Rancho Seco

Final Status Survey Summary Report

March 20, 2008

Industrial Area Central Yard - North and West of the Maintenance Building

Survey Unit F8000102

Prepared By: _____ Date: 3.20.2008

FSS Engineer

Reviewed By: _____ Date: 3/26/08

Lead FSS Engineer

Approved By: _____ Date: 2-20-09 ~~2-20-08~~ 2-20-09

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000102, Industrial Area Central Yard - North and West of the Maintenance Building

Survey Unit Description:

Operating History: This area covers the majority of Industrial Area soils exclusive of the building footprints and rail line in this area. Operating records and the HSA document no specific release of radioactivity in these survey areas however this area does border known contaminated areas. The HSA recorded no specific unplanned release events.

Site Characterization: Soil and sediment samples were collected and analyzed for the presence of plant-derived radionuclides. Cs-137 was the only detected nuclide of plant origin with a mean activity level of 0.062 pCi/g and a maximum value of 0.299 pCi/g. (Site background levels of Cs-137 have been determined to be approximately 0.312 pCi/g.) As described in section 2 of the LTP, the area was evaluated using DSIP-0020 and was designated as Class 3.

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 414 m^2 were scanned for approximately 23% coverage. Soil samples were collected at each direct measurement location and analyzed by HPGe detector. 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:	F800	Industrial Area Central Yard - North and West of the Maintenance Building
Survey Unit:	0102	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	1800	
Evaluator:	Gary Frank	
DCGL Cs137 surrogate (pCi/g)**:**	51.2	
Area Factor:	N/A	Class 3
Design DCGLemc (pCi/g)**:**	N/A	Class 3
LBGR (pCi/g)**:**	25.6	Default = 50% DCGL
Design Sigma (pCi/g)**:**	0.01	DTBD-06-001, Table 5-4D
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m^2)**:**	N/A	Class 3
Total Area Scanned (m^2)**:**	414	
Scan Coverage (%):	23%	Class 3
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	2560	
Relative Shift Used:	3	Uses 3.0 if Rel Shift >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 14 direct measurements were made in F8000102. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity above MDA with Cs-137 having a MDA from 0.245 to 0.313 pCi/g and Co-60 having an MDA from 0.156 to 0.237 pCi/g. Soil samples were counted to the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results
(all activity values in pCi/g)

Measurement ID	Cs137 MDA	Cs137 Activity	Uncertainty
Mean:		5.45E-01	
Median:		7.86E-01	
Standard Deviation:		3.82E-01	
Range:	4.81E-02 to 9.15E-01		
F8000102A0001GD	8.29E-01	< 8.29E-01	
F8000102S0001SS	5.09E-02	< 5.09E-02	
F8000102A0002GD	9.15E-01	< 9.15E-01	
F8000102S0002SS	6.04E-02	< 6.04E-02	
F8000102A0003GD	7.89E-01	< 7.89E-01	
F8000102S0003SS	4.81E-02	< 4.81E-02	
F8000102A0004GD	7.82E-01	< 7.82E-01	
F8000102S0004SS	5.35E-02	< 5.35E-02	
F8000102A0005GD	7.59E-01	< 7.59E-01	
F8000102S0005SS	5.13E-02	< 5.13E-02	
F8000102A0006GD	7.99E-01	< 7.99E-01	
F8000102A0007GD	8.34E-01	< 8.34E-01	
F8000102A0008GD	8.02E-01	< 8.02E-01	
F8000102A0009GD	8.50E-01	< 8.50E-01	

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 3. The sample mean and median values were less than the DCGL. The sample standard deviation was greater than the design standard deviation, but both values of sigma resulted in a relative shift greater than three (3), no additional samples were required.

