Rancho Seco

Final Status Survey Summary Report

February 24, 2009

IA N-S Roadway East of BWB

Survey Unit F8000105

Prepared By: Dan A. Tallman _____ **Date: February 24, 2009**
FSS Engineer

Reviewed By: _____ **Date:** 2/24/09
Lead FSS Engineer

Approved By: _____ **Date:** 2-27-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000105, IA N-S Roadway East of BWB

Survey Unit Description:

Operating History: The Survey Unit consists of the roadway running north and south from the T&R to the intersection with the site exit road east of the solidification pad and BWB. Packaged demolition debris from AB and RB remediation has routinely been transported through the survey unit posing the potential for a small amount of contamination to be deposited along the route. There were no reports of road contamination in the HSA however, during characterization surveys; documented evidence of contamination adjacent to the roadway was discovered. This isolated area designated as a unique survey unit (8000104) and is being evaluated separately.

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.) Based on classification procedure (DSIP-0020), the proximity to a class one survey unit, the potential for contamination resulting from radioactive material transport and the characterization survey data, the roadway running north and south from the T&R to the intersection with the site exit road is a class 2 area.

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 700 m^2 were scanned for approximately 41% coverage. Gamma Direct samples were collected at each direct measurement location and analyzed by Gamma Spec (Genie 2000) Analysis. 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	IA N-S Roadway East of BWB
Survey Unit:	0105	Open Land Area
Class:	2	LTP Table 5-4
SU Area (m^2)**:**	1696	
Evaluator:	D.A.Tallman	
DCGL Cs137 surrogate (pCi/g)**:**	51.2	
Area Factor:	N/A	Class 2
Design DCGLemc (pCi/g)**:**	N/A	Class 2
LBGR (pCi/g)**:**	25.6	Default = 50% DCGL
Design Sigma (pCi/g)**:**	0.57	DTBD-06-001, Table 5-4C
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m^2)**:**	121.1	Class 2
Total Area Scanned (m^2)**:**	700	
Scan Coverage (%):	41.3%	Class 2
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	44.9	
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:	11	Class 2

Survey Results:

A total of 16 direct measurements were made in F8000105. 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. ISOCS Scan results for Co-60 & Cs-137 ≤ the MDC values provided in Table 2-1. Gamma Direct measurements 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:		9.89E-01	
Median:		9.72E-01	
Standard Deviation:		1.12E-01	
Range:	9.11E-01 to 1.39E00		
F8000105 A0015GD	9.31E-01	< 9.31E-01	
F8000105 A0014GD	9.43E-01	< 9.43E-01	
F8000105 A0013GD	9.57E-01	< 9.57E-01	
F8000105 A0012GD	9.40E-01	< 9.40E-01	
F8000105 A0011GD	9.73E-01	< 9.73E-01	
F8000105 A0010GD	9.24E-01	< 9.24E-01	
F8000105 A0009GD	9.94E-01	< 9.94E-01	
F8000105 A0008GD	9.78E-01	< 9.78E-01	
F8000105 A0007GD	9.76E-01	< 9.76E-01	
F8000105 A0006GD	1.04E00	< 1.04E00	
F8000105 A0005GD	9.98E-01	< 9.98E-01	
F8000105 A0004GD	1.39E00	< 1.39E00	
F8000105 A0003GD	9.71E-01	< 9.71E-01	
F8000105 A0002GD	9.16E-01	< 9.16E-01	
F8000105 A0001GD	9.81E-01	< 9.81E-01	
F8000105 A0016GD	9.11E-01	< 9.11E-01	

Survey Unit Data Assessment:

The survey design required 16 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 less than the design standard deviation so no additional samples were required.

Table 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	16	
Median (pCi/g)**:**	9.72E-01	
Mean (pCi/g)**:**	9.89E-01	
Standard Deviation (pCi/g)**:**	1.12E-01	
Maximum (pCi/g)**:**	1.39E00	
Sign Test Final N Value:	16	
S+ Value:	16	
Critical Value:	11	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGLemc:	N/A	Class 2
Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
The survey unit passes all conditions?	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 land 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 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. 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.

