 61'-6"
ELEVATION LOOKING EAST
ELEVATION LOOKING WEST
T.O.PARAPET
EL. 73'-8"
ELEV LKG WEST
ELEV LKG EAST
0 1 2 3 4 5
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
NSEB ROOF PARAPET ELEVATIONS
BETA SCAN
MEASUREMENT LOCATIONS
F8150021-M12
FILE: 815000.05
RC RAYMOND

Attachment 2

Instrumentation

October 31, 2007

Survey Unit F8150021

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; 203484	43-68B; 161410	433	1033
M2350; 203486	43-68B; 161400	433	1033
M2350; 203465	43-68B; 148458	433	1033
M2350; 149802	43-68B; 148453	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	21500
$DCGL_W$	43000
$DCGL_{EMC}$	N/A

Attachment 3

Investigation

October 31, 2007

Survey Unit F8150021

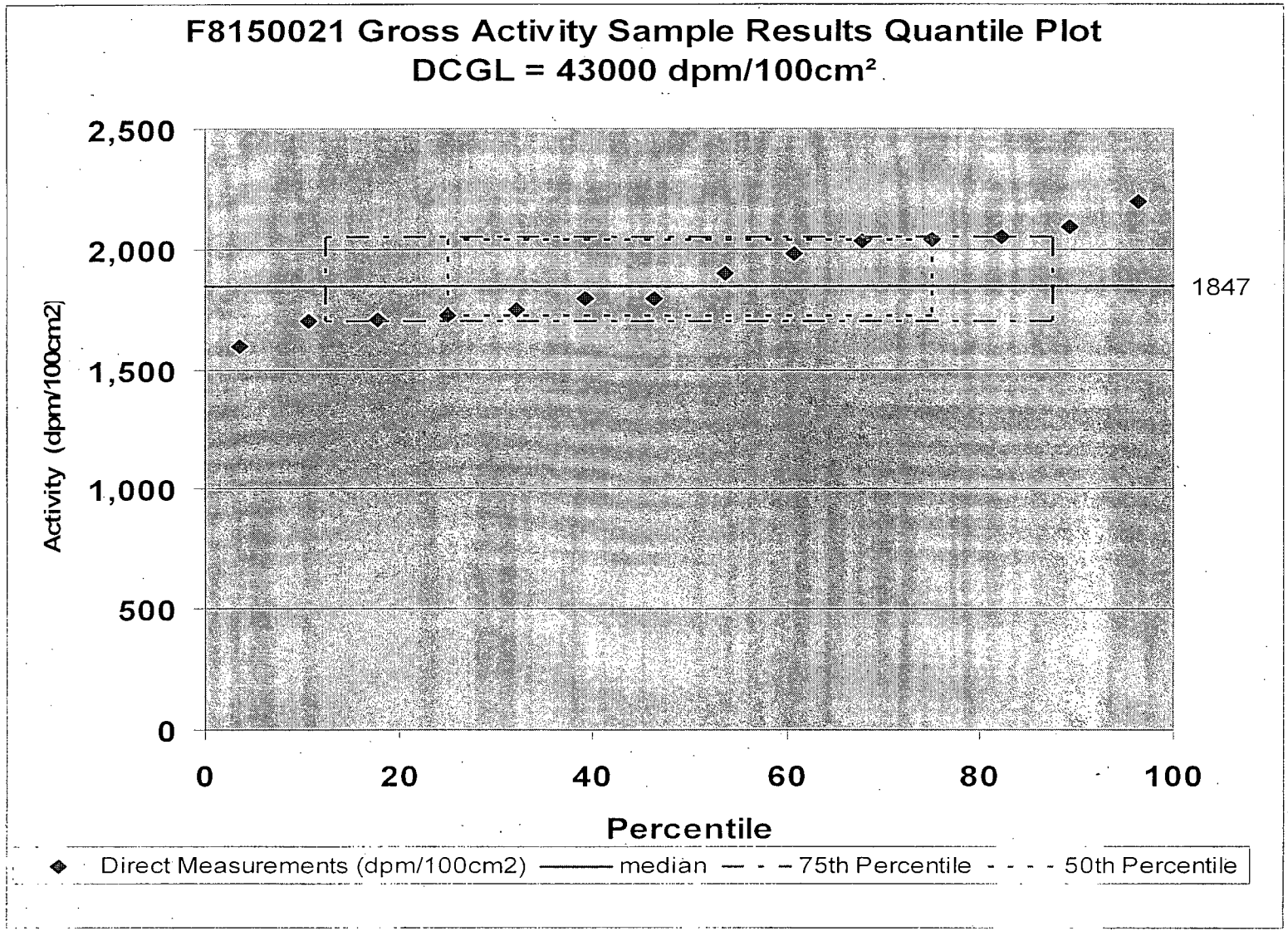
(none required)

