Rancho Seco

Final Status Survey Summary Report

April 9, 2008

South East Industrial Area

Survey Unit F8000091

Prepared By: Erin L. Brown Date: 4/9/2008
FSS Engineer

Reviewed By: _____ Date: 4/9/08
Lead FSS Engineer

Approved By: _____ Date: 1-23-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000091, South East Industrial Area

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 (which consisted of both soil samples and asphalt measurements) were randomly determined and 2346 m^2 were scanned for approximately 4% 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	South East Industrial Area
Survey Unit:	0091	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m^2):	55736	
Evaluator:	Erin L. Brown	
DCGL Cs137 surrogate (pCi/g):	52.6	
Area Factor:	N/A	Class 3
Design DCGLemc (pCi/g):	N/A	Class 3
LBGR (pCi/g):	25.6	Adjusted
Design Sigma (pCi/g):	0.042	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):	2346	
Scan Coverage (%):	4.2%	Class 3
$Z_{1-\alpha}$:	1.645	
$Z_{1-\beta}$:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	642.8	
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 30 direct measurements were made in F8000091. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. Noneof the scan measurements indicated areas of elevated activity. 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:		4.65E-01	
Median:		6.66E-01	
Standard Deviation:		3.66E-01	
Range:	6.14E-02 to 8.96E-01		
F8000091 A0001GD	7.57E-01	< 7.57E-01	
F8000091 A0002GD	8.25E-01	< 8.25E-01	
F8000091 A0003GD	8.22E-01	< 8.22E-01	
F8000091 A0004GD	6.87E-01	< 6.87E-01	
F8000091 A0005GD	8.72E-01	< 8.72E-01	
F8000091 A0007GD	8.96E-01	< 8.96E-01	
F8000091 A0008GD	8.14E-01	< 8.14E-01	
F8000091 A0009GD	8.30E-01	< 8.30E-01	
F8000091 A0010GD	8.57E-01	< 8.57E-01	
F8000091 A0012GD	8.34E-01	< 8.34E-01	
F8000091 A0013GD	8.42E-01	< 8.42E-01	
F8000091 A0015GD	8.36E-01	< 8.36E-01	
F8000091 A0016GD	8.21E-01	< 8.21E-01	
F8000091 C0006GD	7.18E-01	< 7.18E-01	
F8000091 C0011GD	7.06E-01	< 7.06E-01	
F8000091 C0014GD	6.44E-01	< 6.44E-01	
F8000091S0001SS	6.92E-02	< 6.92E-02	
F8000091S0002SS	6.61E-02	7.96E-02	4.44E-02
F8000091S0003SS	9.16E-02	< 9.16E-02	
F8000091S0004SS	9.24E-02	< 9.24E-02	
F8000091S0005SS	6.40E-02	< 6.40E-02	
F8000091S0006SS	8.46E-02	< 8.46E-02	
F8000091S0007SS	6.14E-02	< 6.14E-02	
F8000091S0008SS	8.94E-02	< 8.94E-02	
F8000091S0009SS	6.82E-02	1.09E-01	4.05E-02
F8000091S0010SS	6.16E-02	7.01E-02	4.73E-02
F8000091S0011SS	6.29E-02	< 6.29E-02	
F8000091S0012SS	8.84E-02	< 8.84E-02	

F8000091S0013SS	6.98E-02	< 6.98E-02	
F8000091S0014SS	5.07E-02	1.57E-01	5.88E-02

Survey Unit Data Assessment:

The survey design required 30 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. However, both values of sigma result in a relative shift of greater than 3 so no additional samples were required.

Table 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	30	
Median (pCi/g)**:**	6.66E-01	
Mean (pCi/g)**:**	4.65E-01	
Standard Deviation (pCi/g)**:**	3.66E-01	
Maximum (pCi/g)**:**	8.96E-01	
Sign Test Final N Value:	30	
S+ Value:	30	
Critical Value:	20	
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	No additional samples required
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
The survey unit passes all conditions?	Investigate	The 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 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. 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. 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.

