Rancho Seco

Final Status Survey Summary Report

March 25, 2008

Transformer Yard

Survey Unit F8390001

Prepared By: Dan A. Tallman **Date:** **March 25, 2008**

FSS Engineer

Reviewed By: _____ **Date:** 3/25/08

Lead FSS Engineer

Approved By: _____ **Date:** 5-1-08

Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8390001, Transformer Yard

Survey Unit Description:

Operating History: The area surrounded the main station transformer pads. The adjacent area was used for the storage of radioactive material. Operating records and the HSA document several leaks/spills with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the adjacent area that may have had the potential to contaminate the area.

Site Characterization: Soil samples were collected and analyzed for the presence of plant-derived radionuclides. Cs-137 was the primary nuclide of plant origin detected with a mean activity level of 0.266 pCi/g and a maximum value of 0.913 pCi/g. Based on the classification procedure (DSIP-0020) and initial levels of Cs-137 reported, the area was determined to be a Class 3 land 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 randomly determined and 392 m^2 were scanned for approximately 12% coverage. Soil samples were collected at each of the ten direct measurement locations falling on the dirt/gravel surfaces associated with the survey unit and analyzed by HPGe detector. Direct Gamma Measurements, using the Inspector 1000 (with a characterized 2" by 2" NaI detector), were taken at each of the four direct measurement locations falling on the asphalt surfaces associated with the survey unit. 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:	F839	Transformer Yard
Survey Unit:	0001	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m^2)**:**	3385	
Evaluator:	D.A.Tallman	
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	50% DCGLW
Design Sigma (pCi/g)**:**	0.432	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)**:**	392	
Scan Coverage (%):	11.6%	Class 3
$Z_{1-\alpha}$ **:**	1.645	
$Z_{1-\beta}$ **:**	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	59.2	
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 F8390001. 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. 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:		2.85E-01	
Median:		5.80E-02	
Standard Deviation:		3.62E-01	
Range:	3.83E-02 to 8.75E-01		
F8390001A0002GD	8.75E-01	< 8.75E-01	
F8390001A0004GD	8.49E-01	< 8.49E-01	
F8390001A0001GD	7.69E-01	< 7.69E-01	
F8390001A0003GD	8.36E-01	< 8.36E-01	
F8390001S0012SS	4.20E-02	4.23E-02	2.89E-02
F8390001S0013SS	4.30E-02	1.85E-01	4.29E-02
F8390001S0014SS	5.61E-02	< 5.61E-02	
F8390001S0018SS	5.90E-02	< 5.90E-02	
F8390001S0001SS	6.86E-02	7.36E-02	4.54E-02
F8390001S0002SS	4.37E-02	< 4.37E-02	
F8390001S0004SS	4.78E-02	< 4.78E-02	
F8390001S0007SS	3.83E-02	< 3.83E-02	
F8390001S0009SS	5.23E-02	< 5.23E-02	
F8390001S0010SS	4.11E-02	5.70E-02	2.94E-02

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 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):	14	
Median (pCi/g)**:**	5.80E-02	
Mean (pCi/g)**:**	2.85E-01	
Standard Deviation (pCi/g)**:**	3.62E-01	
Maximum (pCi/g)**:**	8.75E-01	
Sign Test Final N Value:	14	
S+ Value:	14	
Critical Value:	10	
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:	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 3 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 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.

