Rancho Seco

Final Status Survey Summary Report

May 12, 2008

RHUT 8" Line

Survey Unit F8991093

Prepared By: _____ Date: 5.12.2008

FSS Engineer

Reviewed By: _____ Date: 6/3/08

Lead FSS Engineer

Approved By: _____ Date: 3-2-09

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8991093, RHUT 8" Line

Survey Unit Description:

Operating History: This system provided an alternate pathway for delivering feed water to the steam generators. This system was reported to have been contaminated as a result of steam generator primary to secondary tube leaks. Operating records and the HSA document occurrences of radioactive contamination associated with this system piping.

Site Characterization: Direct measurements were made of the interior surfaces of the system piping which confirmed the presence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of 368 dpm/100 cm2 and a maximum value of 634 dpm/100 cm2. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the system was determined to be a Class 3 system.

Due to the difficulty of surveying this system, and the potential for system leakage, the system piping was removed and the resulting trench was surveyed. While the characterization data supported a Class 3 designation, the trench was conservatively determined to be Class 2.

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 randomly determined and 110 m^2 were scanned for approximately 100% 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:	F899	RHUT 8" Line
Survey Unit:	1093	Open Land Area
Class:	2	LTP Table 5-4
SU Area (m^2)**:**	110	
Evaluator:	Gary Frank	
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)**:**	9.83	DTBD-06-001, Table 5-4D
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m^2)**:**	7.3	Class 2
Total Area Scanned (m^2)**:**	110	
Scan Coverage (%):	100%	Class 2
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99379	
Calculated Relative Shift:	2.6	
Relative Shift Used:	2.6	Uses 3.0 if Rel Shift >3
N-Value:	12	
Design N-Value + 20%:	15	NUREG-1575 Table 5-5
Grid Spacing L:	2.7	Class 2

Survey Results:

A total of 16 direct measurements were made in F8991093. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. All of the scan measurements were below the MDA as shown in Attachment 2. None of 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:		4.06E-02	
Median:		4.01E-02	
Standard Deviation:		3.41E-03	
Range:	3.57E-02 to 4.91E-02		
F8991093S0001SS	3.75E-02	< 3.75E-02	
F8991093S0002SS	3.99E-02	< 3.99E-02	
F8991093S0003SS	4.31E-02	< 4.31E-02	
F8991093S0004SS	3.91E-02	< 3.91E-02	
F8991093S0005SS	4.02E-02	< 4.02E-02	
F8991093S0006SS	4.18E-02	< 4.18E-02	
F8991093S0007SS	3.89E-02	< 3.89E-02	
F8991093S0008SS	4.13E-02	< 4.13E-02	
F8991093S0009SS	3.66E-02	< 3.66E-02	
F8991093S0010SS	3.57E-02	< 3.57E-02	
F8991093S0011SS	4.42E-02	< 4.42E-02	
F8991093S0012SS	3.76E-02	< 3.76E-02	
F8991093S0013SS	4.22E-02	< 4.22E-02	
F8991093S0014SS	4.91E-02	< 4.91E-02	
F8991093S0015SS	4.34E-02	< 4.34E-02	
F8991093S0016SS	3.82E-02	< 3.82E-02	

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)**:**	4.01E-02	
Mean (pCi/g)**:**	4.06E-02	
Standard Deviation (pCi/g)**:**	3.41E-03	
Maximum (pCi/g)**:**	4.91E-02	
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, 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 F8991093 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