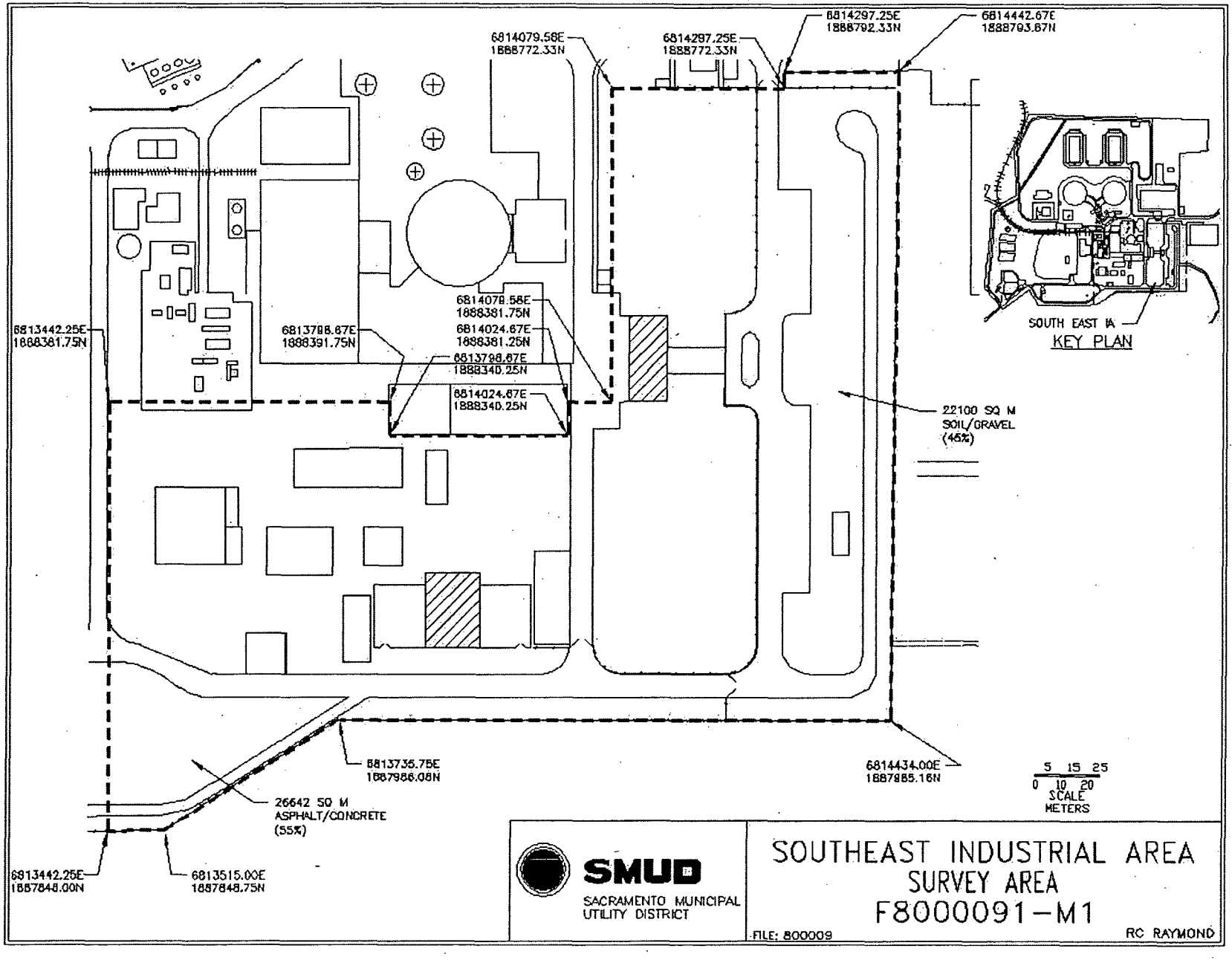
It is concluded that survey unit F8000091 meets the release criteria of 10CFR20.1402.