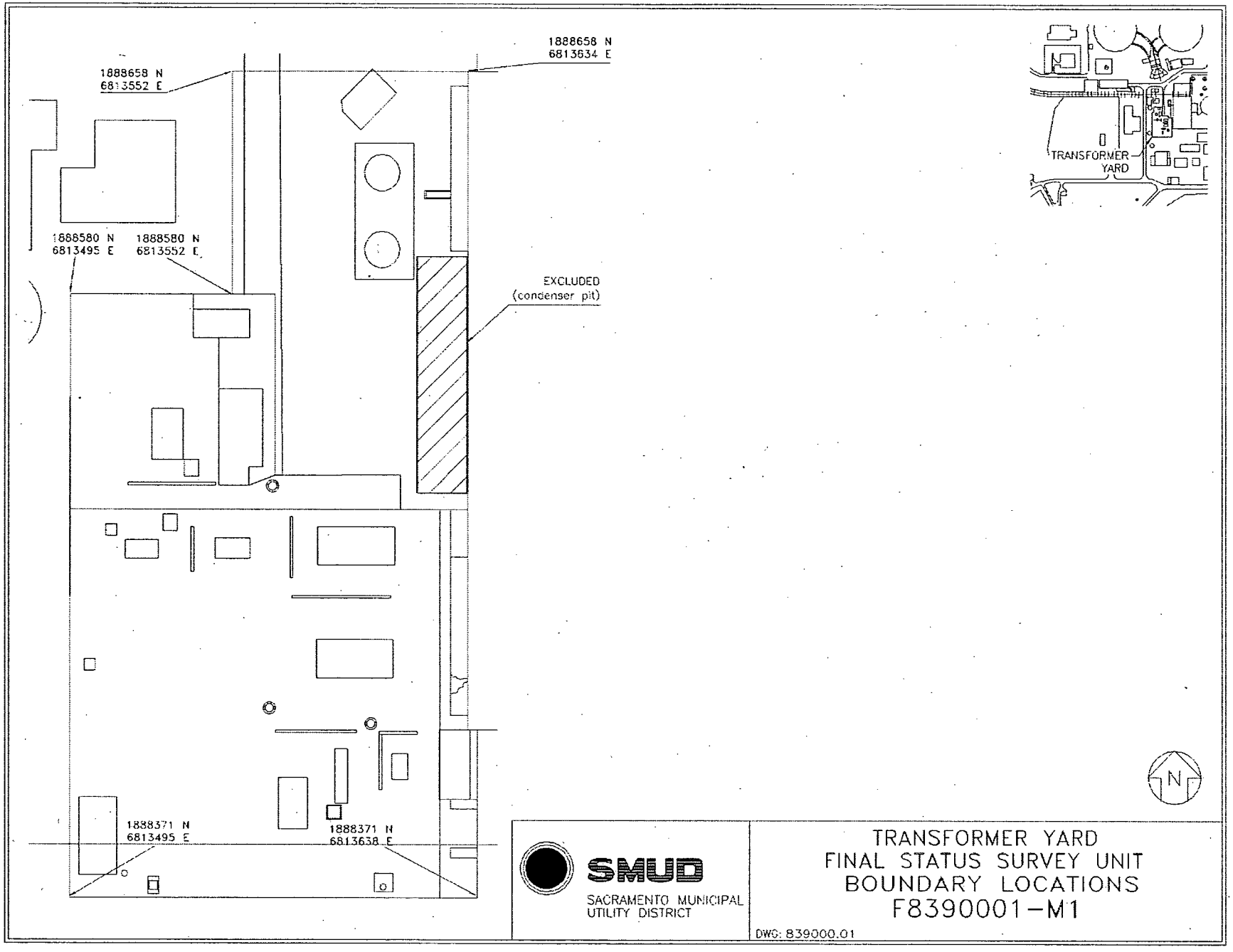
It is concluded that survey unit F8390001 meets the release criteria of 10CFR20.1402.