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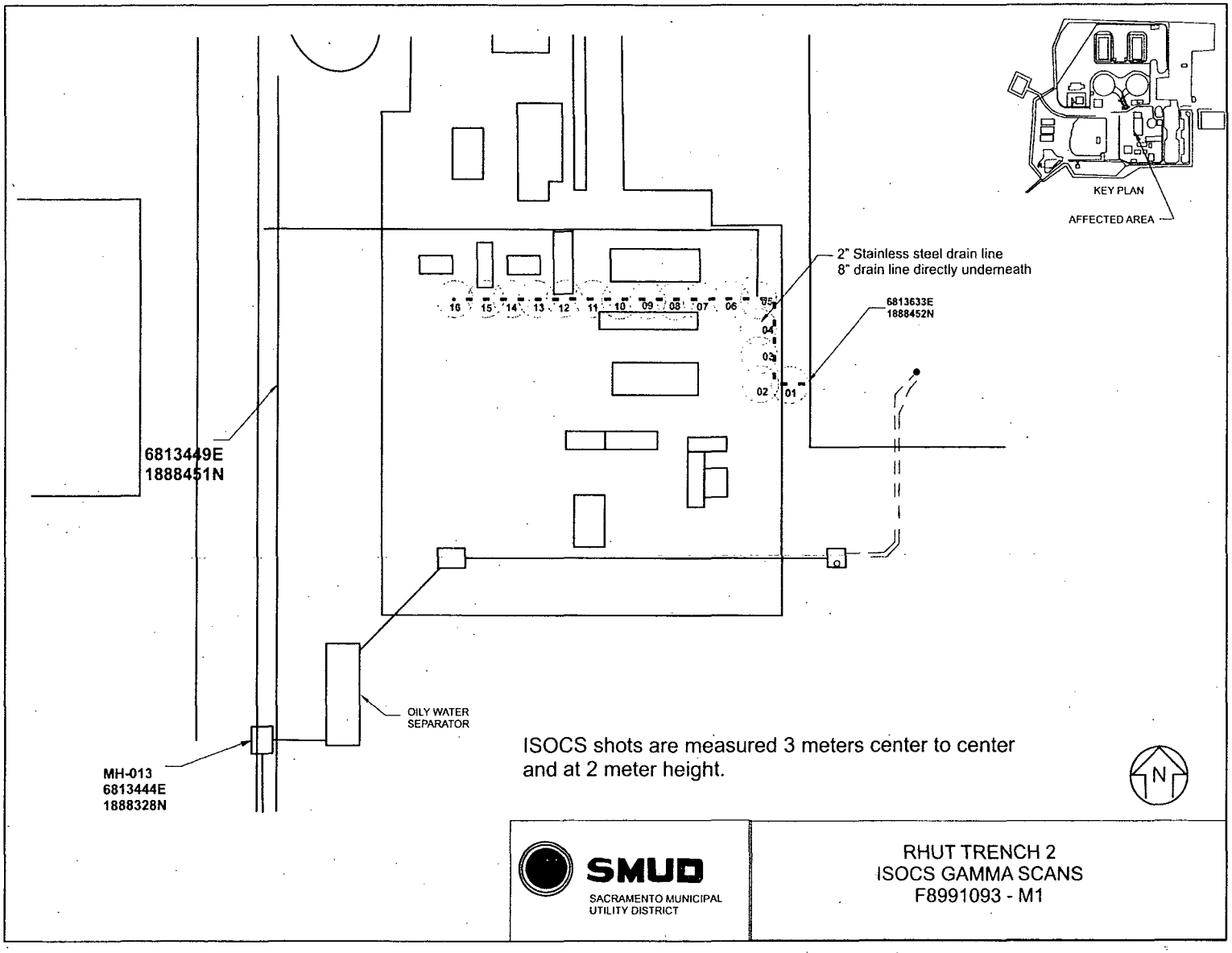
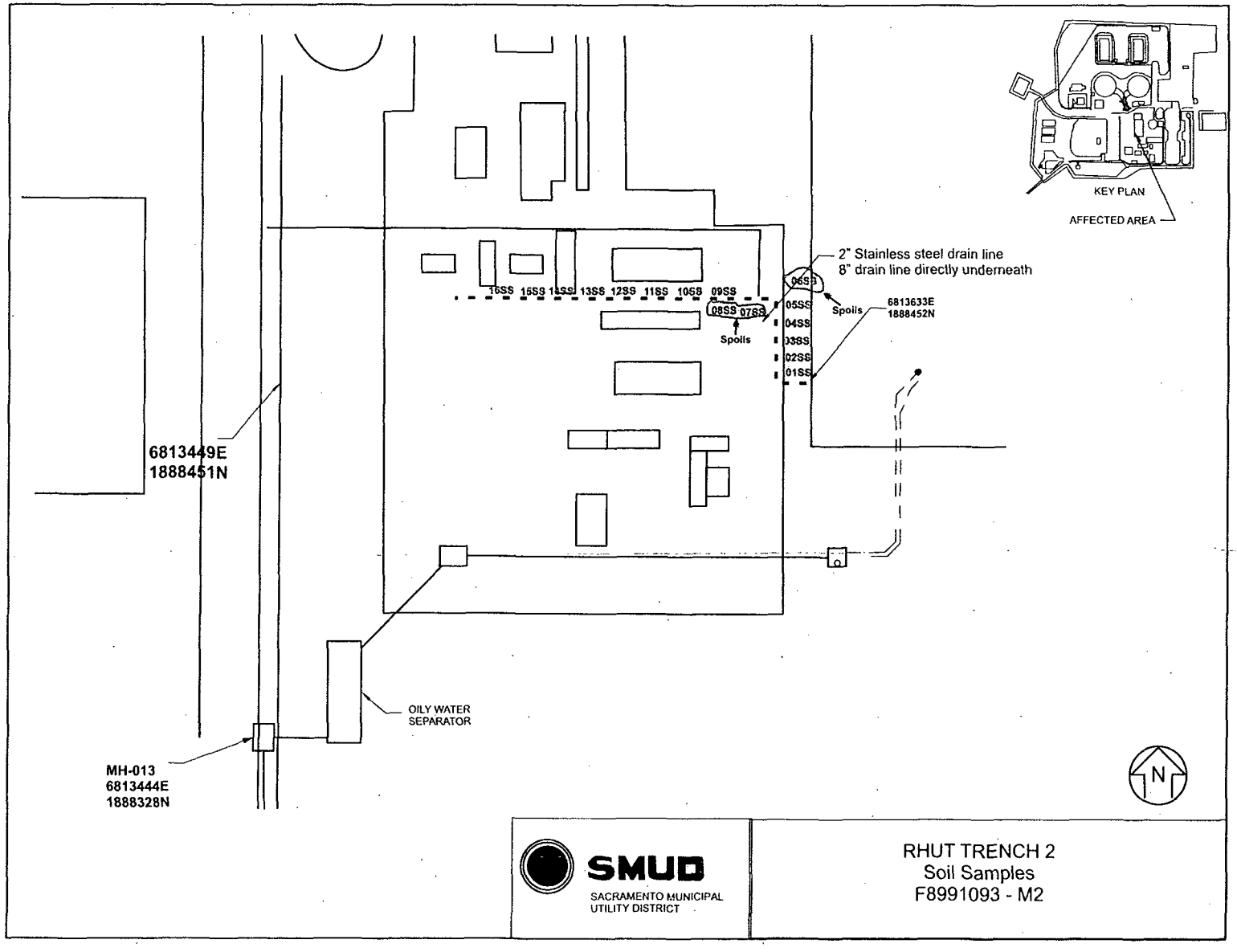
Survey Unit F8991093