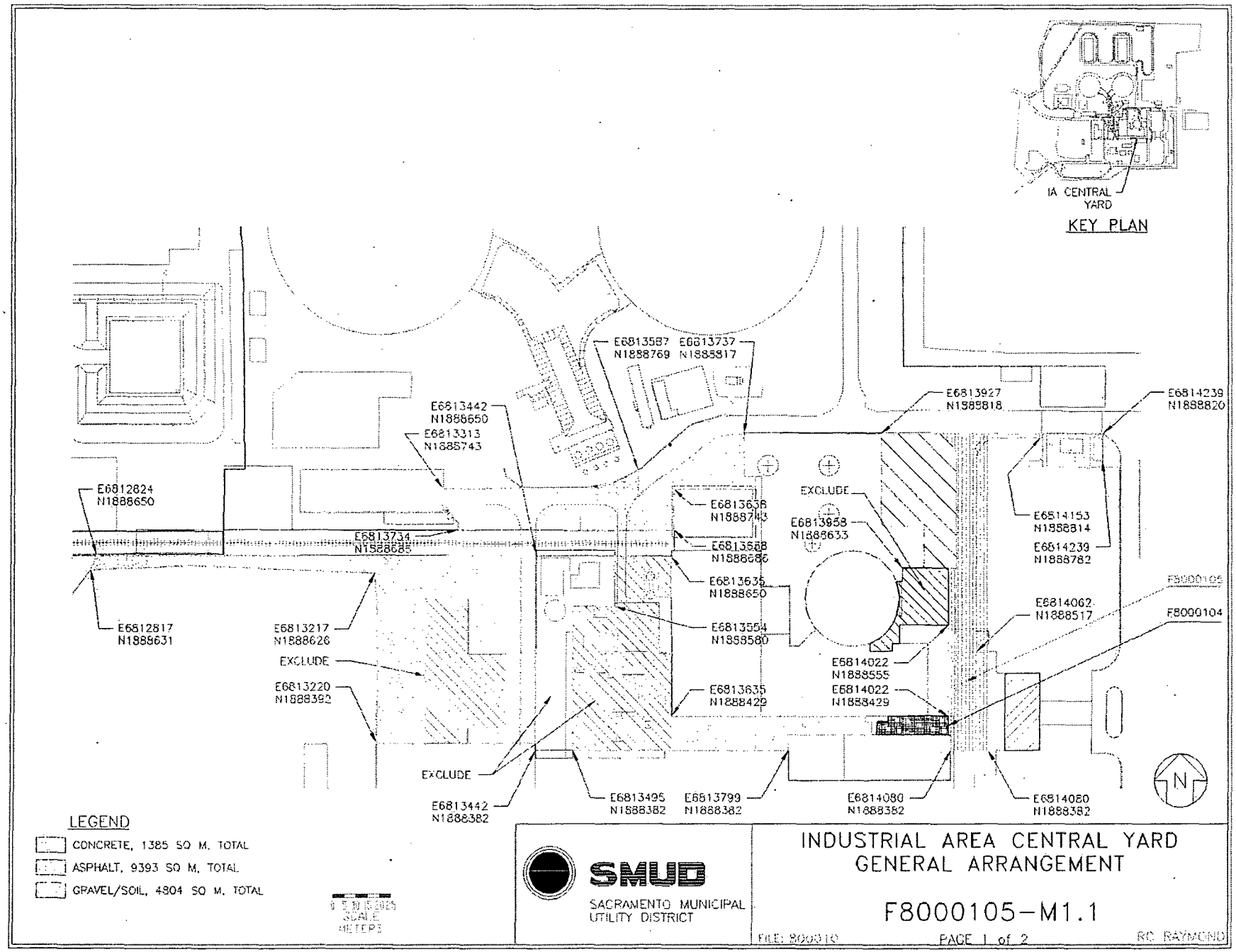
It is concluded that survey unit F8000105 meets the release criteria of 10CFR20.1402.