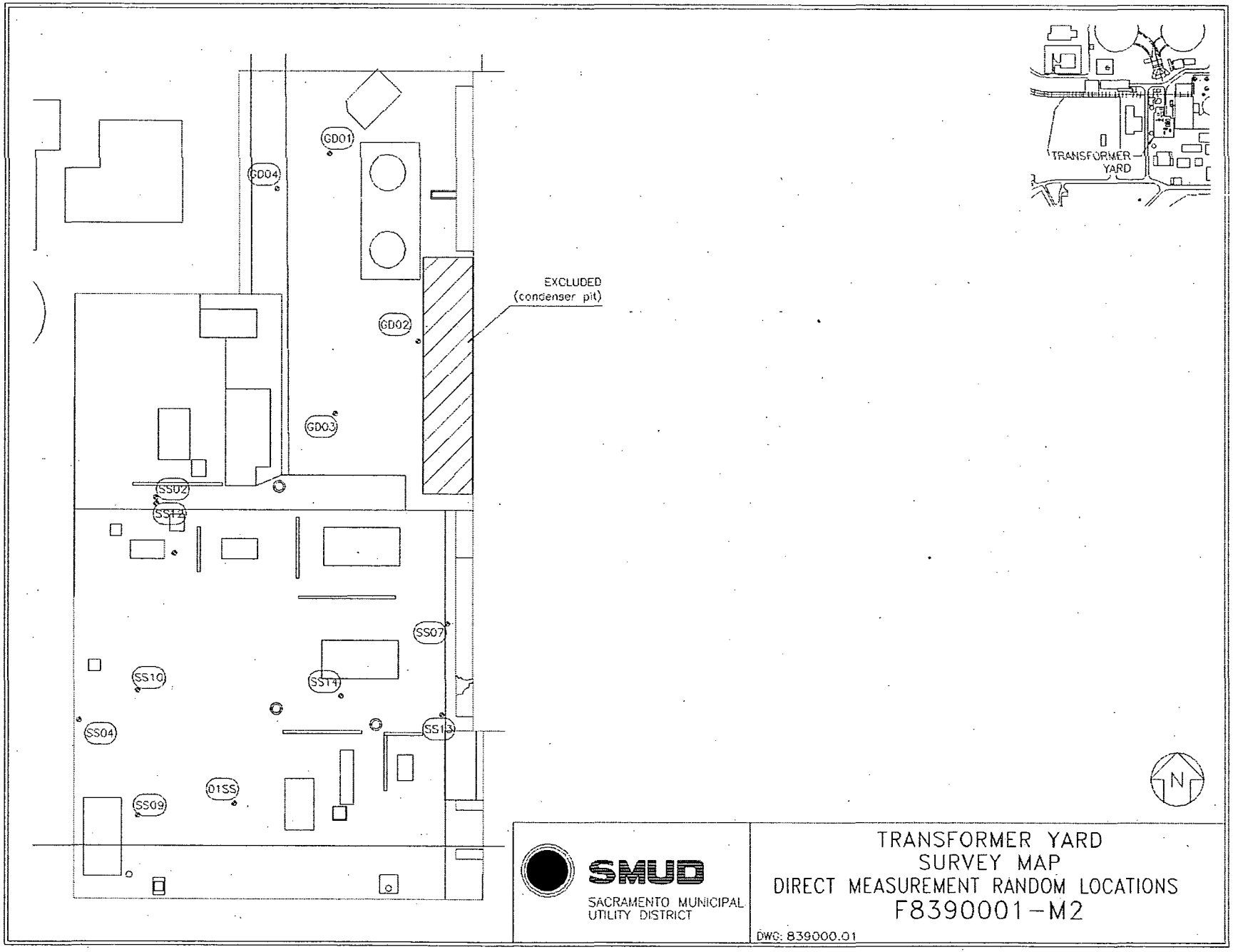
Attachment 1

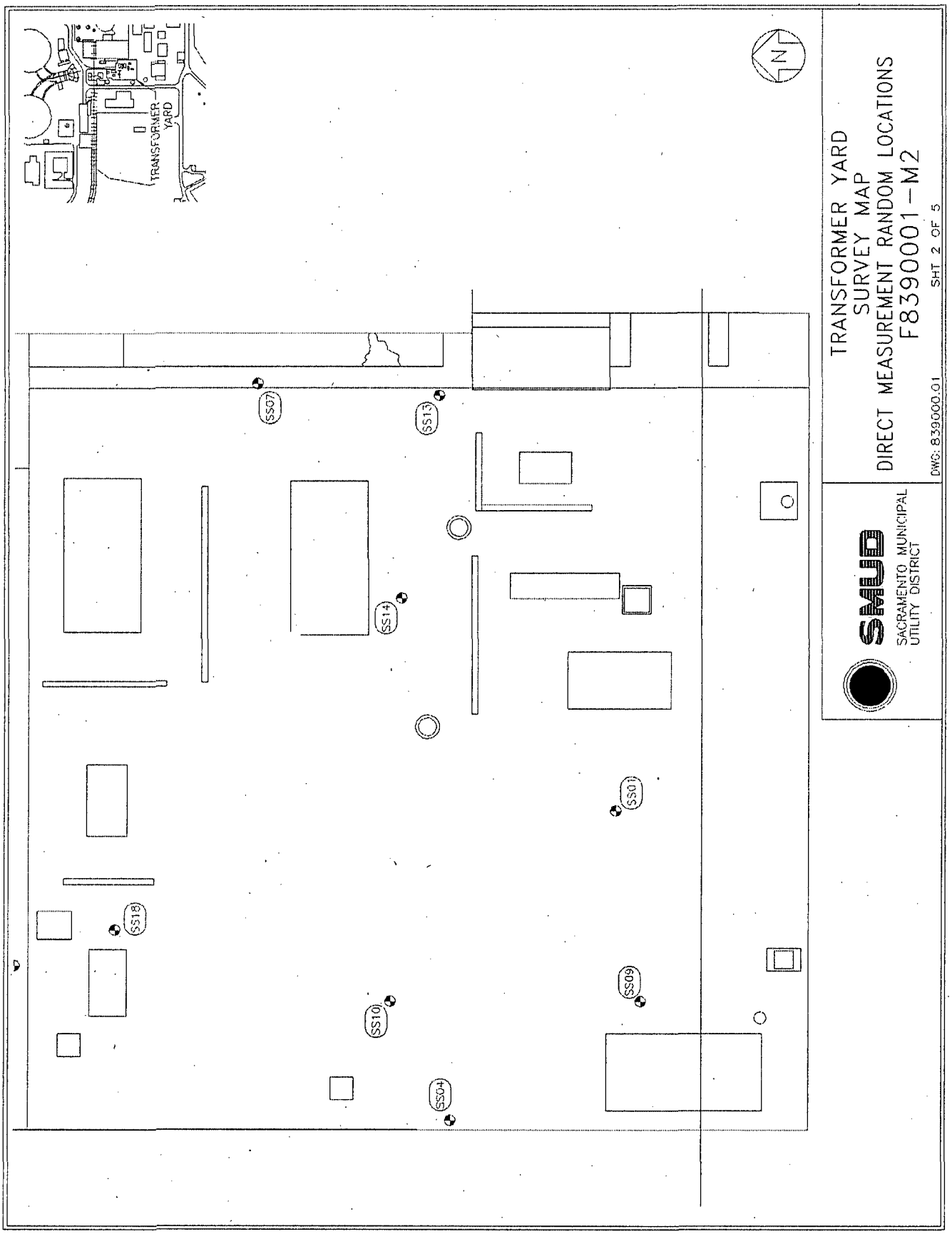
Maps

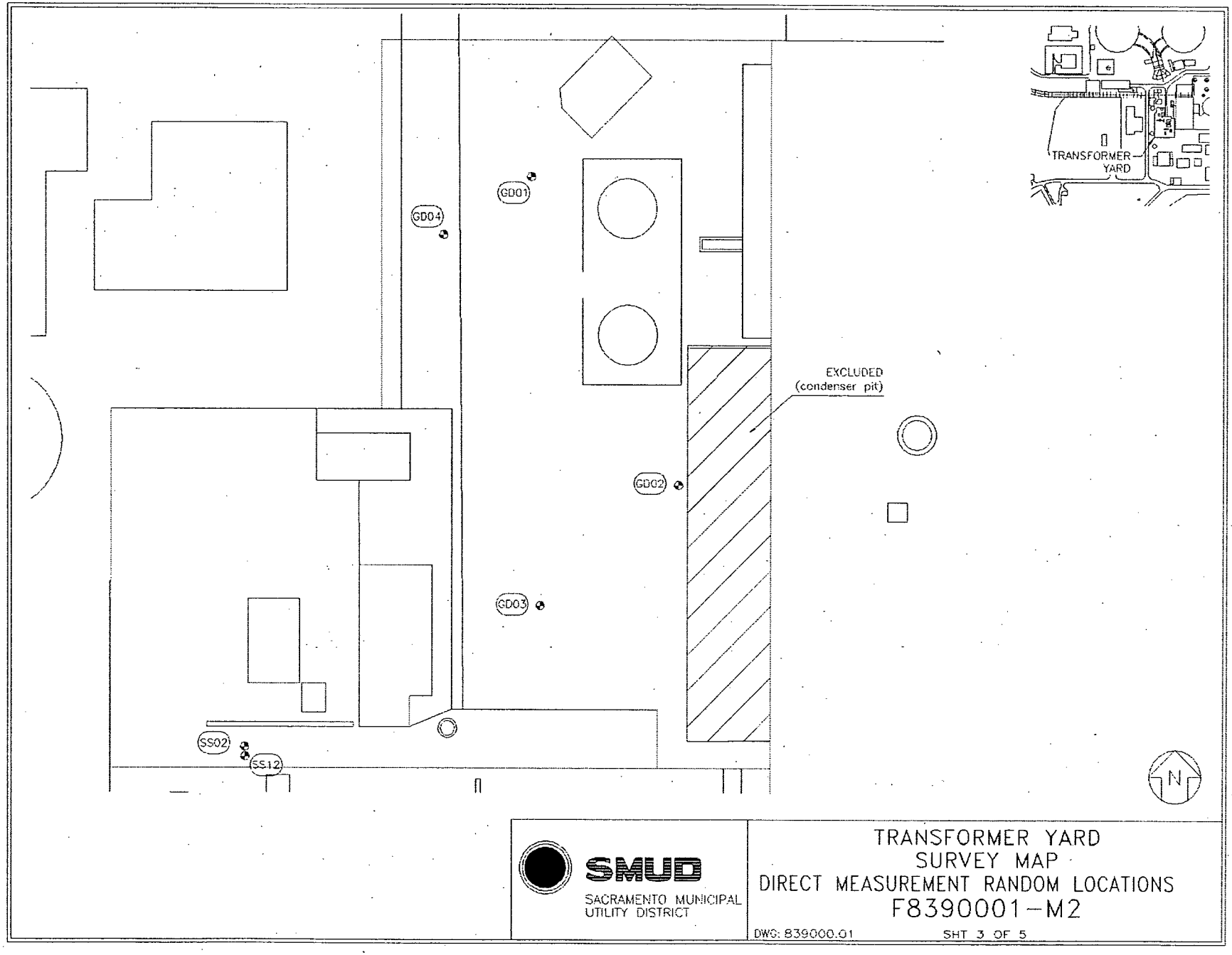
May 1, 2008

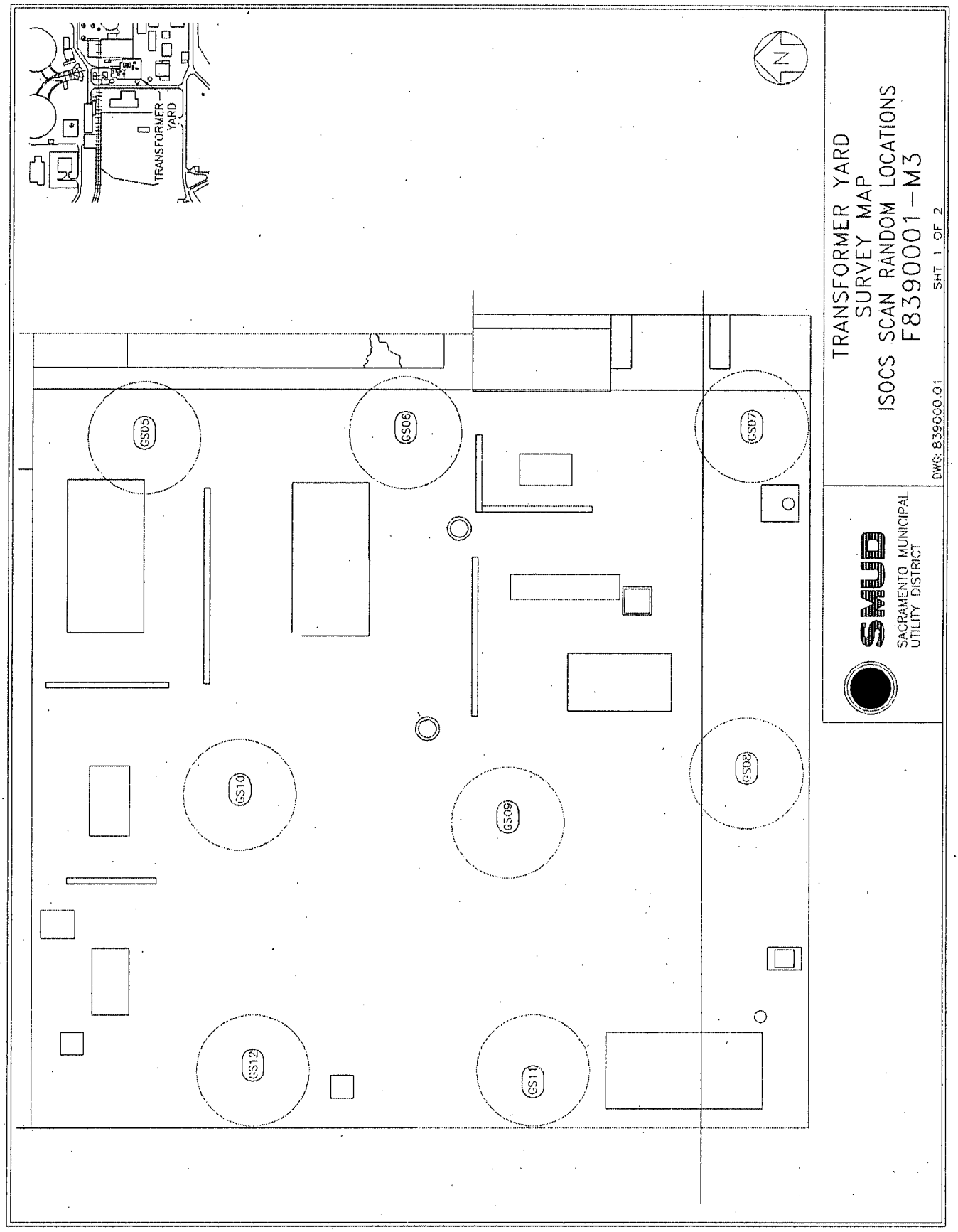
Survey Unit F8390001

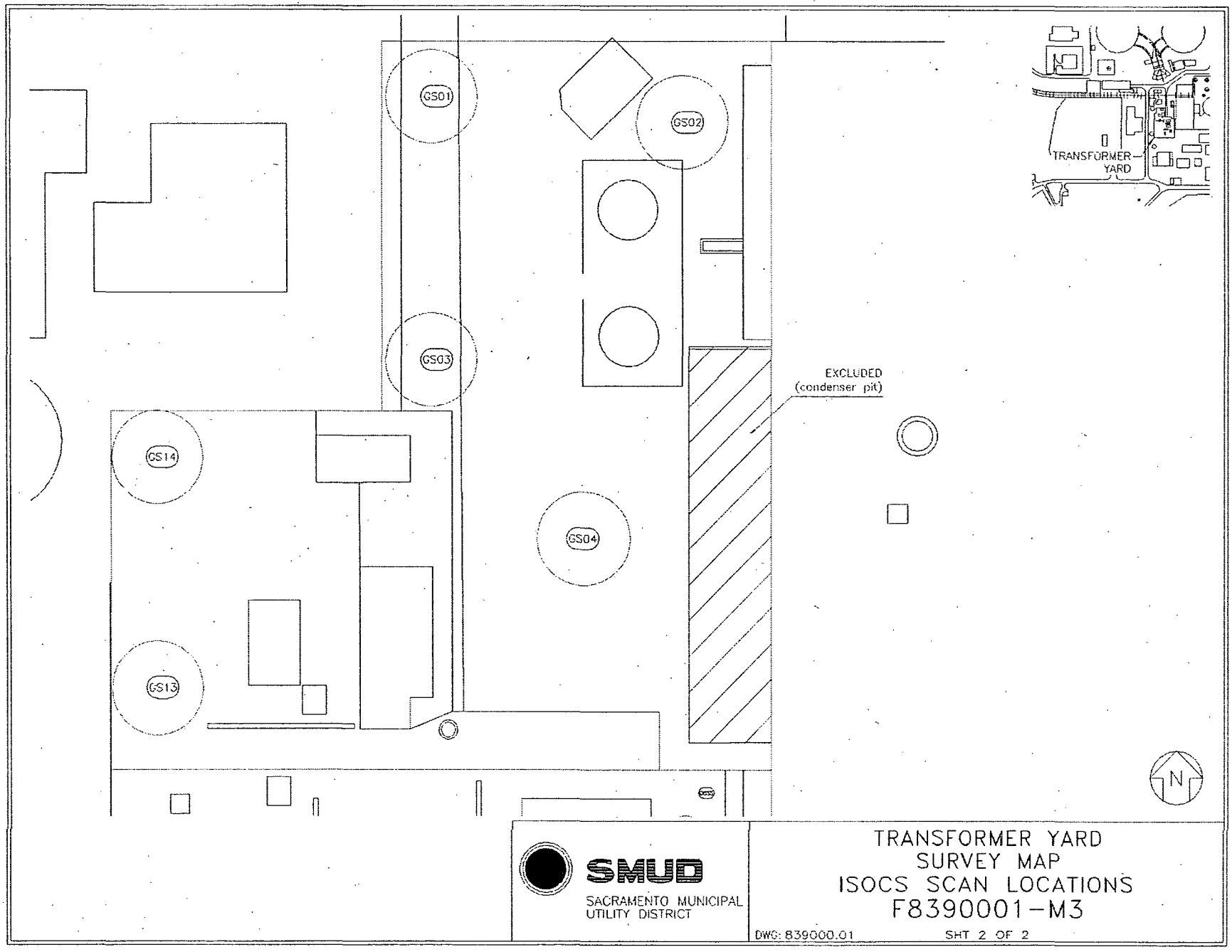

1888658 N
6813634 E
1888658 N
6813552 E
1888580 N
6813495 E
1888580 N
6813552 E
EXCLUDED
(condenser pit)
1888371 N
6813495 E
1888371 N
6813638 E
TRANSFORMER
YARD
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
TRANSFORMER YARD
FINAL STATUS SURVEY UNIT
BOUNDARY LOCATIONS
F8390001-M1
DWG: 839000.01


GD01
GD04
GD02
GD03
EXCLUDED