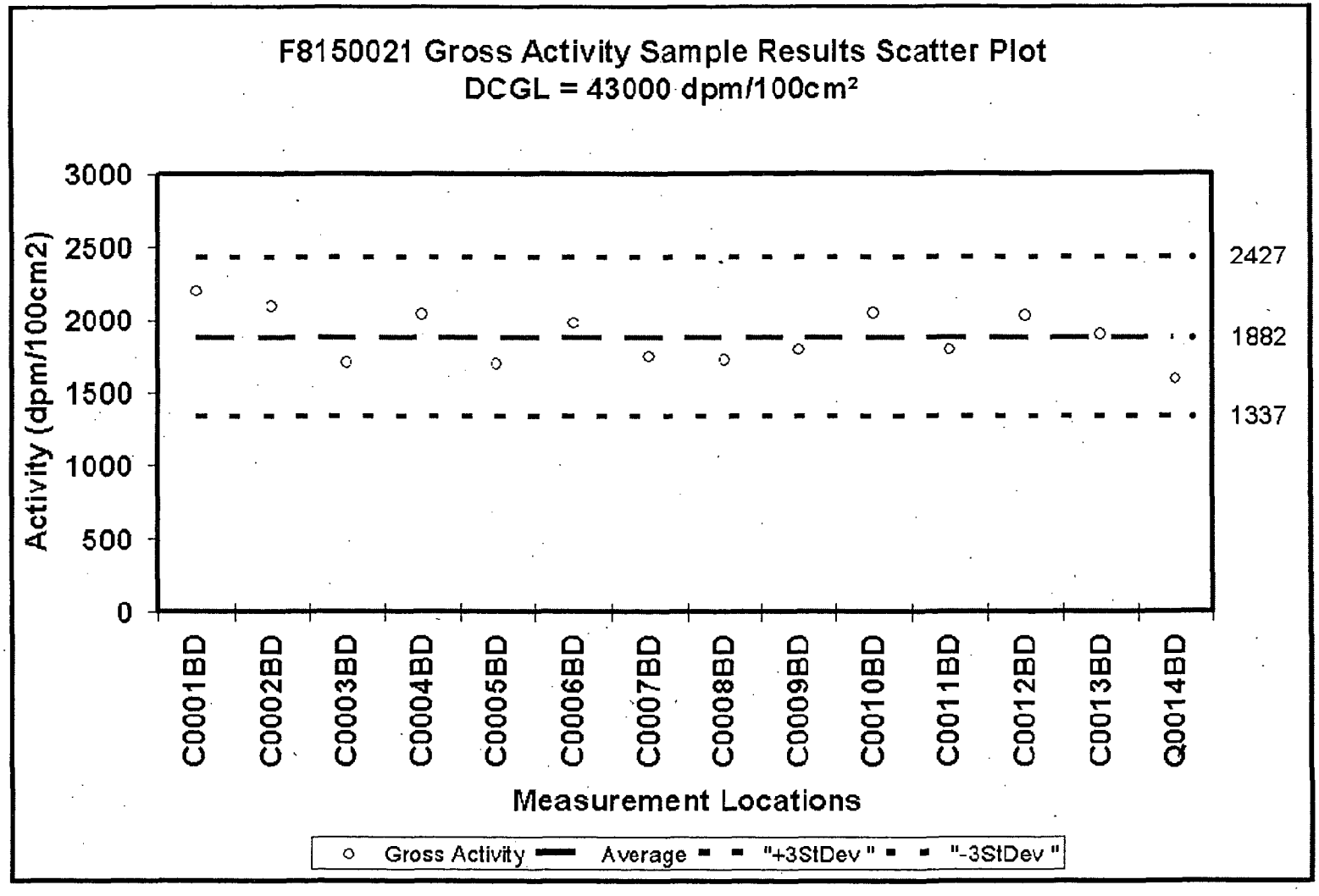
Attachment 4

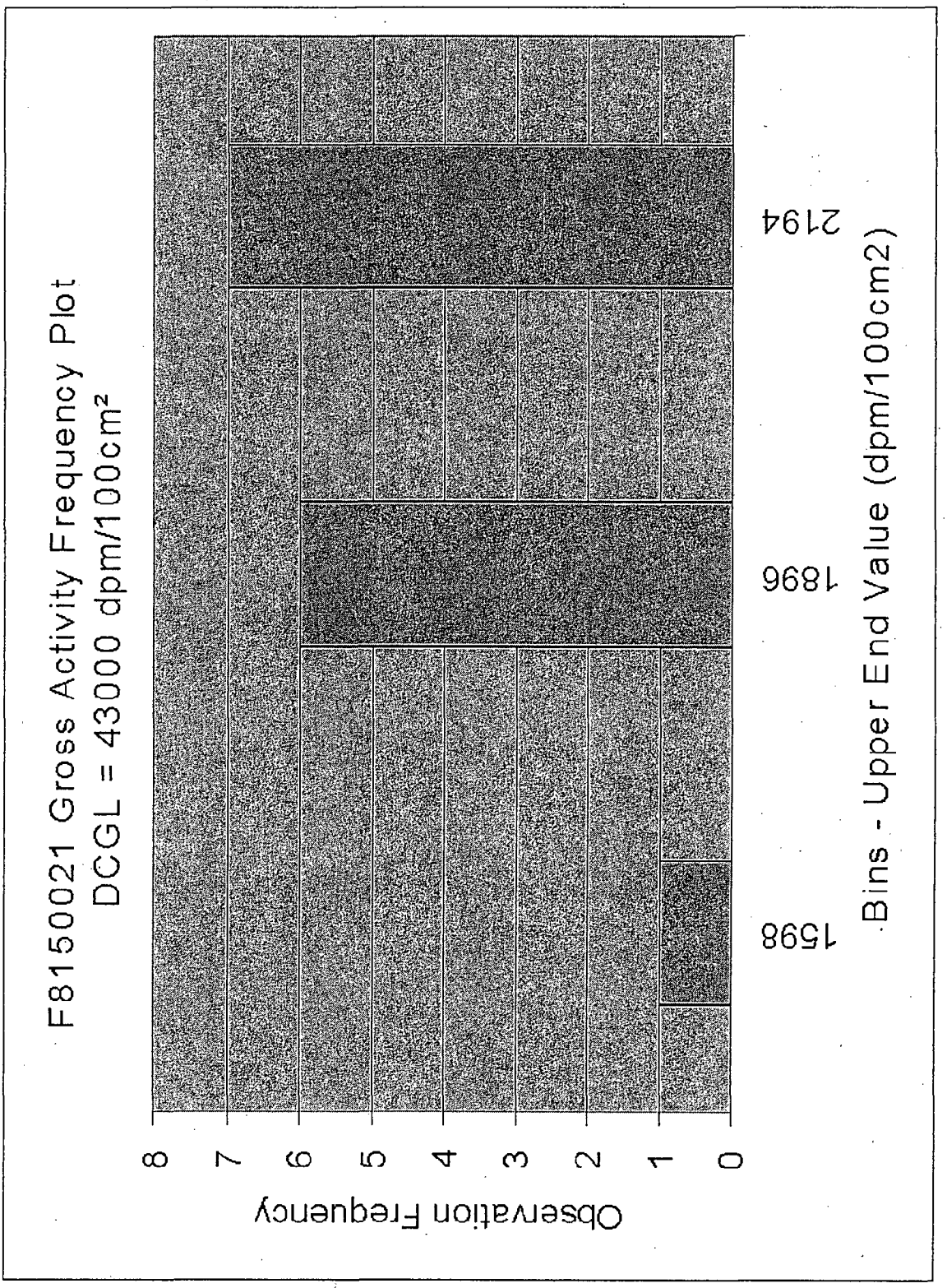
Data Assessment

October 31, 2007

Survey Unit F8150021


F8150021 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
2,500
2,000
1,500
1,000
500
0
Activity (dpm/100cm2)
1847
0
20
40
60
80
100
Percentile
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8150021 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
3000
2500
2000
1500
1000
500
0
2427
1882
1337
C0001BD
C0002BD
C0003BD
C0004BD
C0005BD
C0006BD
C0007BD
C0008BD
C0009BD
C0010BD
C0011BD
C0012BD
C0013BD
Q0014BD
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8150021 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
1
2
3
4
5
6
7
8
1598
1896
2194
Bins - Upper End Value (dpm/100cm2)