Table 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	14	
Median (pCi/g)**:**	7.86E-01	
Mean (pCi/g)**:**	5.45E-01	
Standard Deviation (pCi/g)**:**	3.82E-01	
Maximum (pCi/g)**:**	9.15E-01	
Sign Test Final N Value:	14	
S+ Value:	14	
Critical Value:	9	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGLemc:	N/A	Class 3
Standard Deviation <= Sigma:	Investigate	<0.5 DCGL
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
The survey unit passes all conditions?	Investigate	<0.5 DCGL - Survey 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, the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 3 land 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. 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. All of the direct measurements were less than 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 F8000102 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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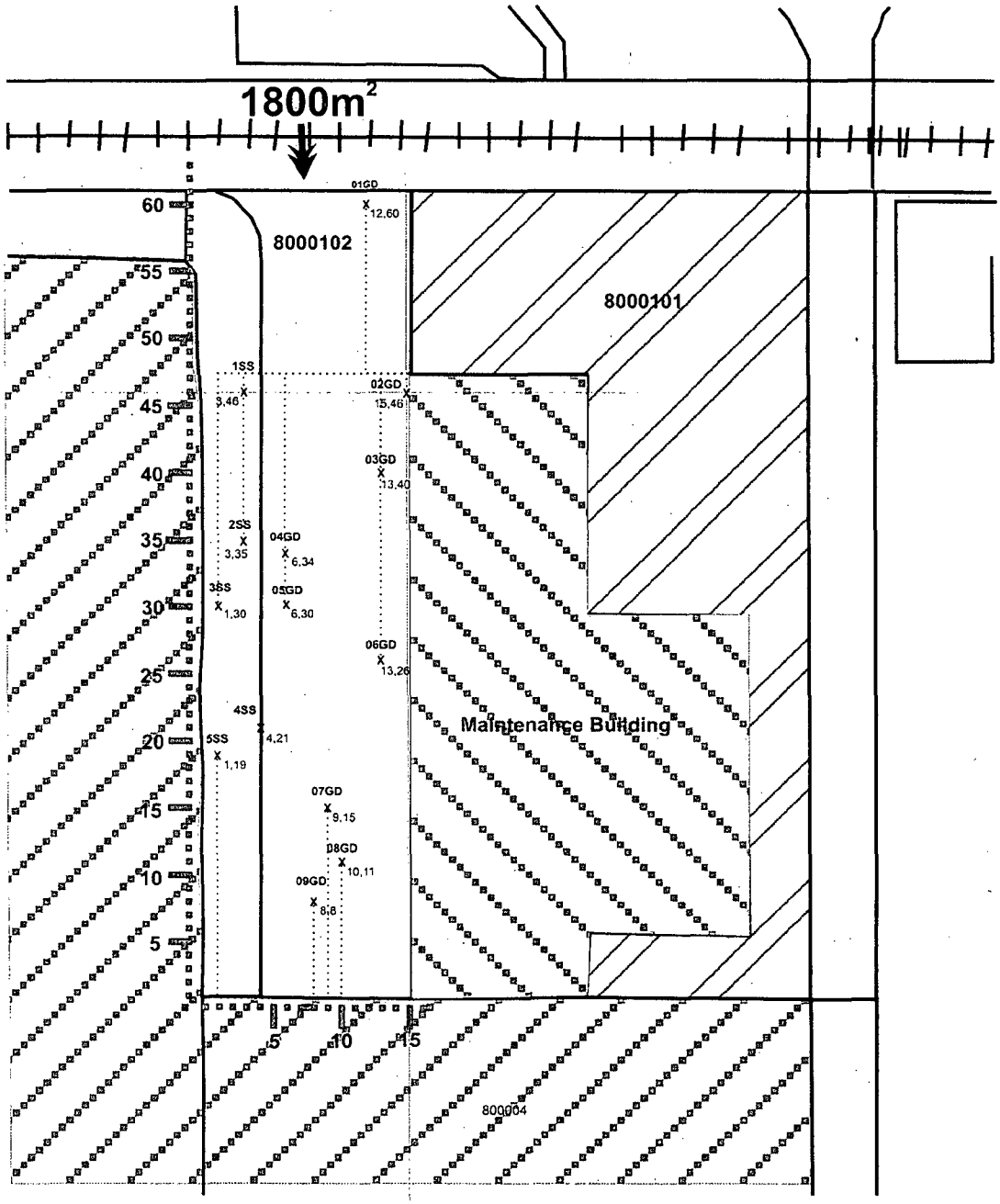
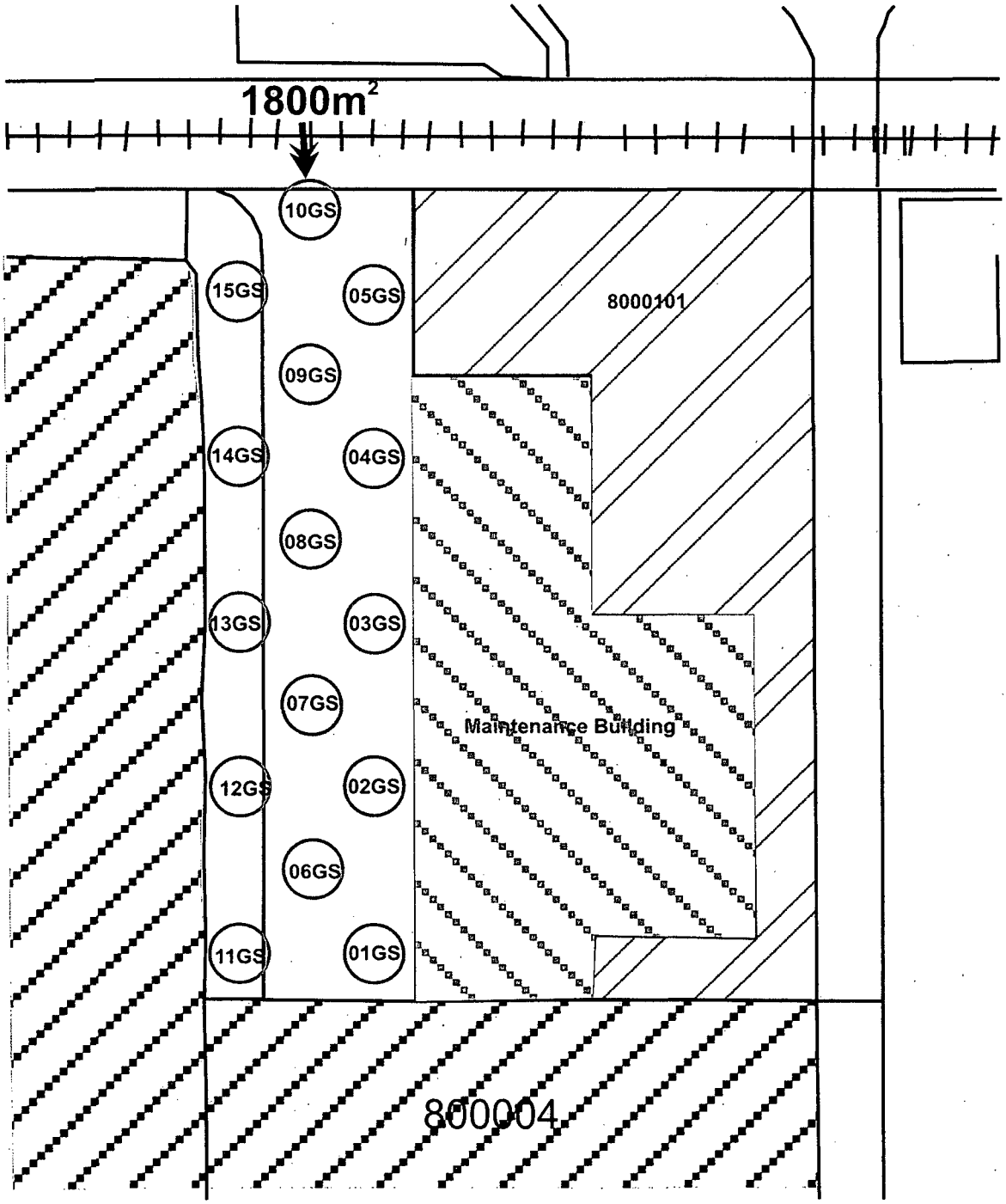
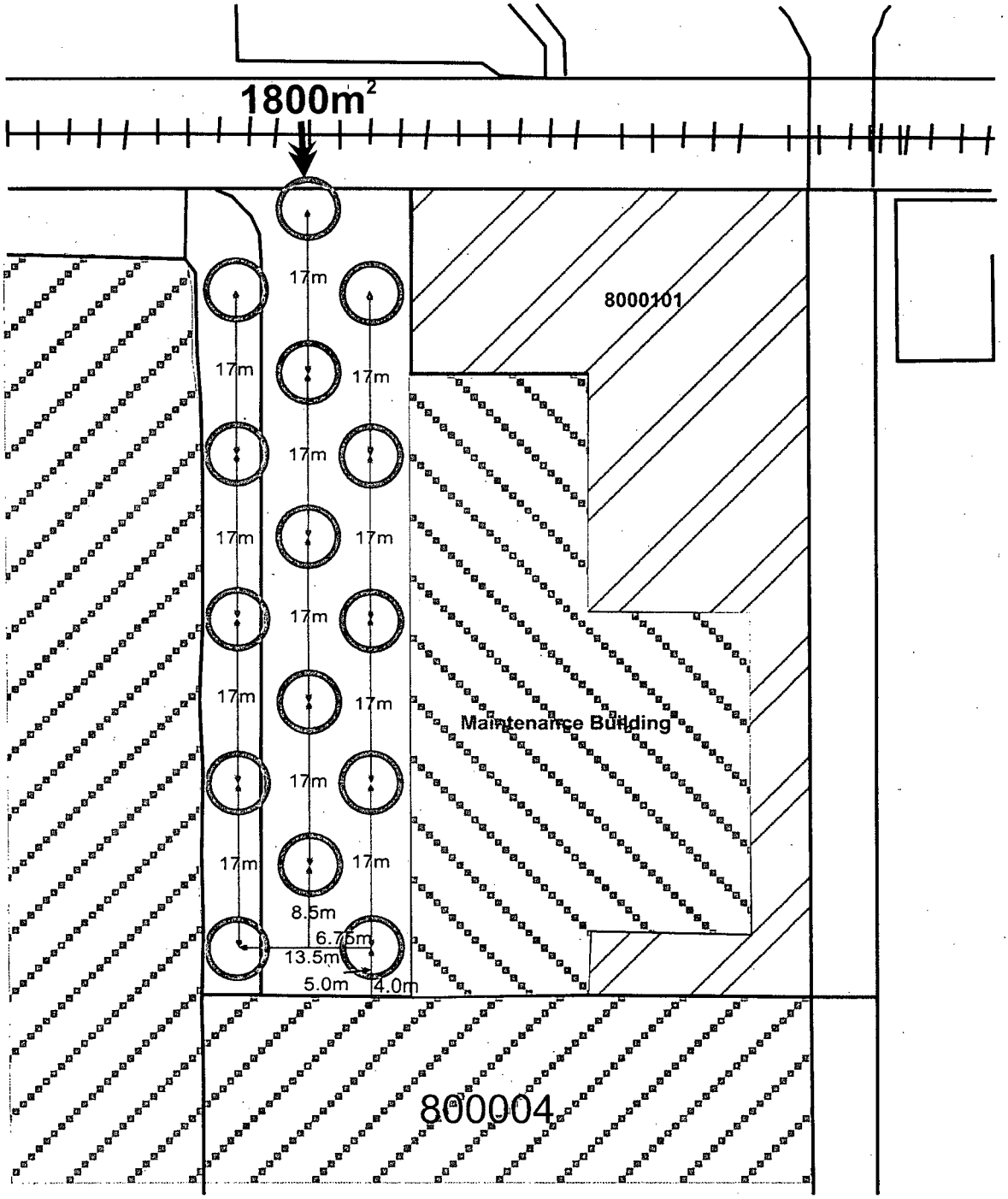
Survey Unit F8000102