(condenser pit)
SS02
SS12
SS07
SS10
SS14
SS04
SS13
01SS
SS09
TRANSFORMER
YARD
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
TRANSFORMER YARD
SURVEY MAP
DIRECT MEASUREMENT RANDOM LOCATIONS
F8390001-M2
DWG: 839000.01


TRANSFORMER YARD
SURVEY MAP
DIRECT MEASUREMENT RANDOM LOCATIONS
F8390001-M2
DWG: 839000.01
SHT 2 OF 5
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
TRANSFORMER YARD
N
SS07
SS13
SS14
SS01
SS18
SS09
SS10
SS04


TRANSFORMER YARD
GD01
GD04
GD02
GD03
EXCLUDED
(condenser pit)
SS02
SS12
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
TRANSFORMER YARD
SURVEY MAP
DIRECT MEASUREMENT RANDOM LOCATIONS
F8390001-M2
DWG: 839000.01
SHT 3 OF 5


TRANSFORMER YARD
SURVEY MAP
ISOCS SCAN RANDOM LOCATIONS
F8390001-M3
SHT 1 OF 2
DWG: 839000.01
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
TRANSFORMER YARD
N
GS05
GS06
GS07
GS08
GS09
GS10
GS11
GS12


GS01
GS02
GS03
GS04
GS13
GS14
EXCLUDED
(condenser pit)
TRANSFORMER
YARD
N
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT
TRANSFORMER YARD
SURVEY MAP
ISOCS SCAN LOCATIONS
F8390001-M3
DWG: 839000.01
SHT 2 OF 2

Attachment 2

Instrumentation

March 25, 2008

Survey Unit F8390001

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	05069128	Soil – 0.3 pCi/g Cs-137
Inspector	N/A	08051294	Asphalt – 0.84 pCi/g Co-60 Asphalt – 0.88 pCi/g Cs-137
ISOCS	N/A	2983947	Soil – 0.34 pCi/g Cs-137 Soil – 0.23 pCi/g Co-60

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
Inspector/ HPGe	Investigation Criteria – Direct measurement/Soil Sample 50% $DCGL_W$	Soil – 25.6 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60 Asphalt – 25.6 pCi/g Cs-137
ISOCS	Investigation Criteria - Scan	Soil – 20 pCi/g Cs-137 Soil – 5 pCi/g Co-60 Asphalt – 20 pCi/g Cs-137
All	$DCGL_W$	52.6 Cs-137 12.6 Co-60