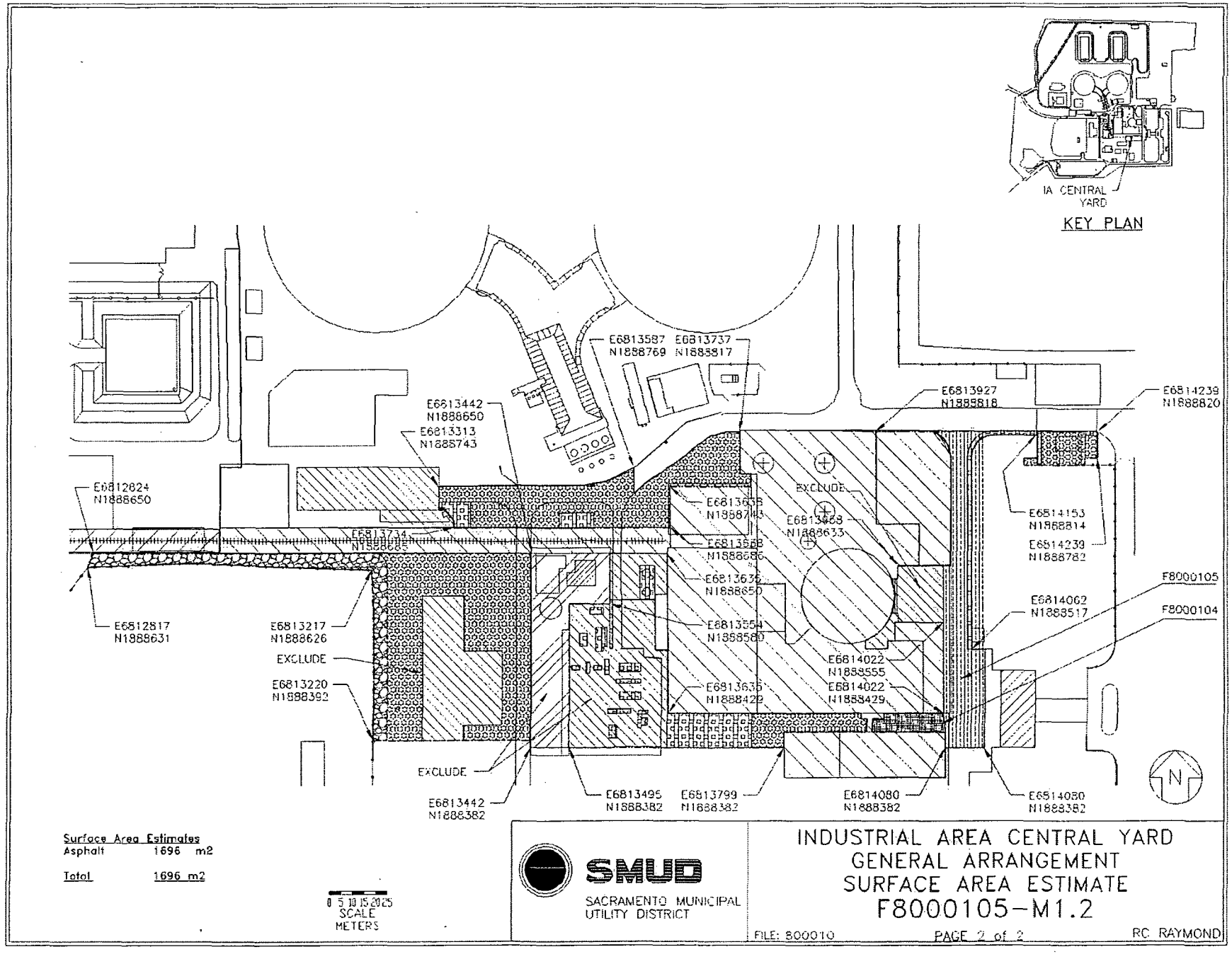
Attachment 1

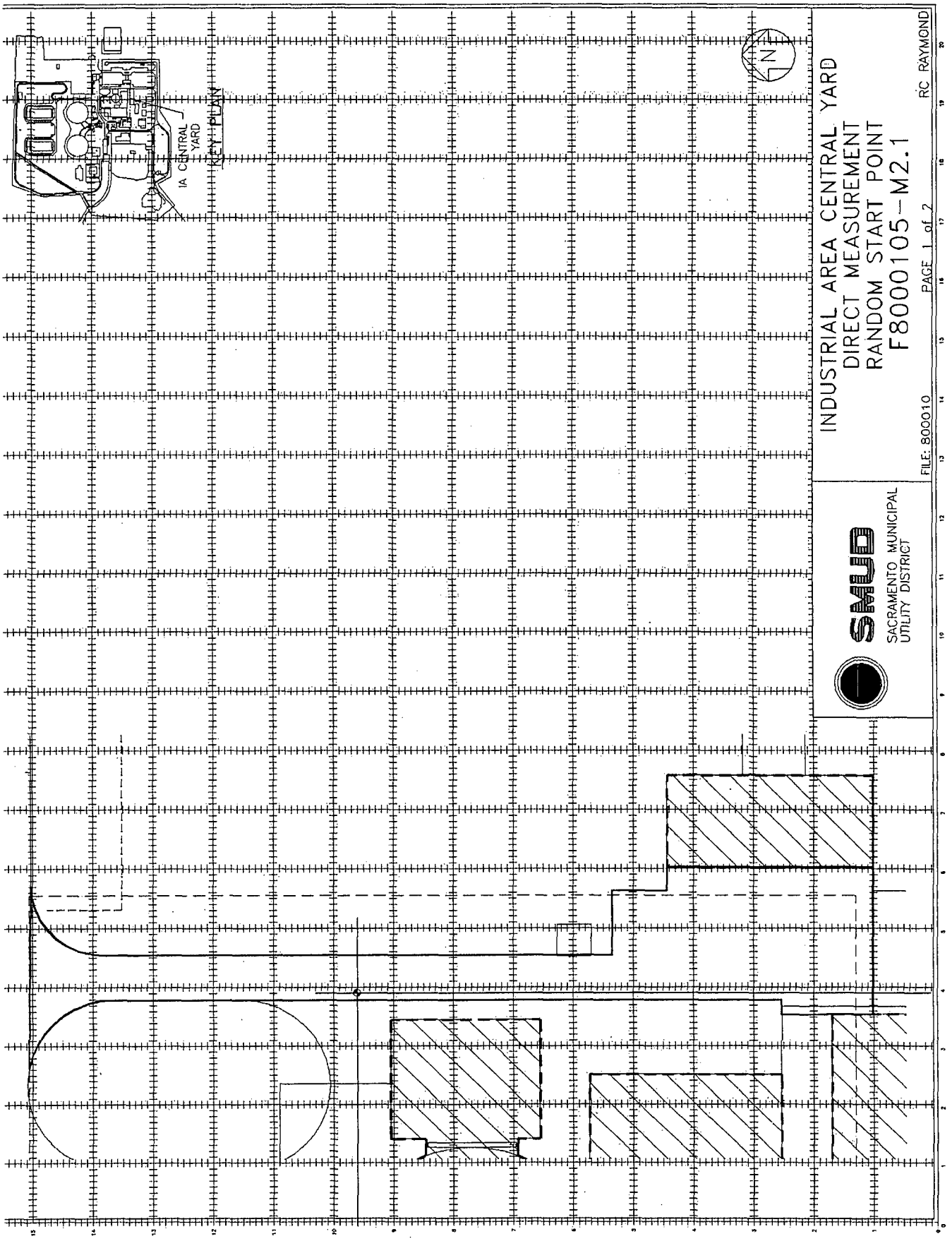
Maps

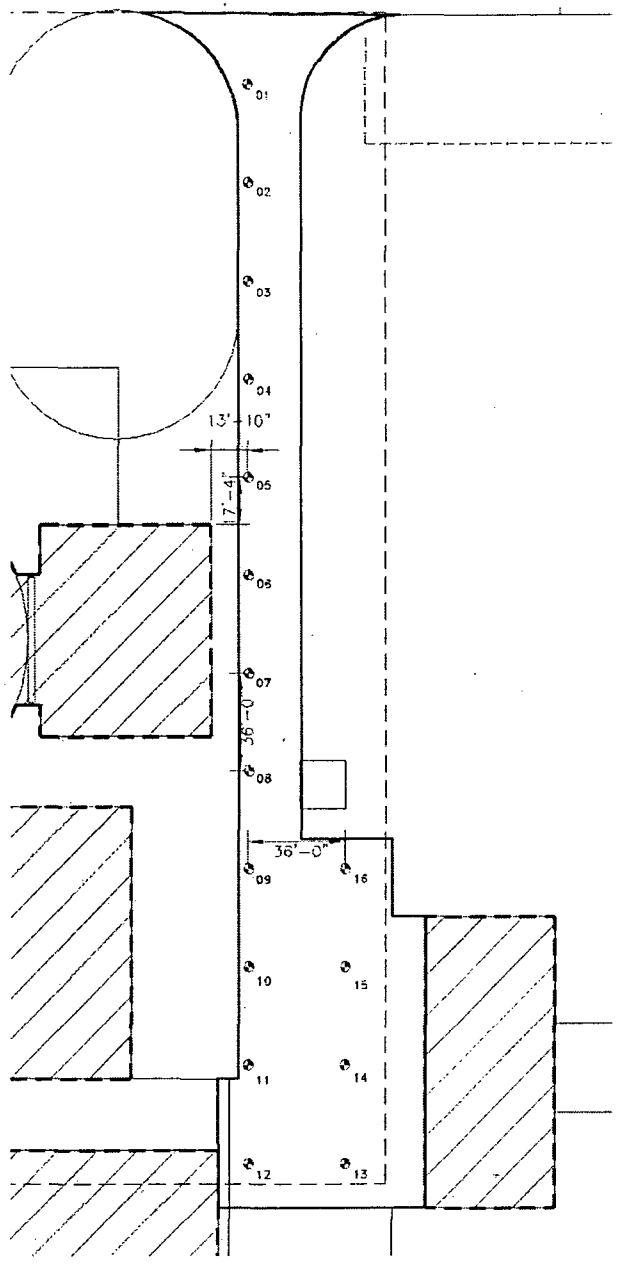
February 24, 2009

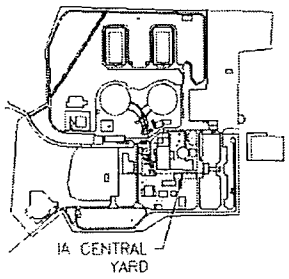
Survey Unit F8000105


IA CENTRAL YARD
KEY PLAN
E6813587 N1888769
E6813737 N1885817
E6813442 N1888650
E6813313 N1885743
E6812824 N1888650
E6813734 N1888685
E6812817 N1888631
E6813217 N1888626
EXCLUDE
E6813220 N1888392
EXCLUDE
E6813442 N1888382
E6813495 N1888382
E6813799 N1888382
E6813927 N1888818
E6814239 N1888820
E6813638 N1888743
E6813858 N1888633
E6813688 N1888686
E6813635 N1888650
E6813554 N1888580
E6813635 N1888429
EXCLUDE
E6814153 N1888814
E6814239 N1888782
E6814062 N1888517
E6814022 N1888555
E6814022 N1888429
E6814080 N1888382
E6814080 N1888382
