Rancho Seco

Final Status Survey Summary Report

November 2, 2007

Waste Gas Valve Gallery Upper Walls and Ceiling (Room 059)

Survey Unit F8130232

Prepared By: _____ Date: 11/2/2007

FSS Engineer

Reviewed By: _____ Date: 11/2/07

Lead FSS Engineer

Approved By: _____ Date: 11-14-07

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130232, Waste Gas Valve Gallery Upper Walls and Ceiling (Room 059)

Survey Unit Description:

Operating History: The Waste Gas Valve Gallery Room is located on the -20' elevation of the Auxiliary Building. The Auxiliary Building is a reinforced concrete structure that, during power operations, contained the Radwaste processing and supporting systems. The building has six main elevations. Residual levels of surface radioactivity were detected on all interior elevations of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were taken on each interior elevation of the Auxiliary Building. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements taken on the -20' elevation, showed a mean gross activity level of 247,831 dpm/100 cm^2 and a maximum value of 10,080,000 dpm/100 cm^2. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior surfaces of the Auxiliary Building were determined primarily to be a Class 1 for the floors and lower walls (bottom 2 meters of the walls), and Class 2 for the upper walls and ceiling. Inside the Waste Gas Valve Gallery Room the gross surface activity levels on the upper walls and ceiling were less than the DCGL prior to remediation. Therefore, a Class 2 final status survey was performed on the upper wall and ceiling surfaces of the room.

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 22 m^2 were scanned for approximately 35% 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	Waste Gas Valve Gallery (Room 059)
Survey Unit:	0232	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m^2)**:**	63	
Evaluator:	Michael Stein	
DCGL (dpm/100 cm^2)**:**	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGLemc (dpm/100 cm^2)**:**	N/A	Class 2
LBGR (dpm/100 cm^2)**:**	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm^2)**:**	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m^2)**:**	3.7	Class 2
Scan Area (m^2)**:**	22	
Scan Coverage (%):	35%	Class 2
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.96407	
Calculated Relative Shift:	1.7	
Relative Shift Used:	1.7	Uses 3.0 if Relative Shift is >3
N-Value:	14	
Design N-Value + 20%:	17	NUREG-1575 Table 5-5
Design Min Samples N:	17	Class 2
Grid Spacing L:	1.9	Class 2

Survey Results:

A total of 21 direct measurements were made in F8130232. 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 3983 to 5487 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)
F8130232-C0001BD	1805
F8130232-C0002BD	1769
F8130232-C0003BD	1618
F8130232-C0004BD	1810
F8130232-C0005BD	1816
F8130232-C0006BD	1629
F8130232-C0007BD	1556
F8130232-C0008BD	1613
F8130232-C0009BD	1629
F8130232-C0010BD	2127
F8130232-C0011BD	1660
F8130232-C0012BD	1748
F8130232-C0013BD	1442
F8130232-C0014BD	1753
F8130232-C0015BD	1665
F8130232-C0016BD	1841
F8130232-C0017BD	1805
F8130232-C0018BD	1847
F8130232-C0019BD	1551
F8130232-C0020BD	1722
F8130232-C0021BD	1198
Mean:	1695
Median:	1722
Standard Deviation:	183
Range:	1198 - 2127

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm^2)
F8130232C0001SM	6.14
F8130232C0002SM	8.7
F8130232C0003SM	6.14
F8130232C0004SM	8.7
F8130232C0005SM	48.44
F8130232C0006SM	3.58
F8130232C0007SM	9.98
F8130232C0008SM	9.98
F8130232C0009SM	9.98
F8130232C0010SM	36.9
F8130232C0011SM	3.58
F8130232C0012SM	2.29
F8130232C0013SM	3.58
F8130232C0014SM	7.42
F8130232C0015SM	9.98
F8130232C0016SM	4.86
F8130232C0017SM	16.39
F8130232C0018SM	2.29
F8130232C0019SM	3.58
F8130232C0020SM	9.98
F8130232C0021SM	1.01
Mean:	10.17
Median:	7.42
Standard Deviation:	11.56
Range:	1.01 to 48.44