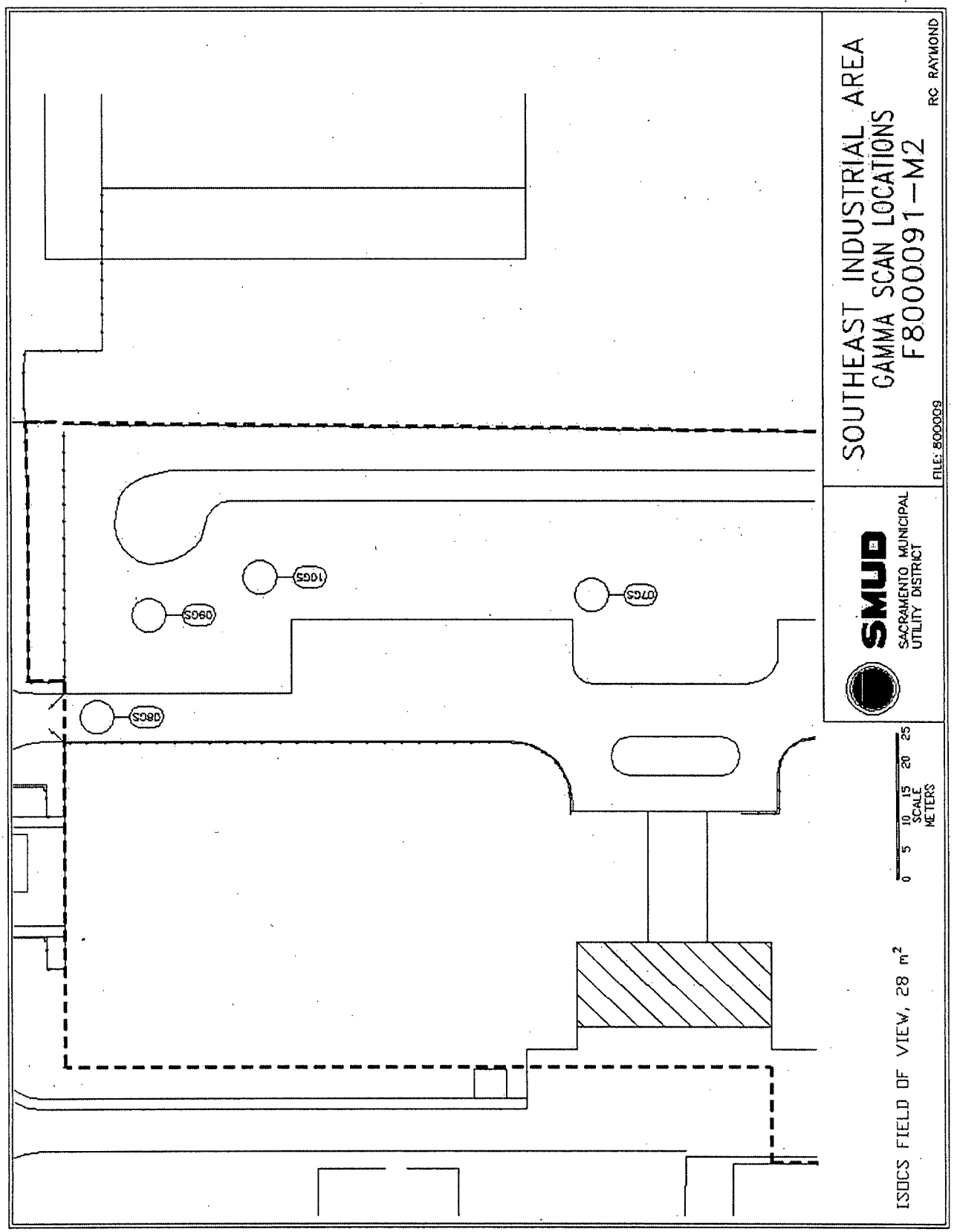
Attachment 1

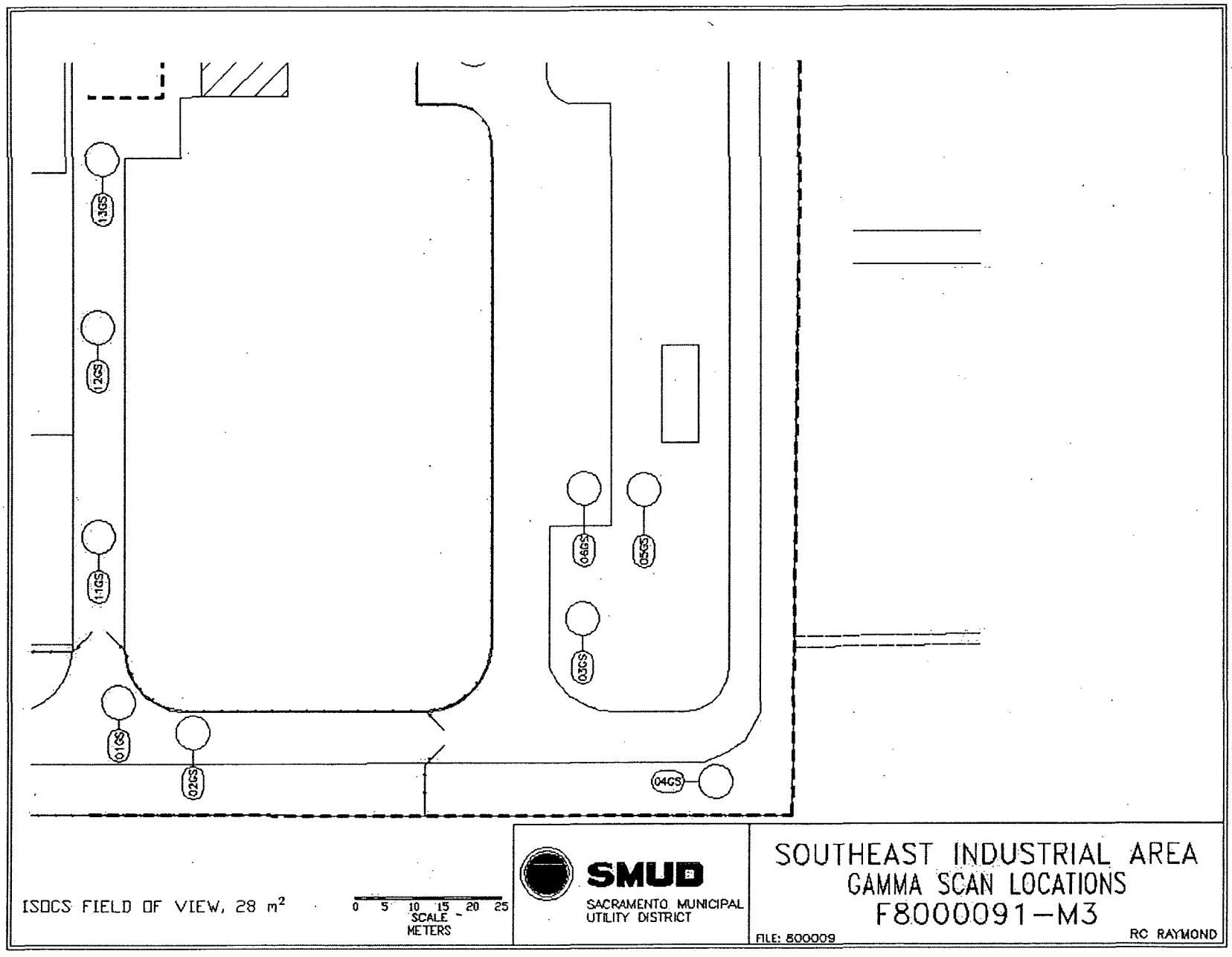
Maps

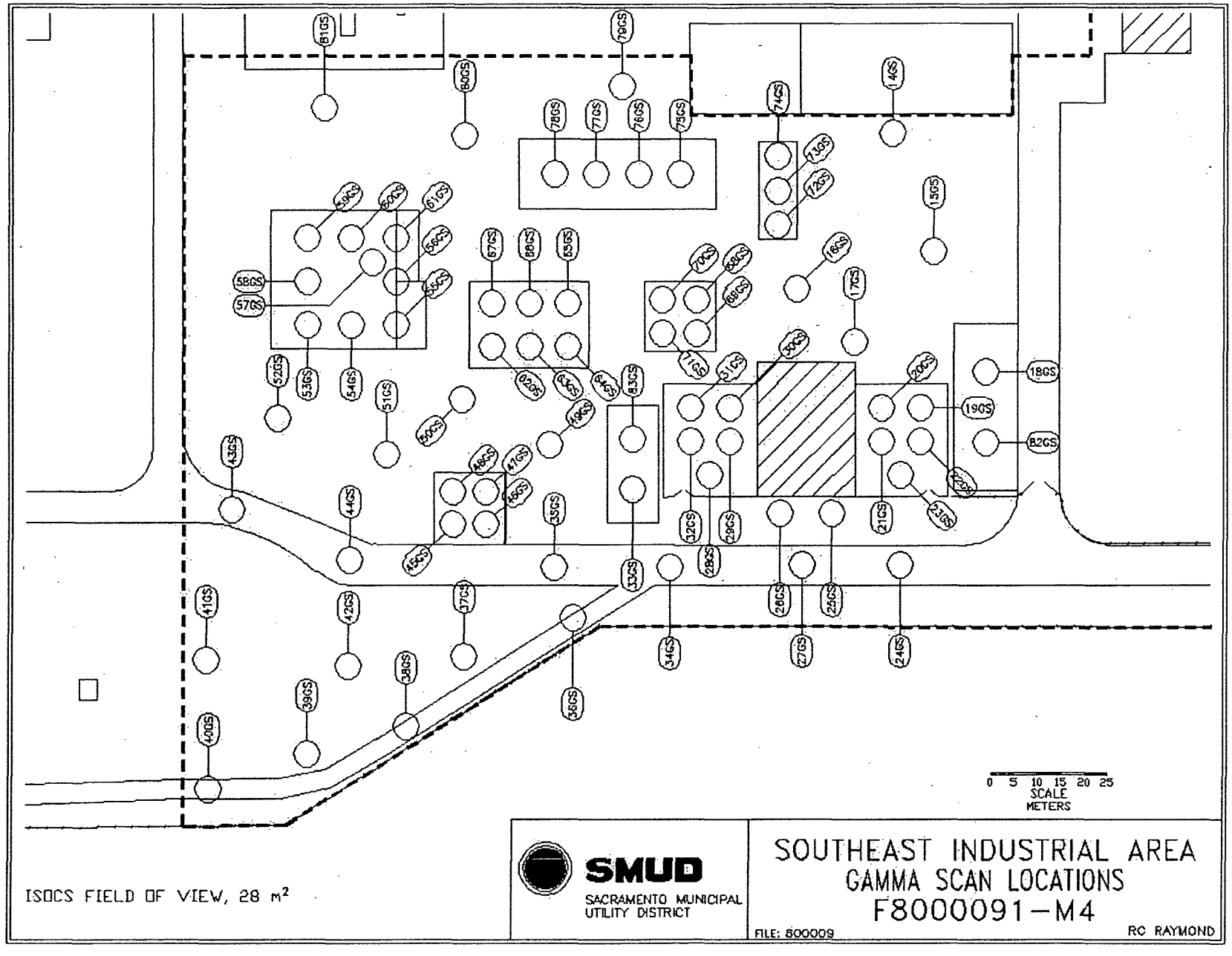
April 9, 2008

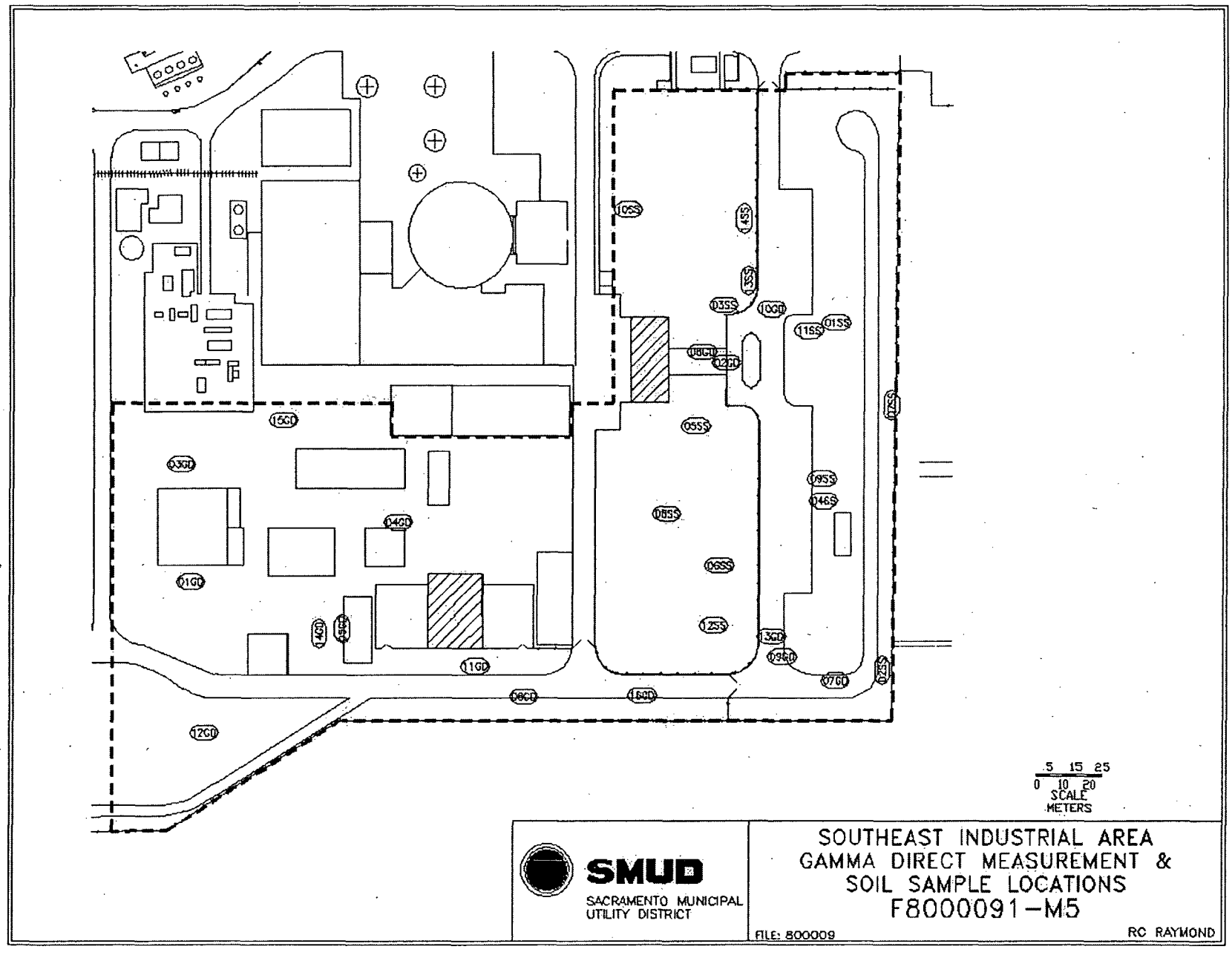
Survey Unit F8000091


6814079.58E
1888772.33N
6814297.25E
1888772.33N
6814297.25E
1888792.33N
6814442.67E
1888793.67N
6813442.25E
1888381.75N
6813786.67E
1888391.75N
6814079.58E
1888381.75N
6814024.67E
1888381.25N
6813786.67E
1888340.25N
6814024.67E
1888340.25N
22100 SQ M
SOIL/GRAVEL
(45%)
SOUTH EAST IA
KEY PLAN
6813735.75E
1887986.06N
6814434.00E
1887985.16N
26642 SQ M
ASPHALT/CONCRETE
(55%)
6813442.25E
1887848.00N
6813515.00E
1887848.75N
5 15 25
0 10 20
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
SOUTHEAST INDUSTRIAL AREA
SURVEY AREA
F8000091-M1
FILE: 800009
RC RAYMOND