F8000105
F8000104
N
LEGEND
CONCRETE, 1385 SQ M, TOTAL
ASPHALT, 9393 SQ M, TOTAL
GRAVEL/SOIL, 4904 SQ M, TOTAL
0 5 10 20 30
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
INDUSTRIAL AREA CENTRAL YARD
GENERAL ARRANGEMENT
F8000105-M1.1
FILE: 8000105
PAGE 1 of 2
RC RAYMOND


IA CENTRAL YARD
KEY PLAN
E6813587 N1888769
E6813737 N1888817
E6813442 N1888650
E6813313 N1888743
E6812824 N1888650
E6813734 N1888685
E6813638 N1888743
E6813868 N1888633
E6813868 N1888686
E6813636 N1888650
E6813554 N1888580
E6813635 N1888429
E6813927 N1888818
E6814239 N1888820
EXCLUDE
E6814153 N1888814
E6814239 N1888782
F8000105
F8000104
E6814062 N1888517
E6814022 N1888555
E6814022 N1888429
E6812817 N1888631
E6813217 N1888626
EXCLUDE
E6813220 N1888392
EXCLUDE
E6813442 N1888382
E6813495 N1888382
E6813799 N1888382
E6814080 N1888382
E6814080 N1888382
N
Surface Area Estimates
Asphalt 1696 m2
Total 1696 m2
0 5 10 15 20 25
SCALE METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
INDUSTRIAL AREA CENTRAL YARD
GENERAL ARRANGEMENT
SURFACE AREA ESTIMATE
F8000105-M1.2
FILE: 800010
PAGE 2 of 2
RC RAYMOND


KEY PLAN
IA CENTRAL YARD
N
INDUSTRIAL AREA CENTRAL YARD
DIRECT MEASUREMENT
RANDOM START POINT
F8000105-M2.1
PAGE 1 of 2
RC RAYMOND
FILE: 800010
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT





KEY PLAN

N

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INDUSTRIAL AREA CENTRAL YARD
DIRECT MEASUREMENT
LOCATION DETAIL
F8000105-M2.1

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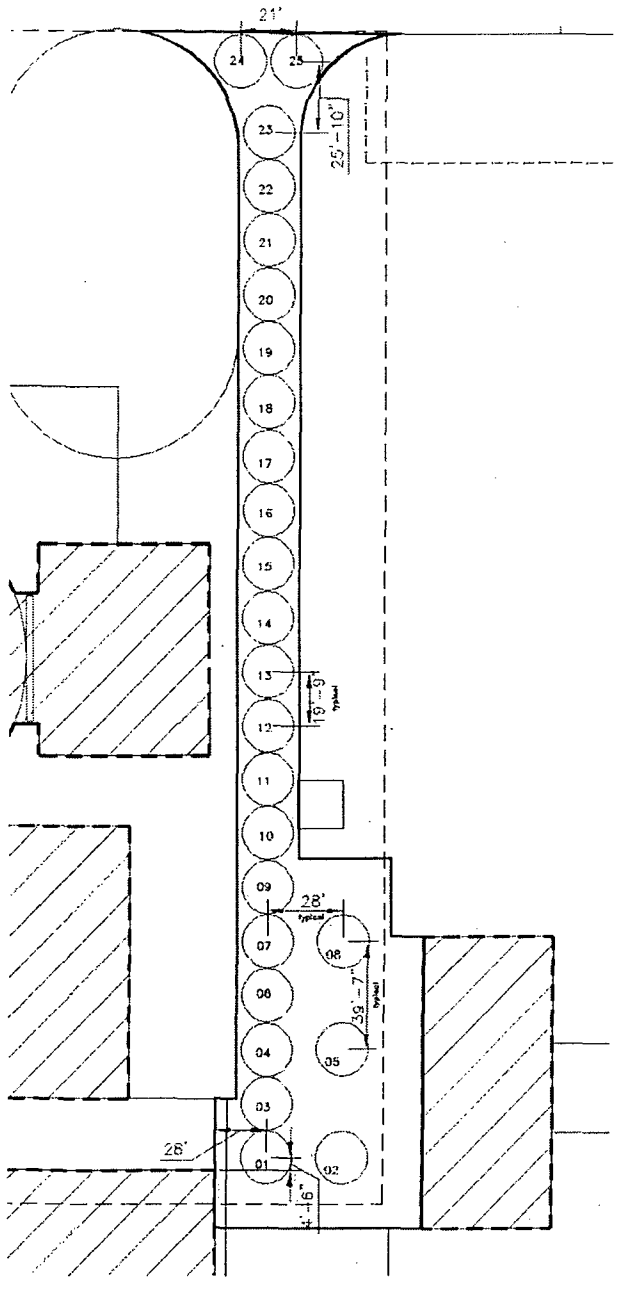