Survey Unit Data Assessment:

The survey design required 17 direct measurements for the Sign Test. In actuality 21 direct measurements were obtained. 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	
Ambient Background Used (dpm/100 cm^2):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	21	
Median (dpm/100 cm^2):	1722	
Mean (dpm/100 cm^2):	1695	
Direct Measurement Standard Deviation (dpm/100 cm^2):	183	
Total Standard Deviation (dpm/100 cm^2):	183	Based on samples and backgrounds.
Maximum (dpm/100 cm^2):	2127	
Material Type:	N/A	Background Subtract Not Applied
Sign Test Final N Value:	21	
S+ Value:	21	
Critical Value:	14	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGLemc:	N/A	Class 2
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 2 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.

Conclusion:

The FSS of this survey unit was properly designed as a Class 2 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 F8130232 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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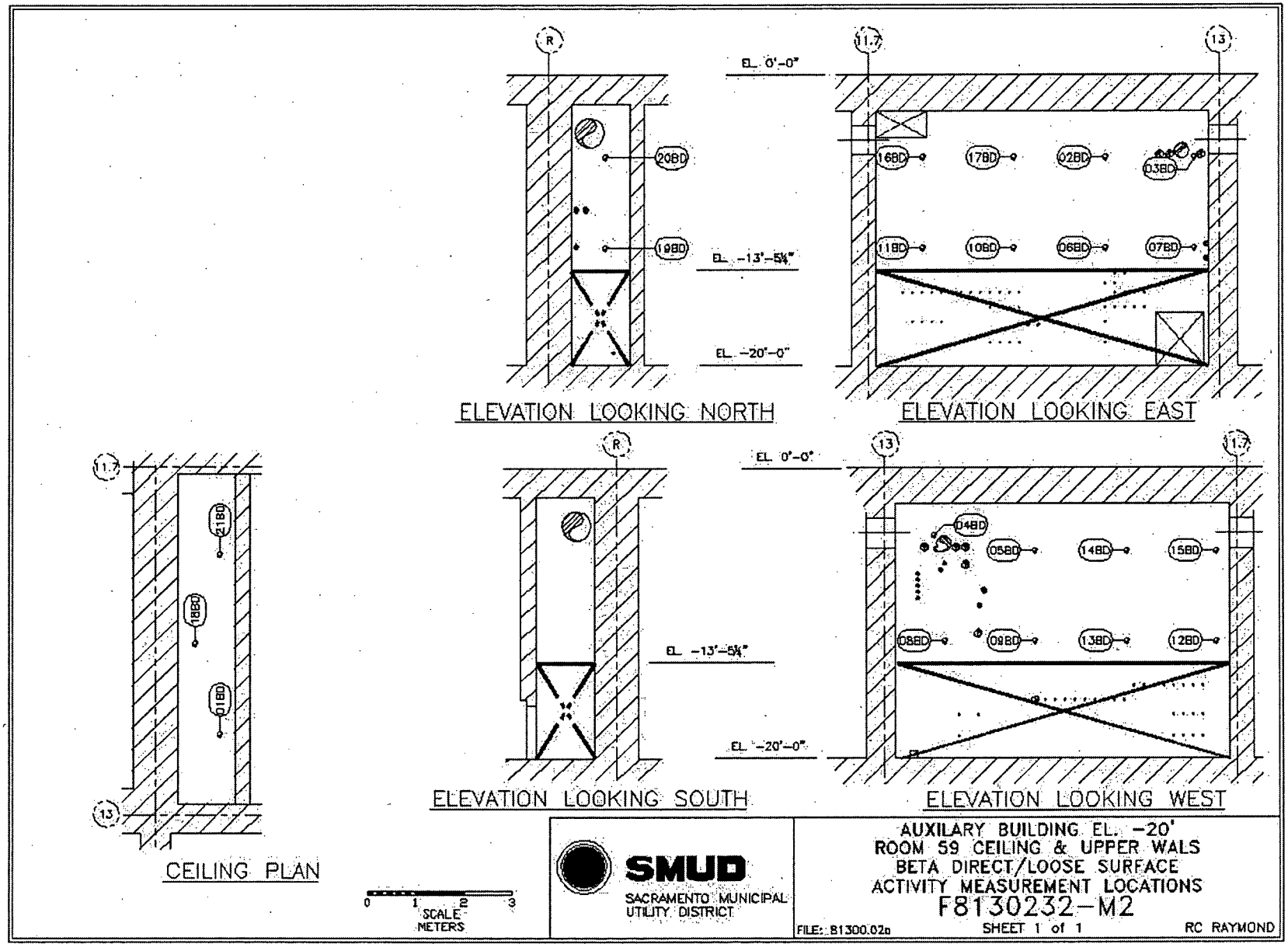
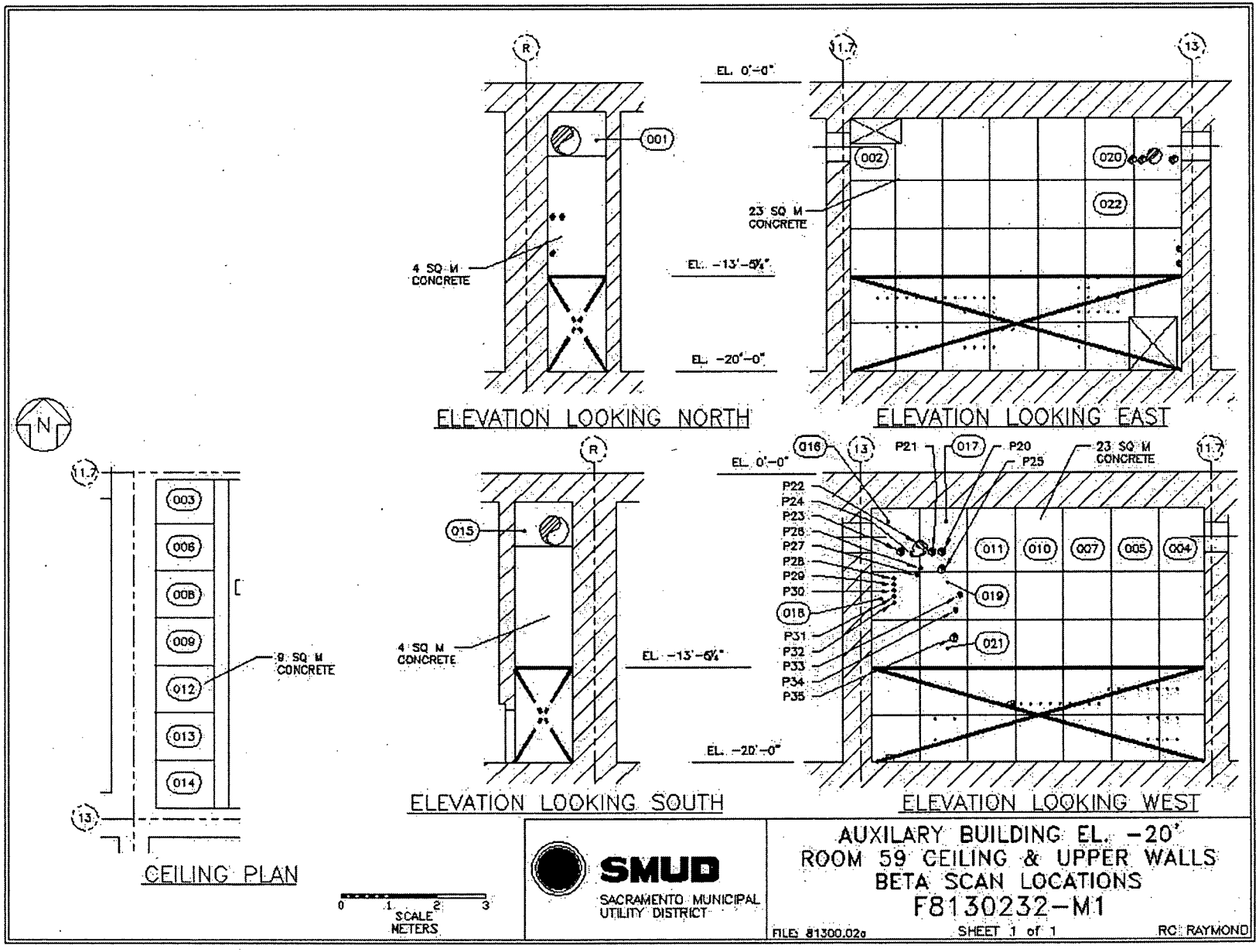
Survey Unit F8130232