SOUTHEAST INDUSTRIAL AREA
GAMMA SCAN LOCATIONS
F8000091-M2
RC RAYMOND
FILE: 800009
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
S060
S070
S080
S090
S100
0 5 10 15 20 25
SCALE METERS
ISOCS FIELD OF VIEW, 28 m²


13GS
12GS
11GS
01GS
02GS
04GS
06GS
05GS
03GS
ISOCS FIELD OF VIEW, 28 m²
0 5 10 15 20 25
SCALE - METERS
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SOUTHEAST INDUSTRIAL AREA
GAMMA SCAN LOCATIONS
F8000091-M3
FILE: 800009
RC RAYMOND


ISOCS FIELD OF VIEW, 28 m²
0 5 10 15 20 25
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
SOUTHEAST INDUSTRIAL AREA
GAMMA SCAN LOCATIONS
F8000091-M4
FILE: 800009
RC RAYMOND


105S
45S
135S
035S
10GD
11SS
01SS
08GD
02GD
15GD
055S
07SS
03GD
095S
046S
04GD
085S
065S
01GD
14GD
05GD
125S
13GD
09SD
07GD
025S
1GD
08GD
16GD
12GD
5 15 25
0 10 20
SCALE
METERS
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
SOUTHEAST INDUSTRIAL AREA
GAMMA DIRECT MEASUREMENT &
SOIL SAMPLE LOCATIONS
F8000091-M5
FILE: 800009
RC RAYMOND

Attachment 2

Instrumentation

April 9, 2008

Survey Unit F8000091

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	9987008	Soil – 0.06 pCi/g Cs-137
HPGe	N/A	05047773	Soil – 0.09 pCi/g Cs-137
Inspector	N/A	08051294	Concrete 0.7 pCi/g Cs-137 Asphalt – 0.8 pCi/g Cs-137
ISOCS	N/A	2983947	Soil – 0.3 pCi/g Cs-137 Soil – 0.1 pCi/g Co-60 Asphalt – 0.3 pCi/g Cs-137 Concrete- 0.4 pCi/g Cs-137

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS	Investigation Criteria - Scan	Soil – 23 pCi/g Cs-137 Soil – 5.7 pCi/g Co-60 Asphalt – 23 pCi/g Cs-137
All	$DCGL_W$	52.6 Cs-137 12.6 Co-60
All	$DCGL_{EMC}$	N/A

Attachment 3

Investigation

April 9, 2008

Survey Unit F8000091

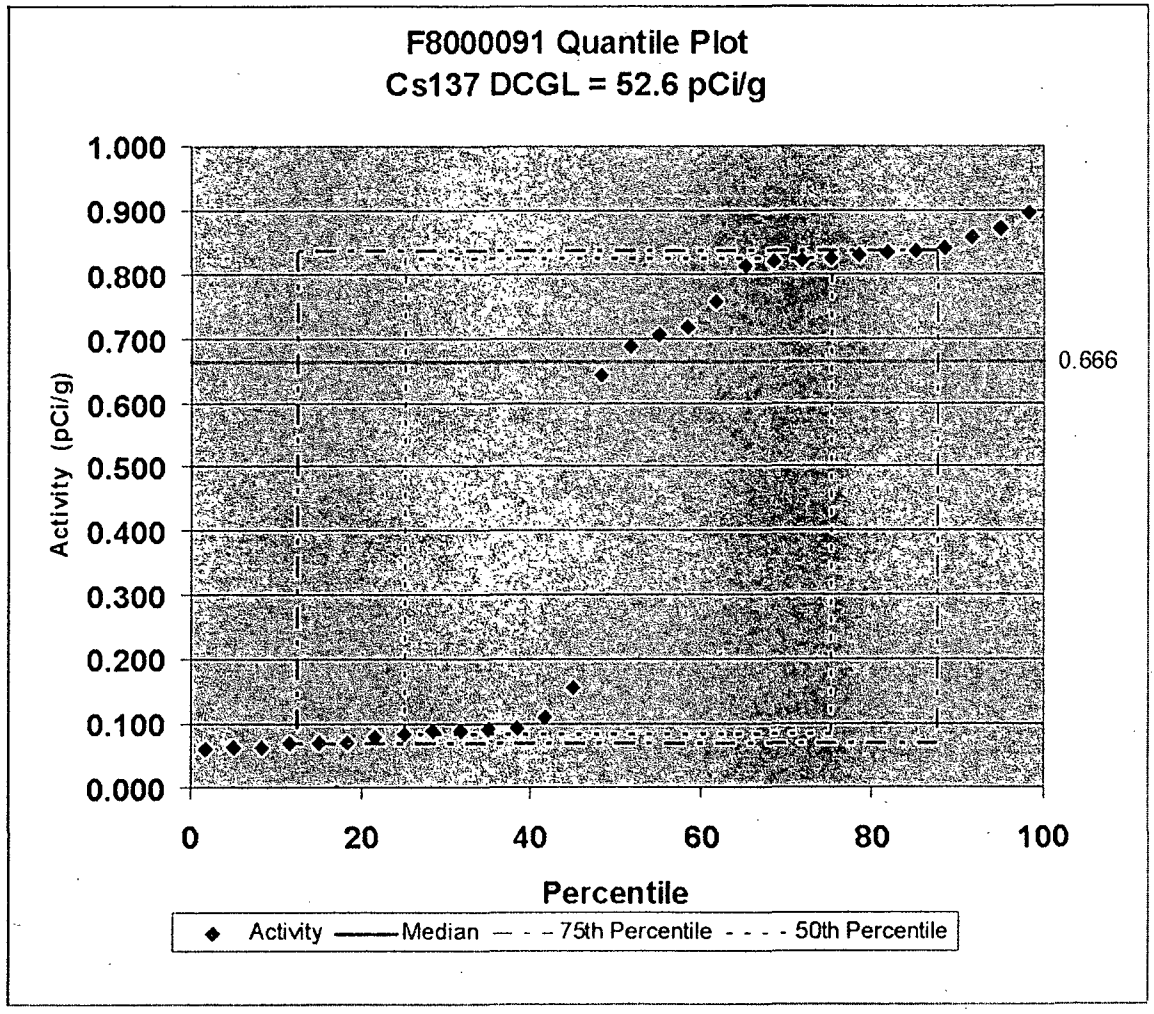
(none required)