KEY PLAN
AFFECTED AREA
2" Stainless steel drain line
8" drain line directly underneath
6813633E
1888452N
6813449E
1888451N
OILY WATER
SEPARATOR
MH-013
6813444E
1888328N
ISOCS shots are measured 3 meters center to center
and at 2 meter height.
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
RHUT TRENCH 2
ISOCS GAMMA SCANS
F8991093 - M1


KEY PLAN
AFFECTED AREA
2" Stainless steel drain line
8" drain line directly underneath
16SS 15SS 14SS 13SS 12SS 11SS 10SS 09SS
08SS 07SS
06SS
05SS
04SS
03SS
02SS
01SS
Spoils
Spoils
6813633E
1888452N
6813449E
1888451N
OILY WATER
SEPARATOR
MH-013
6813444E
1888328N
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
RHUT TRENCH 2
Soil Samples
F8991093 - M2

Attachment 2

Instrumentation

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Survey Unit F8991093

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	05069128	Soil – 1.67e-1 pCi/g Cs-137
ISOCS	N/A	2983947	Soil – 2.95e-1 pCi/g Cs-137 Soil – 2.55e-1 pCi/g Co-60

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS	Investigation Criteria - Scan	Soil – 25.6 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60
All	$DCGL_W$	51.2 Cs-137 12.6 Co-60

Attachment 3

Investigation

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(none required)