R
11.7
13
EL. 0'-0"
EL. -13'-5¼"
EL. -20'-0"
20BD
19BD
16BD
17BD
02BD
03BD
11BD
10BD
06BD
07BD
ELEVATION LOOKING NORTH
ELEVATION LOOKING EAST
21BD
18BD
01BD
ELEVATION LOOKING SOUTH
04BD
05BD
14BD
15BD
08BD
09BD
13BD
12BD
ELEVATION LOOKING WEST
CEILING PLAN
0 1 2 3
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILARY BUILDING EL. -20'
ROOM 59 CEILING & UPPER WALS
BETA DIRECT/LOOSE SURFACE
ACTIVITY MEASUREMENT LOCATIONS
F8130232-M2
FILE: B1300.02a
SHEET 1 of 1
RC RAYMOND


R
001
4 SQ M CONCRETE
EL. 0'-0"
EL. -13'-6¾"
EL. -20'-0"
ELEVATION LOOKING NORTH
11.7
13
002
020
022
23 SQ M CONCRETE
ELEVATION LOOKING EAST
N
11.7
003
006
008
009
012
013
014
13
9 SQ M CONCRETE
CEILING PLAN
R
015
4 SQ M CONCRETE
EL. -13'-6¾"
ELEVATION LOOKING SOUTH
016
13
P21
017
P20
P25
23 SQ M CONCRETE
11.7
EL. 0'-0"
P22
P24
P23
P26
P27
P28
P29
P30
018
P31
P32
P33
P34
P35
011
010
007
005
004
019
021
EL. -20'-0"
ELEVATION LOOKING WEST
0 1 2 3
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
AUXILARY BUILDING EL. -20'
ROOM 59 CEILING & UPPER WALLS
BETA SCAN LOCATIONS
F8130232-M1
FILES 81300.02o
SHEET 1 of 1
RC: RAYMOND

Attachment 2

Instrumentation

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Survey Unit F8130232

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; 203486	43-68B; 161400	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 cm^2)
Investigation Criteria - Direct	43000
Investigation Criteria – Scan	43000
$DCGL_W$	43000
$DCGL_{EMC}$	N/A

Attachment 3

Investigation

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(none required)