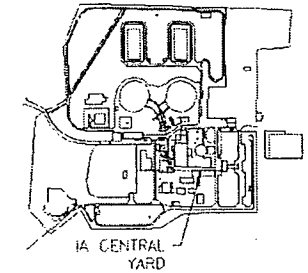

KEY PLAN

SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

INDUSTRIAL AREA CENTRAL YARD
GAMMA (ISOCS) SCAN
MEASUREMENT LOCATIONS
F8000105-M3.1

FILE: 800010 PAGE 1 of 1 RC RAYMOND

Attachment 2

Instrumentation

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Survey Unit F8000105

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
Inspector	N/A	08051294	Asphalt – 1.02 pCi/g Co-60 Asphalt – 1.39 pCi/g Cs-137
ISOCS	N/A	2983947	Asphalt – 0.227 pCi/g Co-60 Asphalt – 0.413 pCi/g Cs-137

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
InSpector	Investigation Criteria - Direct	Asphalt – 51.2 pCi/g $Cs\text{-}137_{(surr.)}$
ISOCS	Investigation Criteria - Scan	Asphalt – 5 pCi/g Co-60 Asphalt – 29 pCi/g Cs-137
All	$DCGL_W$	51.2 Cs-137 12.6 Co-60
All	$DCGL_{EMC}$	NA – Class II

Attachment 3

Investigation

February 24, 2009

Survey Unit F8000105

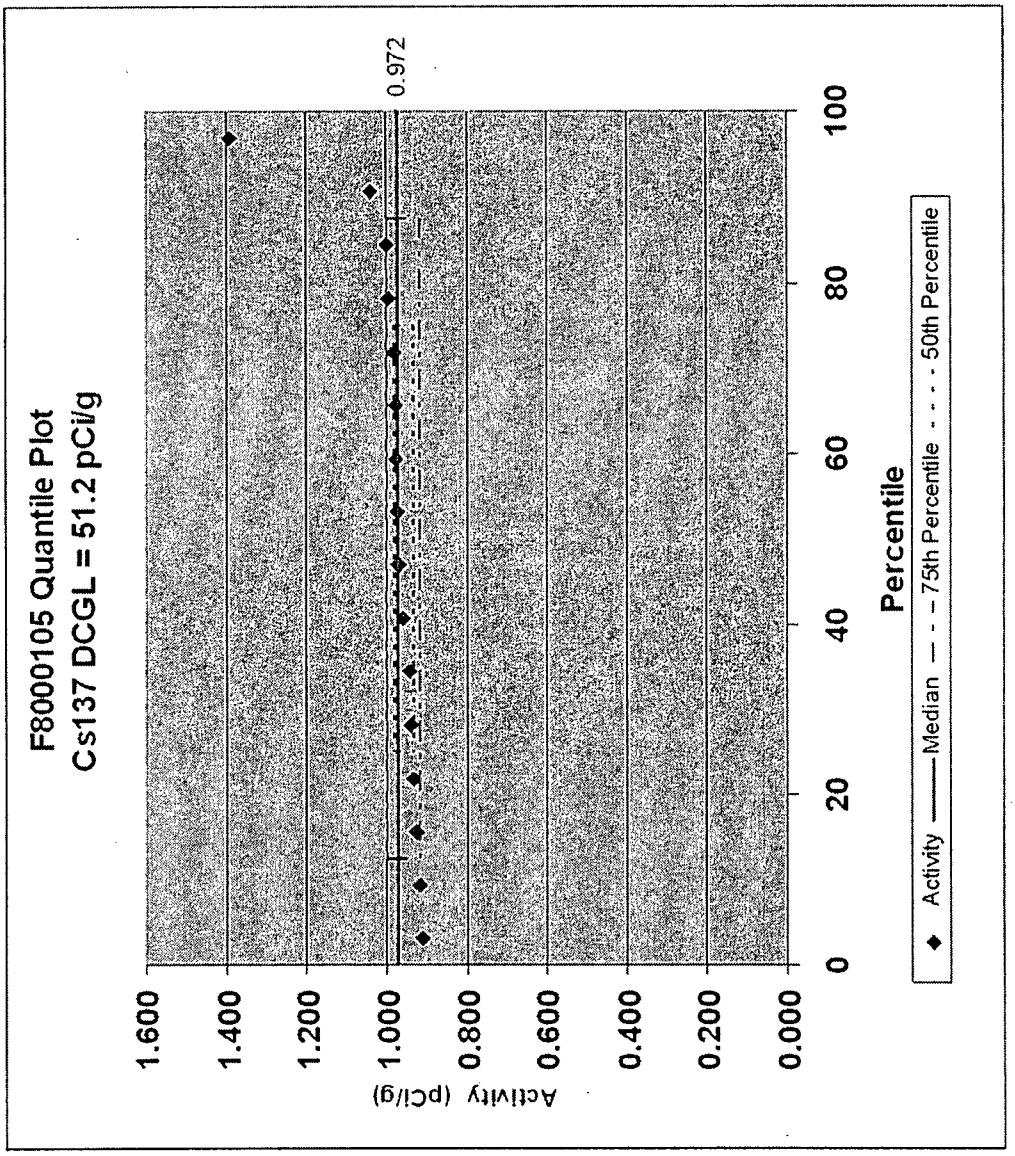
(none required)