1800m²
8000102
8000101
Maintenance Building
800004
01GD
12.60
02GD
15.46
03GD
13.40
04GD
6.34
05GD
6.30
06GD
13.26
07GD
9.15
08GD
10.11
09GD
8.8
1SS
3.46
2SS
3.35
3SS
1.30
4SS
4.21
5SS
1.19
60
55
50
45
40
35
30
25
20
15
10
5
5
10
15

F8000102 - M1


1800m²
10GS
15GS
05GS
09GS
14GS
04GS
08GS
13GS
03GS
07GS
12GS
02GS
06GS
11GS
01GS
8000101
Maintenance Building
800004

F8000102 - M2



F8000102 - M2A

Attachment 2

Instrumentation

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Survey Unit F8000102

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	05069128	Soil – 0.0604 pCi/g Cs-137
Inspector	N/A	08051294	Asphalt – 0.915 pCi/g Cs-137
ISOCS	N/A	2983947	Soil – 0.272 pCi/g Cs-137 Soil – 0.178 pCi/g Co-60 Asphalt – 0.313 pCi/g Cs-137

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS	Investigation Criteria - Scan	Soil – 26.3 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60 Asphalt – 26.3 pCi/g Cs-137
Inspector	Investigation Level – Direct	Asphalt – 26.3 pCi/g Cs-137
HPGe	Investigation Level	Soil – 26.3 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60
All	$DCGL_W$	51.2 Cs-137 12.6 Co-60
All	$DCGL_{EMC}$	N/A

Attachment 3

Investigation

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Survey Unit F8000102

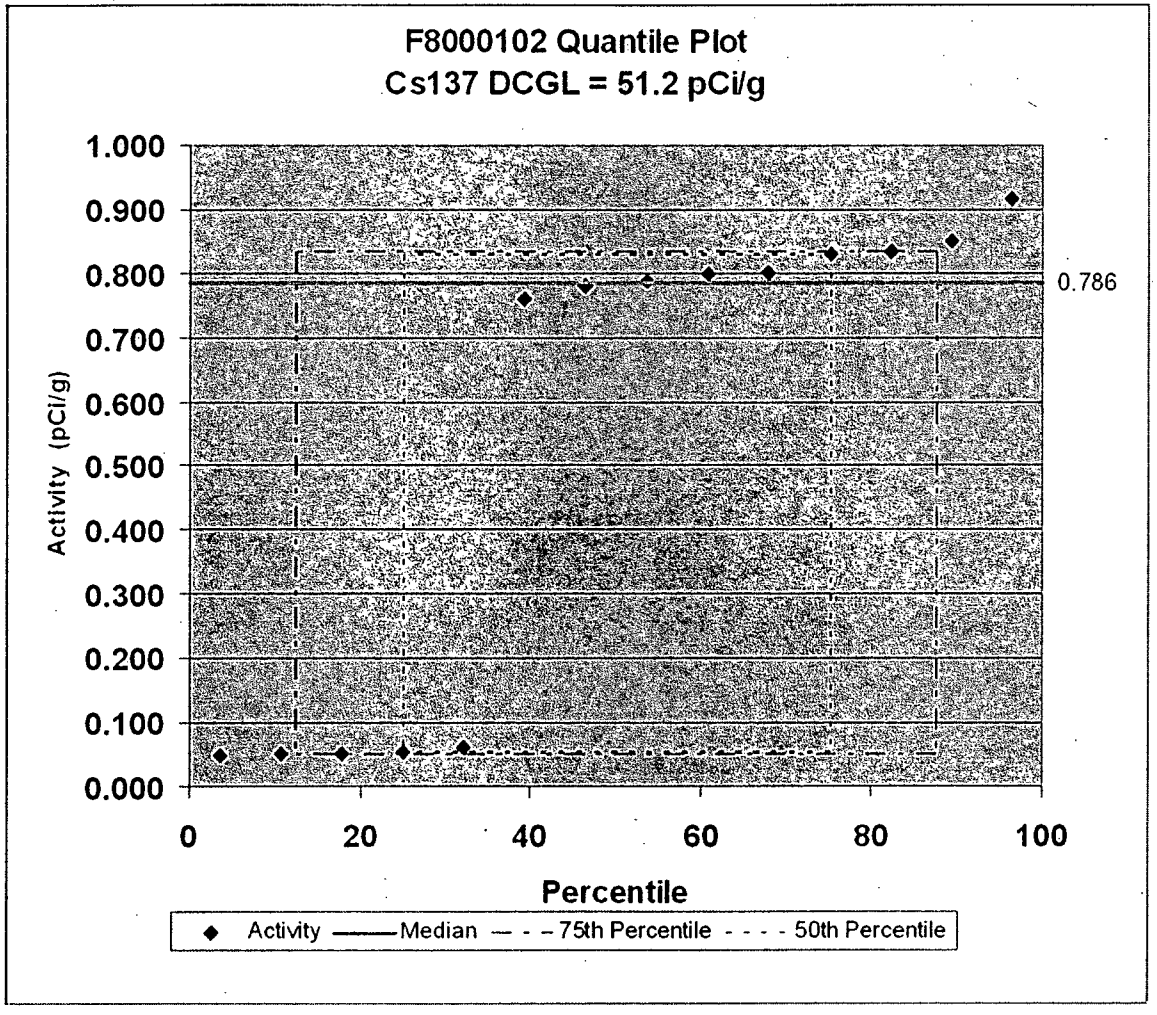
(none required)