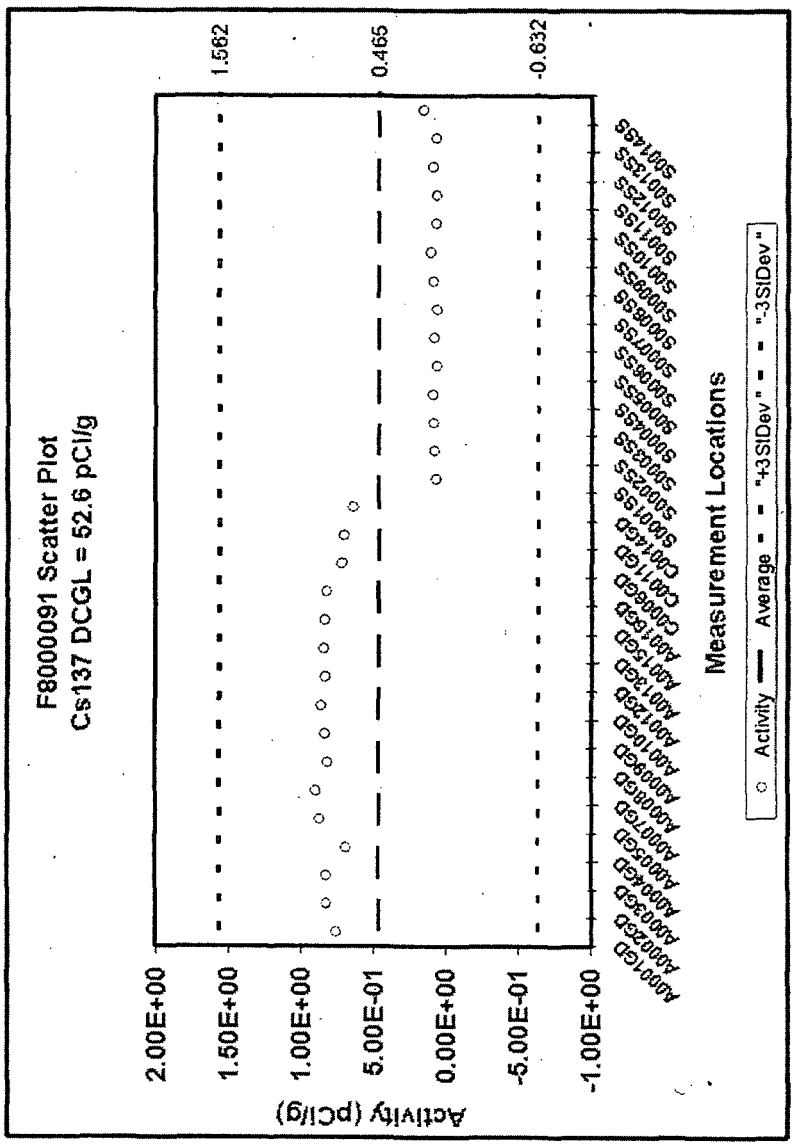
Attachment 4

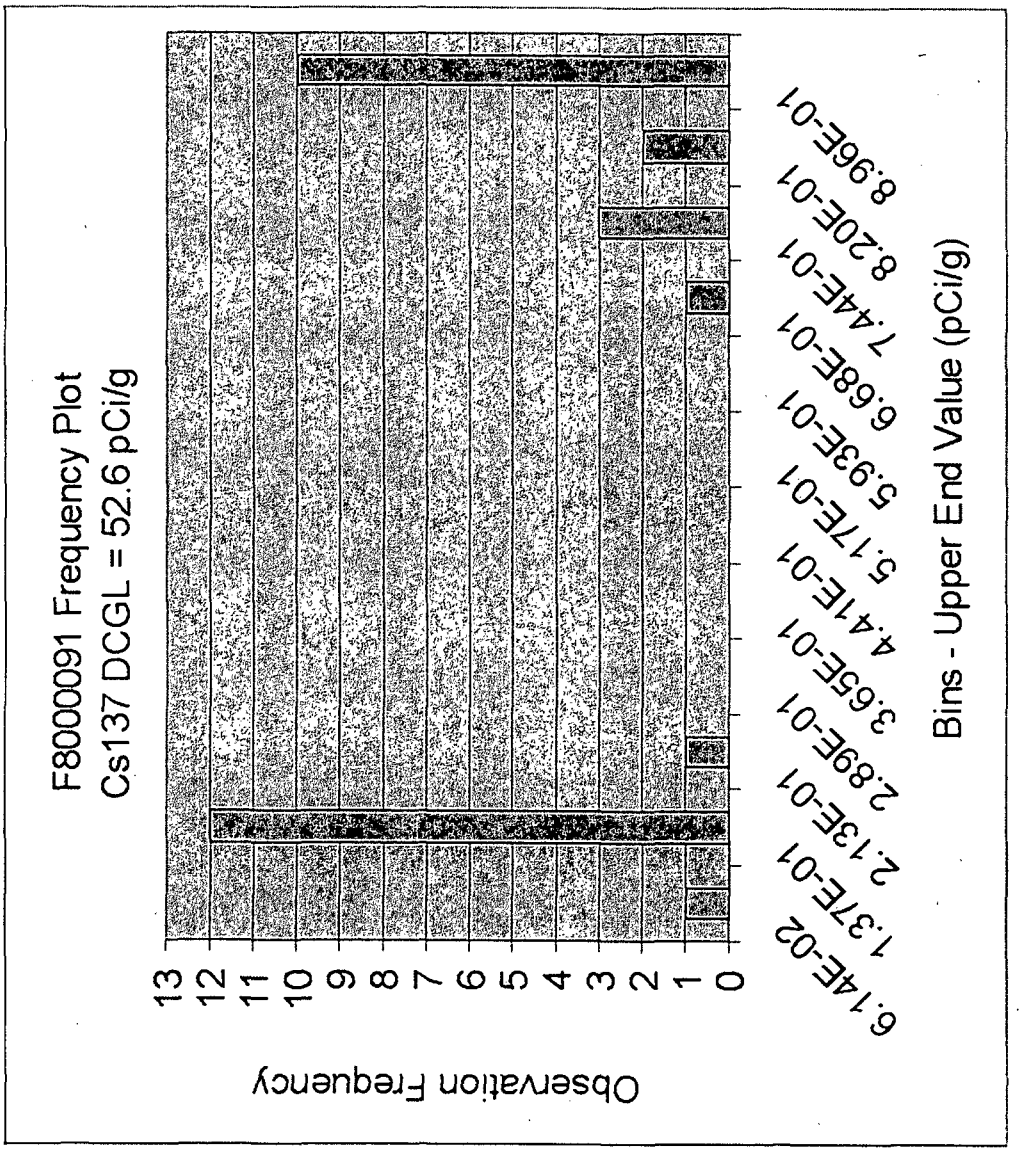
Data Assessment

April 9, 2008

Survey Unit F8000091


F8000091 Quantile Plot
Cs137 DCGL = 52.6 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)
0.666
0
20
40
60
80
100
Percentile
Activity
Median
75th Percentile
50th Percentile


F8000091 Scatter Plot
Cs137 DCGL = 52.6 pCi/g
1.562
0.465
-0.632
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
-5.00E-01
-1.00E+00
Activity (pCi/g)
Measurement Locations
Activity
Average
"+3SIDev"
"-3SIDev"


F8000091 Frequency Plot
Cs137 DCGL = 52.6 pCi/g
Observation Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Bins - Upper End Value (pCi/g)
6.14E-02
1.37E-01
2.13E-01
2.89E-01
3.65E-01
4.41E-01
5.17E-01
5.93E-01
6.68E-01
7.44E-01
8.20E-01
8.96E-01