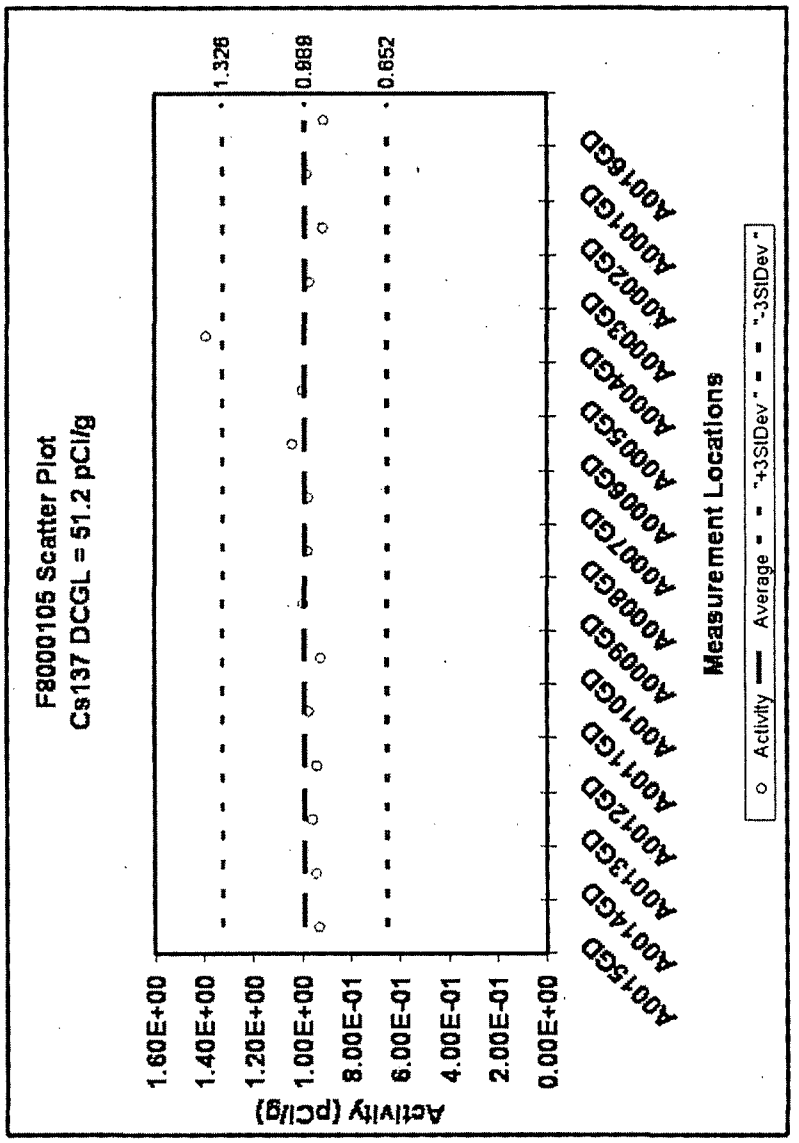
Attachment 4

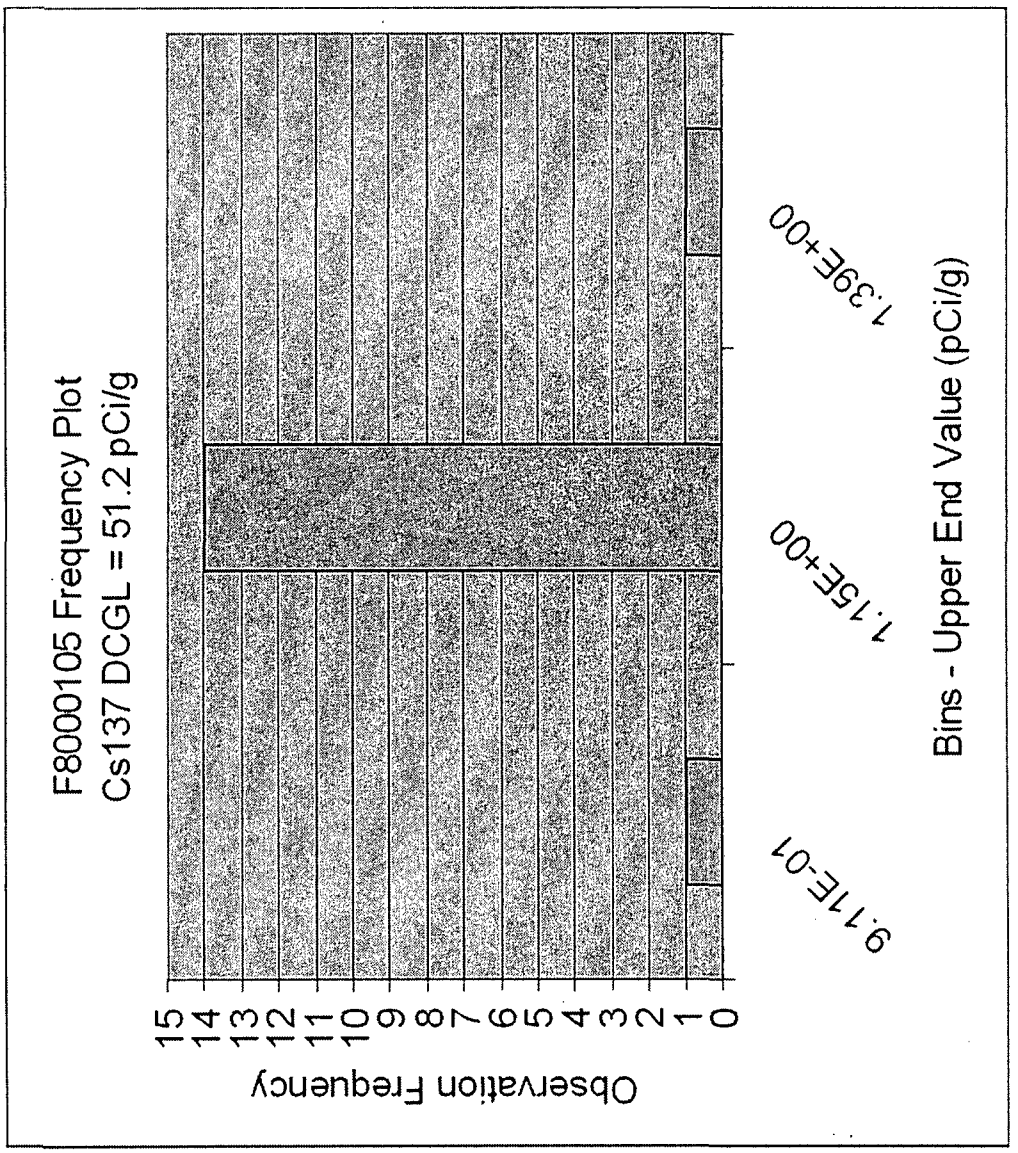
Data Assessment

February 24, 2009

Survey Unit F8000105


F8000105 Quantile Plot
Cs137 DCGL = 51.2 pCi/g
0.972
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Activity (pCi/g)
0
20
40
60
80
100
Percentile
Activity
Median
75th Percentile
50th Percentile


F8000105 Scatter Plot
Cs137 DCGL = 51.2 pCi/g
1.326
0.988
0.652
1.60E+00
1.40E+00
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Activity (pCi/g)
A0015GD
A0014GD
A0013GD
A0012GD
A0011GD
A0010GD
A0009GD
A0008GD
A0007GD
A0006GD
A0005GD
A0004GD
A0003GD
A0002GD
A0001GD
A0016GD
Measurement Locations
Activity
Average
"+3SIDev"
"-3SIDev"


F8000105 Frequency Plot
Cs137 DCGL = 51.2 pCi/g
Observation Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
9.11E-01
1.15E+00
1.39E+00
Bins - Upper End Value (pCi/g)