Attachment 3

Investigation

March 25, 2008

Survey Unit F8390001

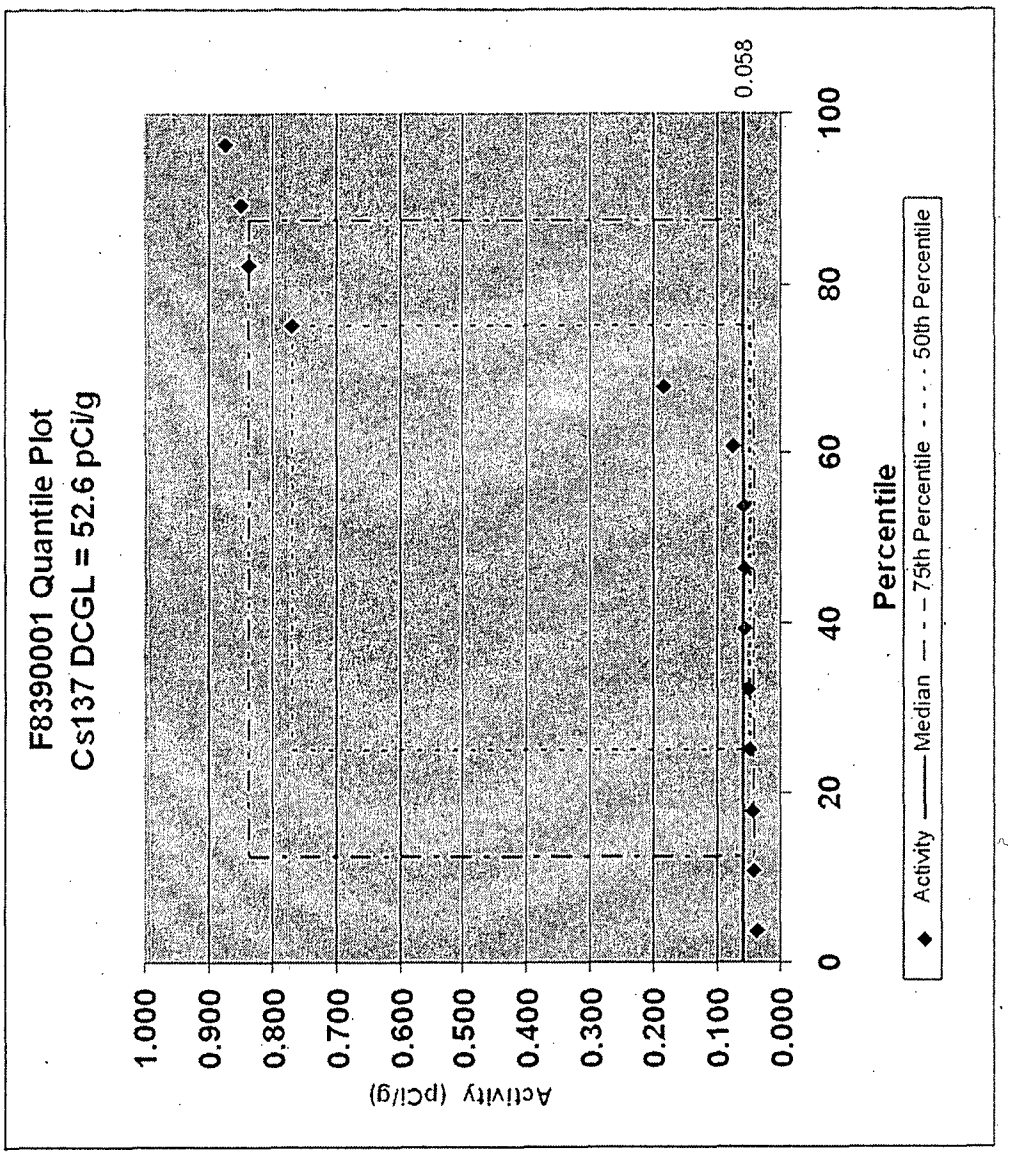
(none required)