Attachment 4

Data Assessment

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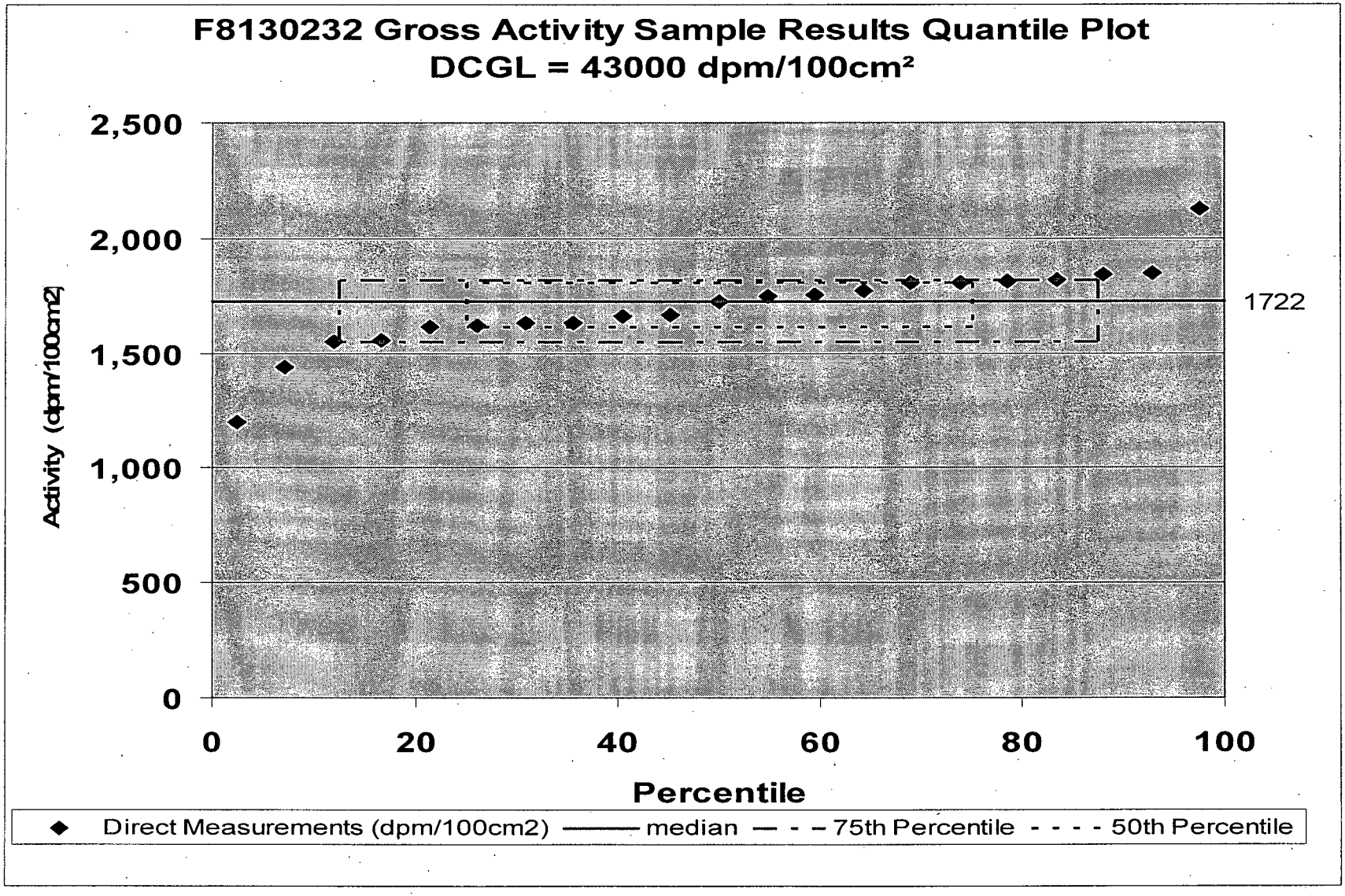
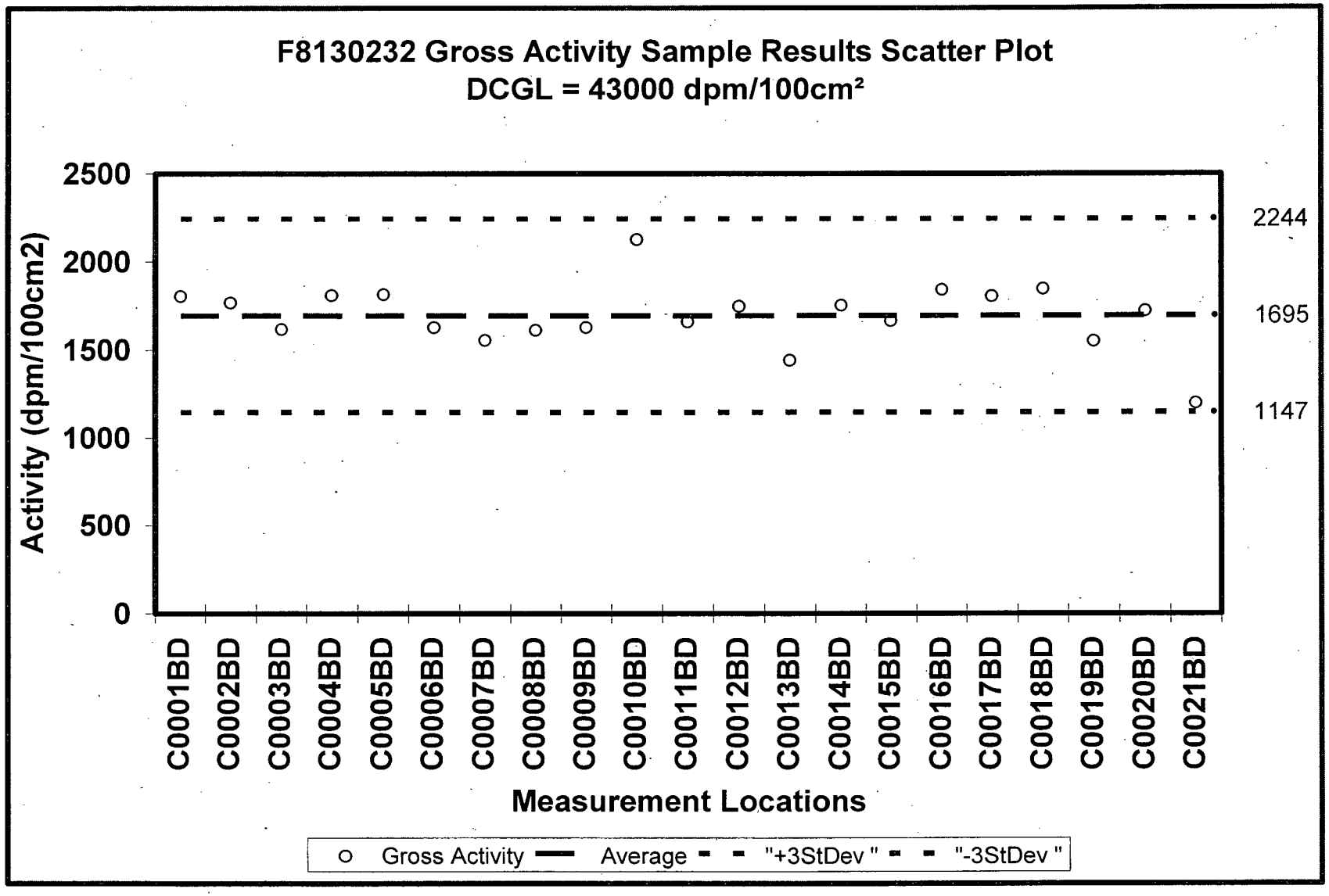
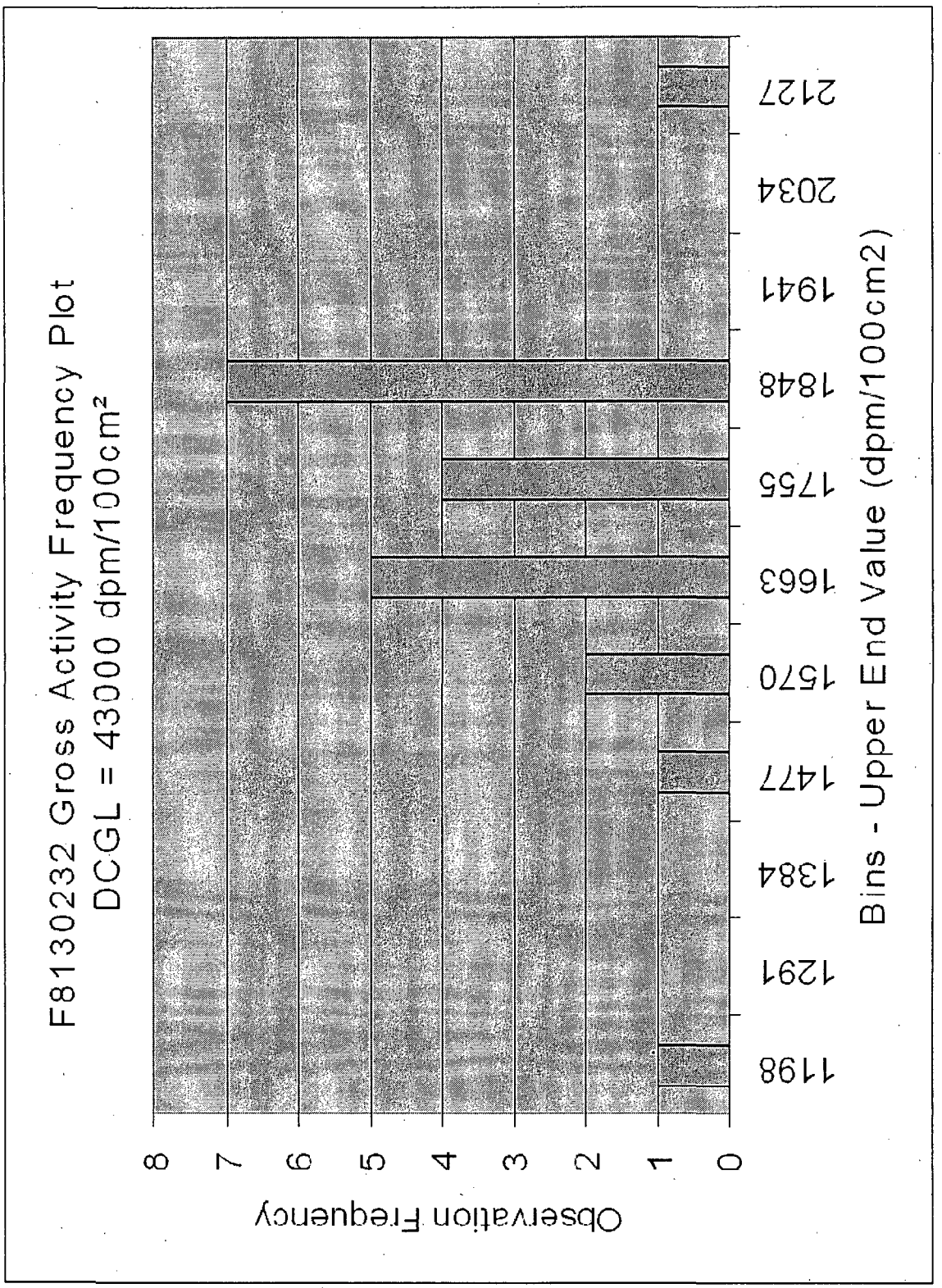
Survey Unit F8130232


F8130232 Gross Activity Sample Results Quantile Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
2,500
2,000
1,500
1,000
500
0
0
20
40
60
80
100
Percentile
1722
Direct Measurements (dpm/100cm2)
median
75th Percentile
50th Percentile


F8130232 Gross Activity Sample Results Scatter Plot
DCGL = 43000 dpm/100cm²
Activity (dpm/100cm2)
2500
2000
1500
1000
500
0
2244
1695
1147
C0001BD
C0002BD
C0003BD
C0004BD
C0005BD
C0006BD
C0007BD
C0008BD
C0009BD
C0010BD
C0011BD
C0012BD
C0013BD
C0014BD
C0015BD
C0016BD
C0017BD
C0018BD
C0019BD
C0020BD
C0021BD
Measurement Locations
Gross Activity
Average
"+3StDev"
"-3StDev"


F8130232 Gross Activity Frequency Plot
DCGL = 43000 dpm/100cm²
Observation Frequency
0
1
2
3
4
5
6
7
8
Bins - Upper End Value (dpm/100cm2)
1198
1291
1384
1477
1570
1663
1755
1848
1941
2034
2127