Attachment 4

Data Assessment

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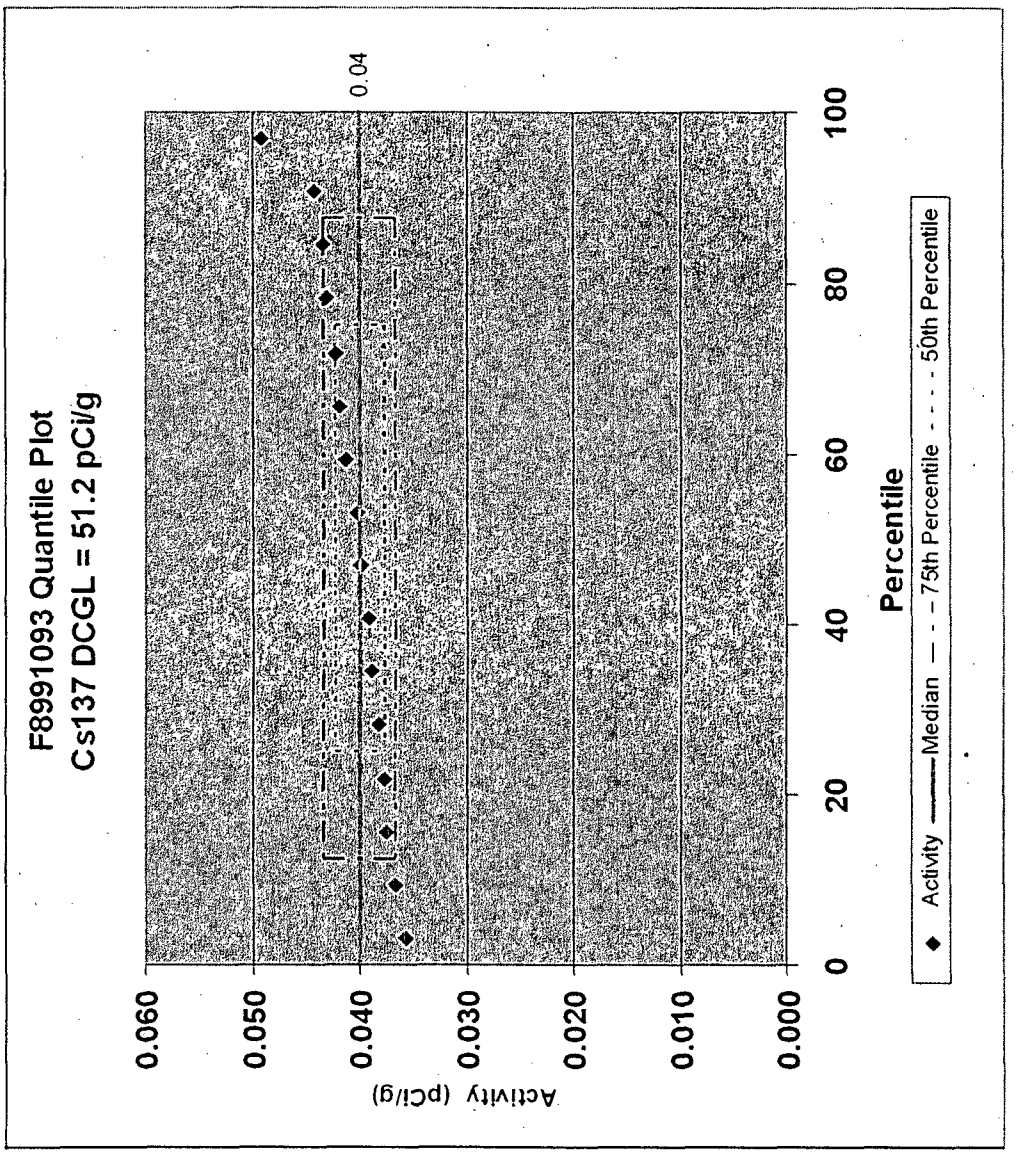
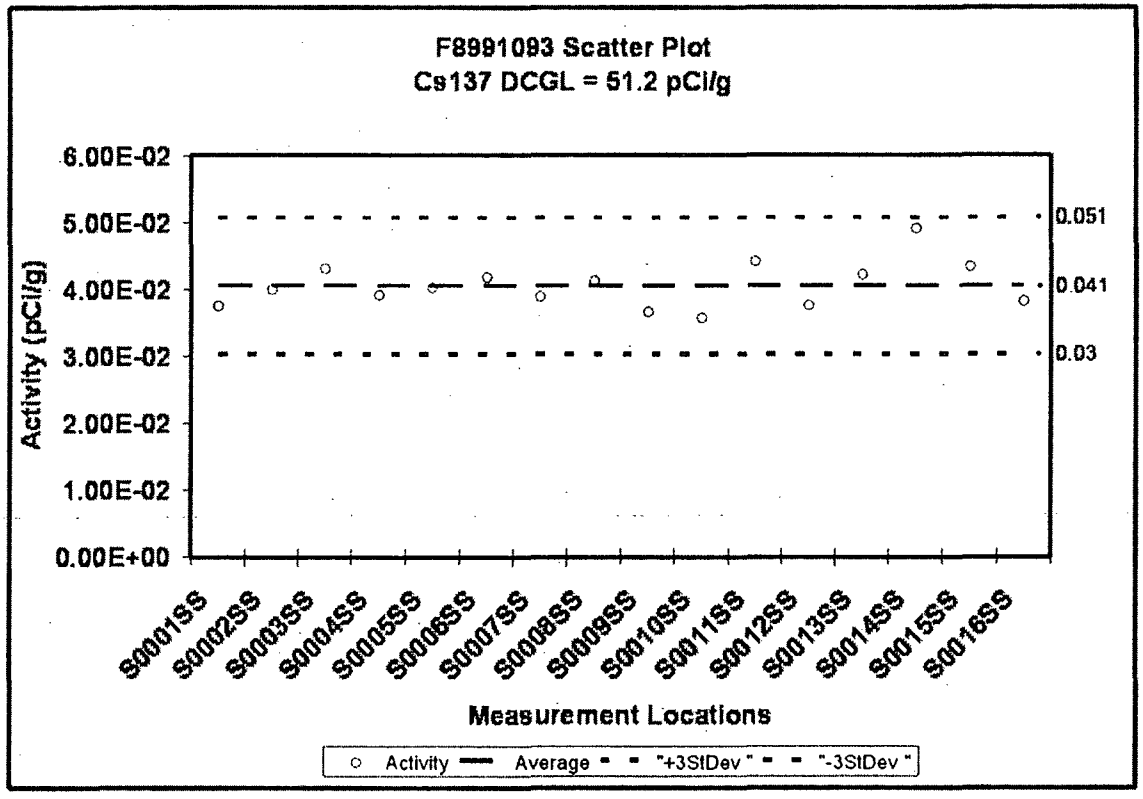
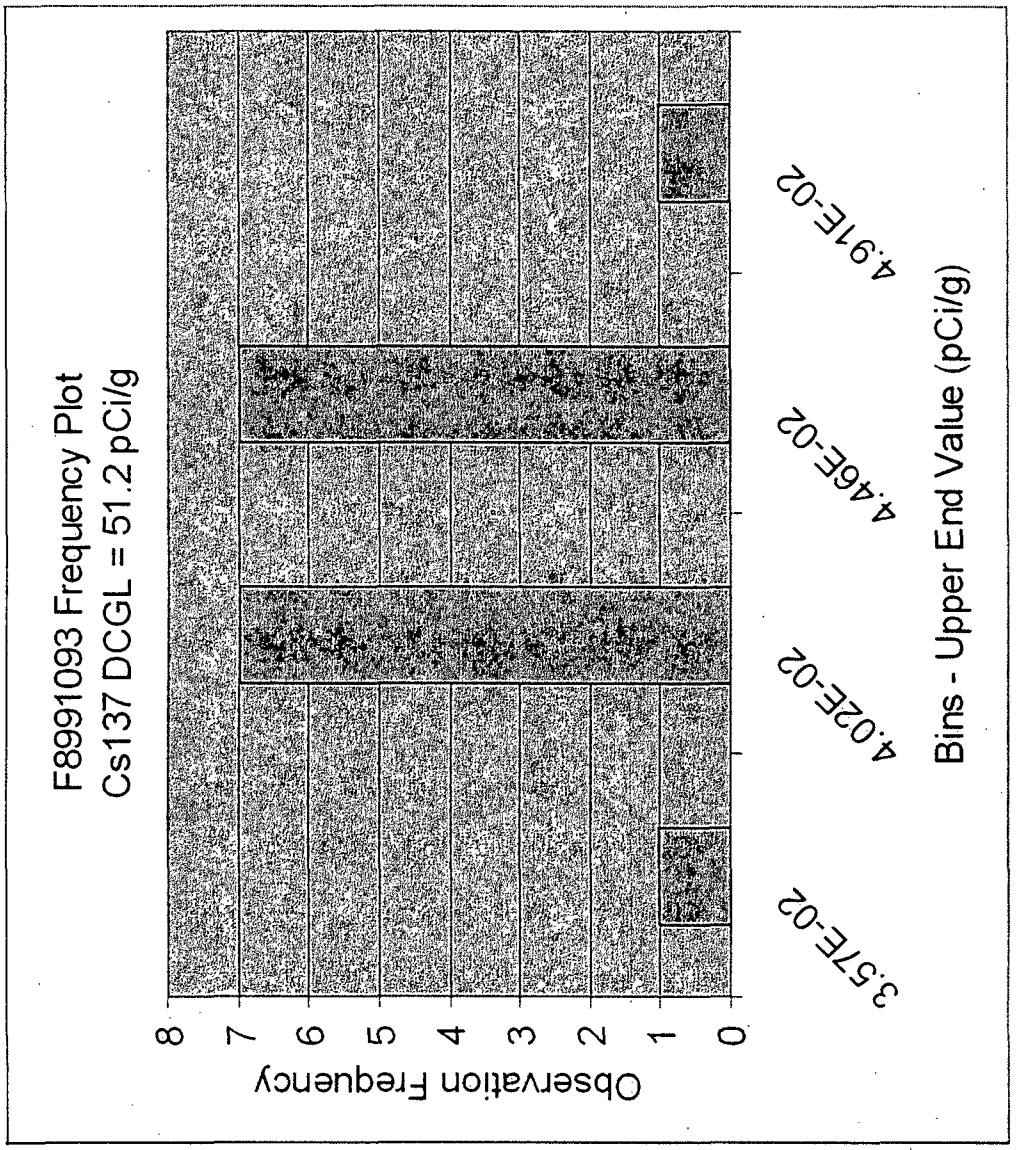
Survey Unit F8991093


F8991093 Quantile Plot
Cs137 DCGL = 51.2 pCi/g
0.04
0.060
0.050
0.040
0.030
0.020
0.010
0.000
Activity (pCi/g)
0
20
40
60
80
100
Percentile
Activity
Median
75th Percentile
50th Percentile


F8991093 Scatter Plot
Cs137 DCGL = 51.2 pCi/g
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Activity (pCi/g)
0.051
0.041
0.03
S0001SS
S0002SS
S0003SS
S0004SS
S0005SS
S0006SS
S0007SS
S0008SS
S0009SS
S0010SS
S0011SS
S0012SS
S0013SS
S0014SS
S0015SS
S0016SS
Measurement Locations
Activity
Average
"+3StDev"
"-3StDev"


F8991093 Frequency Plot
Cs137 DCGL = 51.2 pCi/g
Observation Frequency
0
1
2
3
4
5
6
7
8
3.57E-02
4.02E-02
4.46E-02
4.91E-02
Bins - Upper End Value (pCi/g)