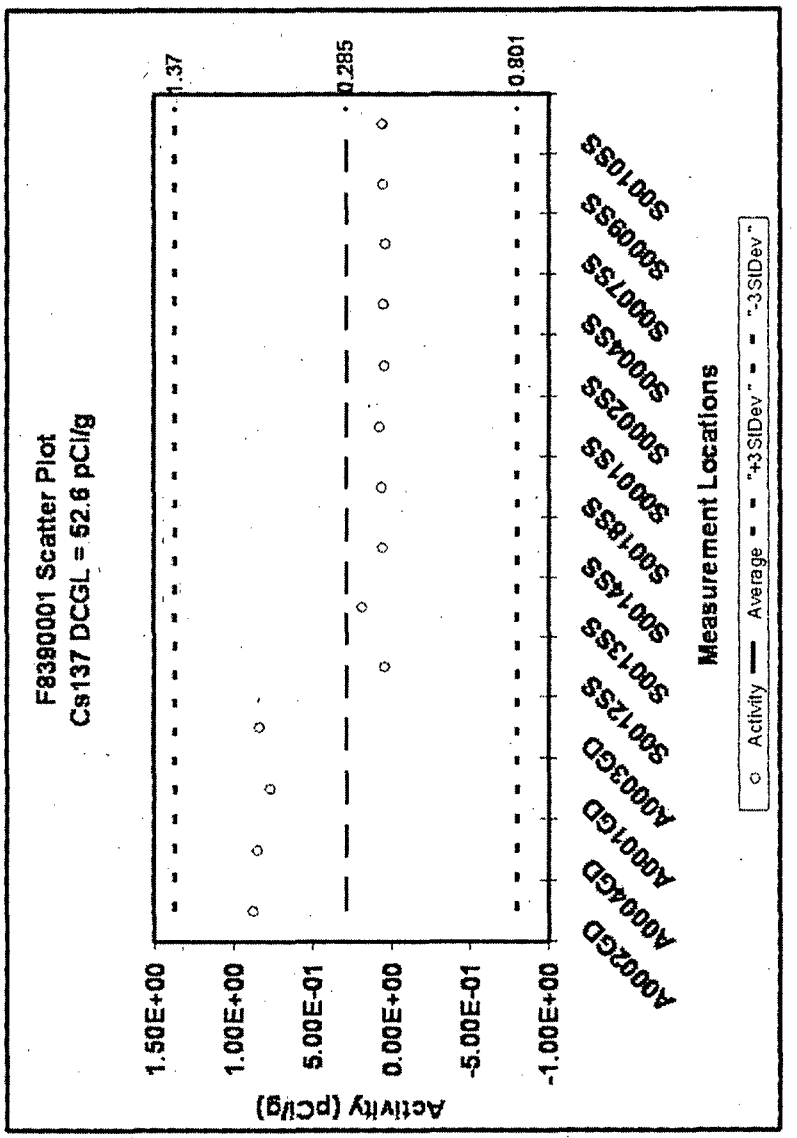
Attachment 4

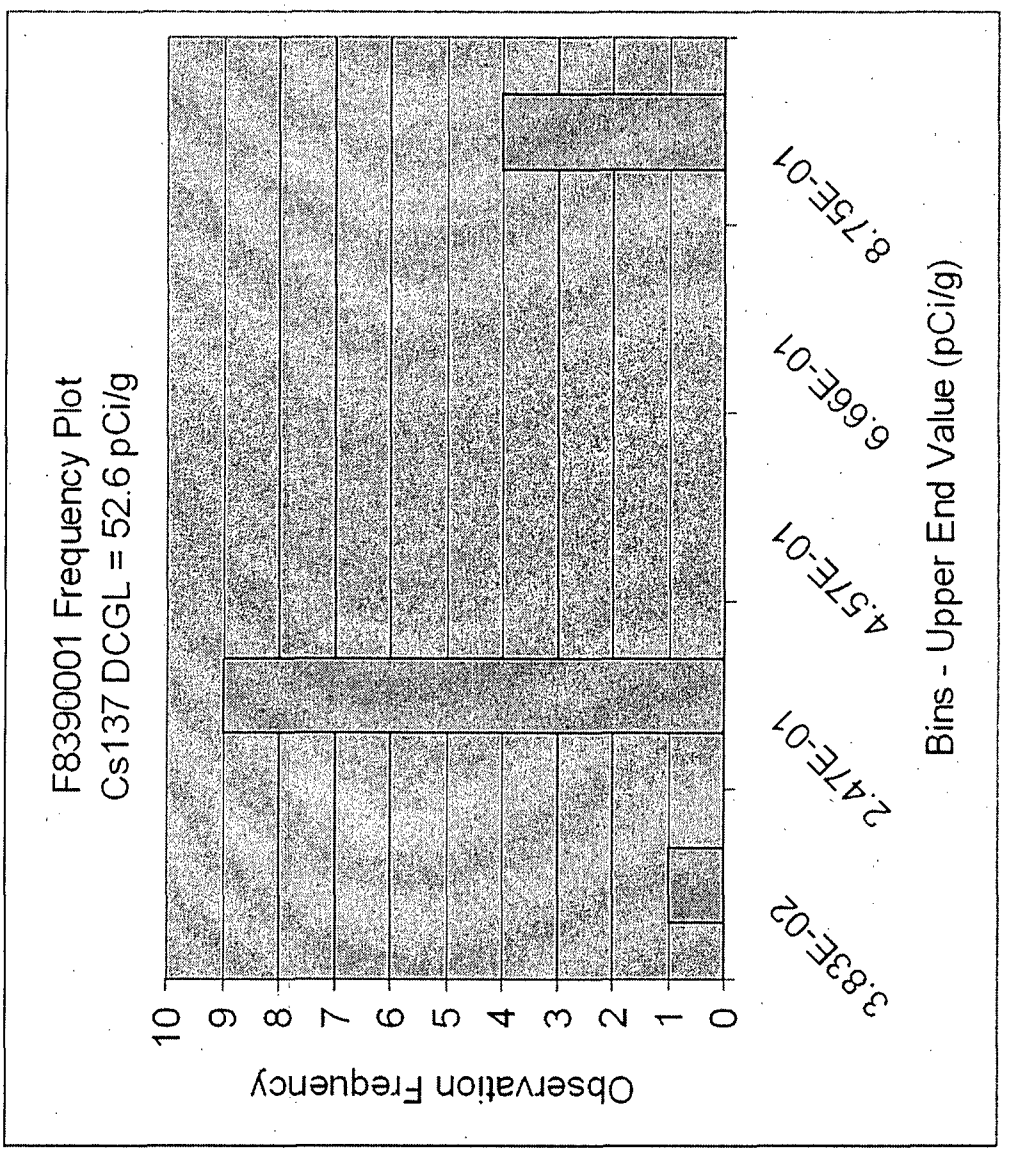
Data Assessment

March 25, 2008

Survey Unit F8390001


F8390001 Quantile Plot
Cs137 DCGL = 52.6 pCi/g
Activity (pCi/g)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0.058
0
20
40
60
80
100
Percentile
Activity
Median
75th Percentile
50th Percentile


F8390001 Scatter Plot
Cs137 DCGL = 52.6 pCi/g
Activity (pCi/g)
1.50E+00
1.00E+00
5.00E-01
0.00E+00
-5.00E-01
-1.00E+00
1.37
0.285
0.801
Measurement Locations
A0002GD
A0004GD
A0001GD
A0003GD
S0012SS
S0013SS
S0014SS
S0018SS
S0001SS
S0002SS
S0004SS
S0007SS
S0009SS
S0010SS
Activity
Average
"+3 SIDev"
"-3 SIDev"


F8390001 Frequency Plot
Cs137 DCGL = 52.6 pCi/g
Observation Frequency
0
1
2
3
4
5
6
7
8
9
10
3.83E-02
2.47E-01
4.57E-01
6.66E-01
8.75E-01
Bins - Upper End Value (pCi/g)