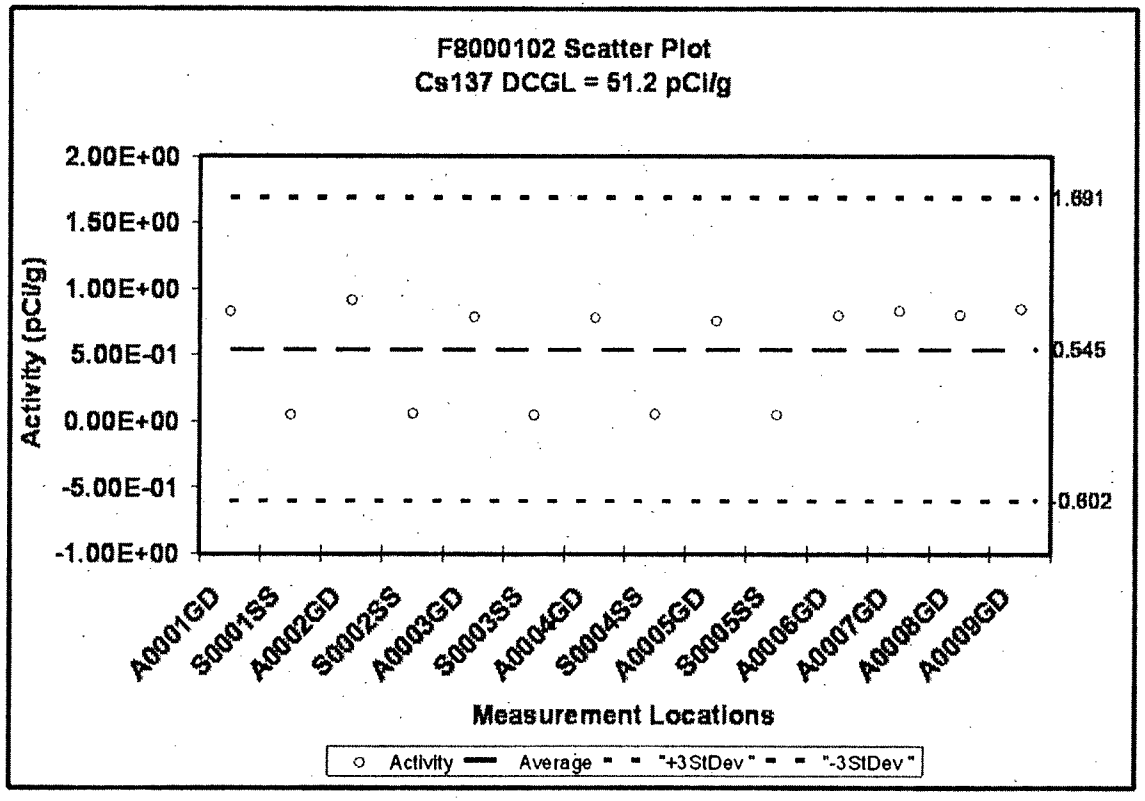
Attachment 4

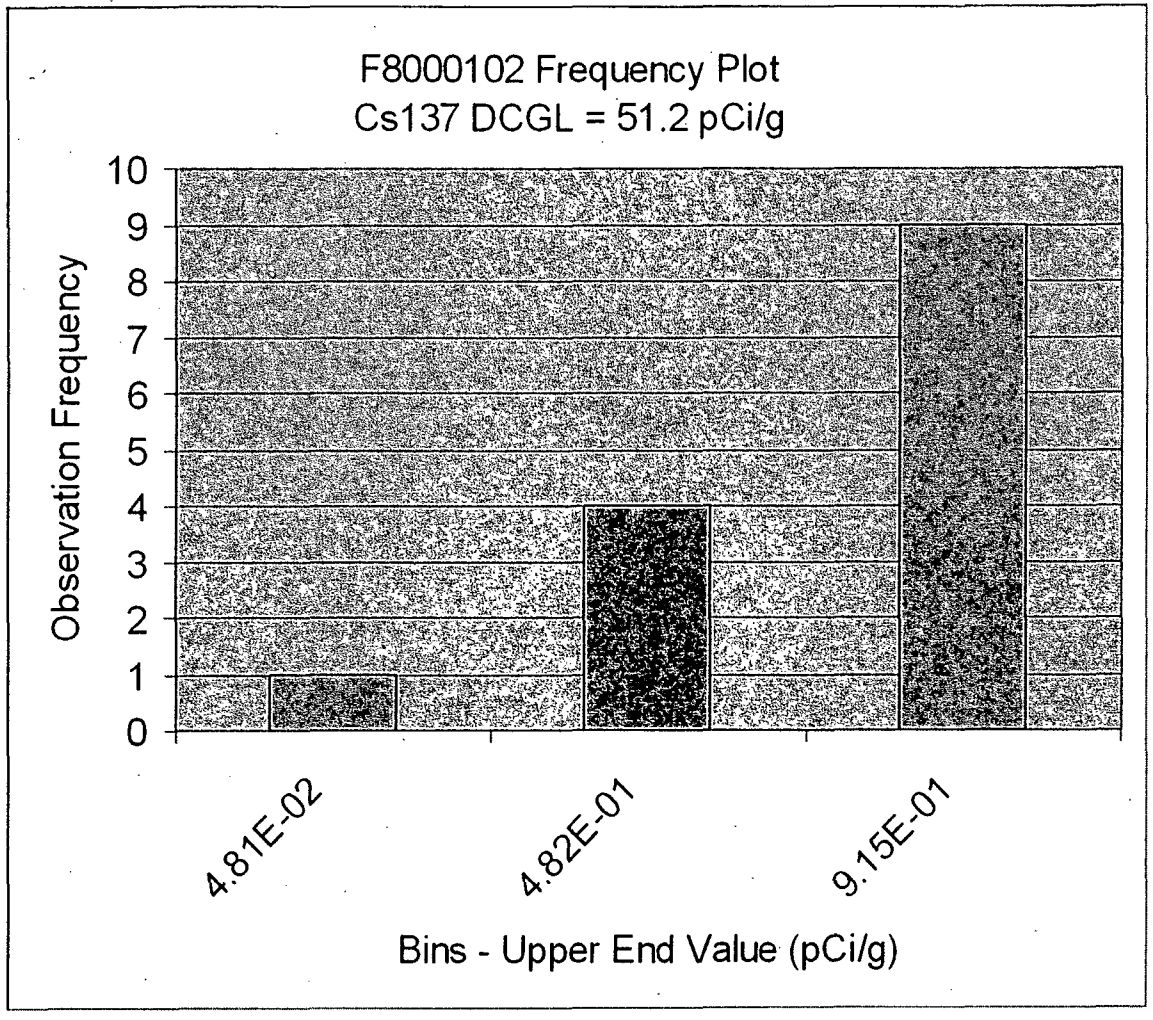
Data Assessment

March 20, 2008

Survey Unit F8000102


F8000102 Quantile Plot
Cs137 DCGL = 51.2 pCi/g
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Activity (pCi/g)
0.786
0
20
40
60
80
100
Percentile
Activity
Median
75th Percentile
50th Percentile


F8000102 Scatter Plot
Cs137 DCGL = 51.2 pCi/g
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
-5.00E-01
-1.00E+00
Activity (pCi/g)
1.691
0.545
-0.602
A0001GD
S0001SS
A0002GD
S0002SS
A0003GD
S0003SS
A0004GD
S0004SS
A0005GD
S0005SS
A0006GD
A0007GD
A0008GD
A0009GD
Measurement Locations
Activity
Average
"+3StDev"
"-3StDev"


F8000102 Frequency Plot
Cs137 DCGL = 51.2 pCi/g
Observation Frequency
10
9
8
7
6
5
4
3
2
1
0
4.81E-02
4.82E-01
9.15E-01
Bins - Upper End Value (pCi/g)