

Rancho Seco

Final Status Survey Summary Report

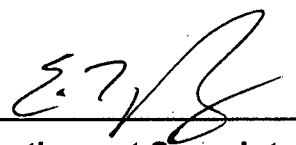
April 5, 2008

Northern Industrial Area (land)

Survey Unit F8000141

Prepared By: Dan A. Tallman  Date: April 5, 2008
FSS Engineer

Reviewed By:  Date: 4/7/08
Lead FSS Engineer

Approved By:  Date: 5-5-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8000141, Northern Industrial Area (land)

Survey Unit Description:

Operating History:

Survey F8000141 - Northern IA Land Areas, provided for the survey and evaluation of the non-paved lands areas located primarily north of the site's two cooling towers. As shown in Attachment 1, these areas extending from the eastern Industrial Area security fence adjacent to the staff parking lots west to encompass the western Spray Pond and its associate dirt berm. These land areas were characterized individually as four distinct units during the characterization phase of the RSSI as follows:

800013 – Central Industrial Area, Class 3 ~ 14,676 square meters

This area was located north of, and extending to the south-east of, the cooling towers to the PAP, exclusive of the PAP, sewer plant, water treatment building, chlorine building, and intake structure. This area was used for the storage and/or transport of radioactive material. Operating records and the HSA document several nearby leaks or spills with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

800014 – North Industrial Area Boundary, Class 3 ~ 6,410 square meters

This area was located to the north of the spray ponds extending to the IA fence. This area was used for the storage of radioactive material. Operating records and the HSA document several nearby leaks or spills with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

803002 – Quonset-Hut Yard Class 3 ~ 13,075 square meters

This area was located to the northeast of the cooling towers and east of the spray ponds, excluding the Quonset hut pad itself. This area was used for the storage of radioactive material. Operating records and the HSA document several events with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

806003 – East/West Spray Ponds, Class 3 ~ 21,600 square meters

This area was located to the north of the cooling towers and surrounding the spray ponds. This area was used for the storage of radioactive material. Operating records and the HSA document several events with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

Characterization data collected within these areas, summarized below, revealed no elevated levels of contamination and confirmed the essentially uniform nature of these units.

SUID	Name	Sigma	Mean pCi/g, Cs-137	Maximum pCi/g, Cs-137
800013	Central Industrial Area	0.030	0.070	0.149
800014	North Industrial Area Boundary	0.007	0.060	0.068
803002	Quonset-Hut Yard	0.030	0.077	0.146
806000	East/West Spray Ponds	0.026	0.069	0.167

(Site background levels of Cs-137 have been determined to be approximately 0.312 pCi/g.)

Based on this uniformity and the contiguous nature of the areas, F8000141 consolidated all four into a single Class 3 Survey Unit designated 8000141, the boundaries of which were located by SMUD survey crews and are shown on survey map F8000141-M1. 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 5460 m² were scanned for approximately 10% 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	Northern Industrial Area (land)
Survey Unit:	0141	Open Land Area
Class:	3	LTP Table 5-4
SU Area (m²):	55761	
Evaluator:	D.A.Tallman	
DCGL Cs137 surrogate (pCi/g):	51.2	
Area Factor:	N/A	Class 3
Design DCGL_{emc} (pCi/g):	N/A	Class 3
LBGR (pCi/g):	25.6	Default = 50% DCGL
Design Sigma (pCi/g):	0.03	DTBD-06-001, Table 5-4D
Type I Error:	0.05	
Type II Error:	0.05	
Nuclide:	Cs137	
Sample Area (m²):	N/A	Class 3
Total Area Scanned (m²):	5460	
Scan Coverage (%):	9.8%	Class 3
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	853.3	
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 F8000141. 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:		7.81E-02	
Median:		6.76E-02	
Standard Deviation:		3.89E-02	
Range:	4.13E-02 to 2.01E-01		
F8000141S0001SS	7.10E-02	< 7.10E-02	
F8000141S0002SS	6.78E-02	< 6.78E-02	
F8000141S0003SS	5.73E-02	< 5.73E-02	
F8000141S0004SS	4.66E-02	< 4.66E-02	
F8000141S0005SS	4.13E-02	< 4.13E-02	
F8000141S0006SS	6.35E-02	< 6.35E-02	
F8000141S0007SS	6.37E-02	< 6.37E-02	
F8000141S0008SS	5.51E-02	< 5.51E-02	
F8000141S0009SS	6.11E-02	2.01E-01	5.45E-02
F8000141S0010SS	8.55E-02	< 8.55E-02	
F8000141S0011SS	9.36E-02	< 9.36E-02	
F8000141S0012SS	8.66E-02	< 8.66E-02	
F8000141S0013SS	6.75E-02	< 6.75E-02	
F8000141S0014SS	9.31E-02	< 9.31E-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 greater than the design standard deviation. Use of Standard Deviation vs. design sigma does not alter the relative shift used to determine the minimum number of direct measurements, so no additional samples were required.

Table 3. Data Assessment Results

Survey Results Parameter	Value	Comment
Actual Direct Measurements (N):	14	
Median (pCi/g):	6.76E-02	
Mean (pCi/g):	7.81E-02	
Standard Deviation (pCi/g):	3.89E-02	
Maximum (pCi/g):	2.01E-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 < DCGL_{mc}:	N/A	Class 3
Standard Deviation <= Sigma:	Investigate	Use of Standard Deviation vs. design sigma does not alter the relative shift used to determine the minimum number of direct measurements required.
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 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.

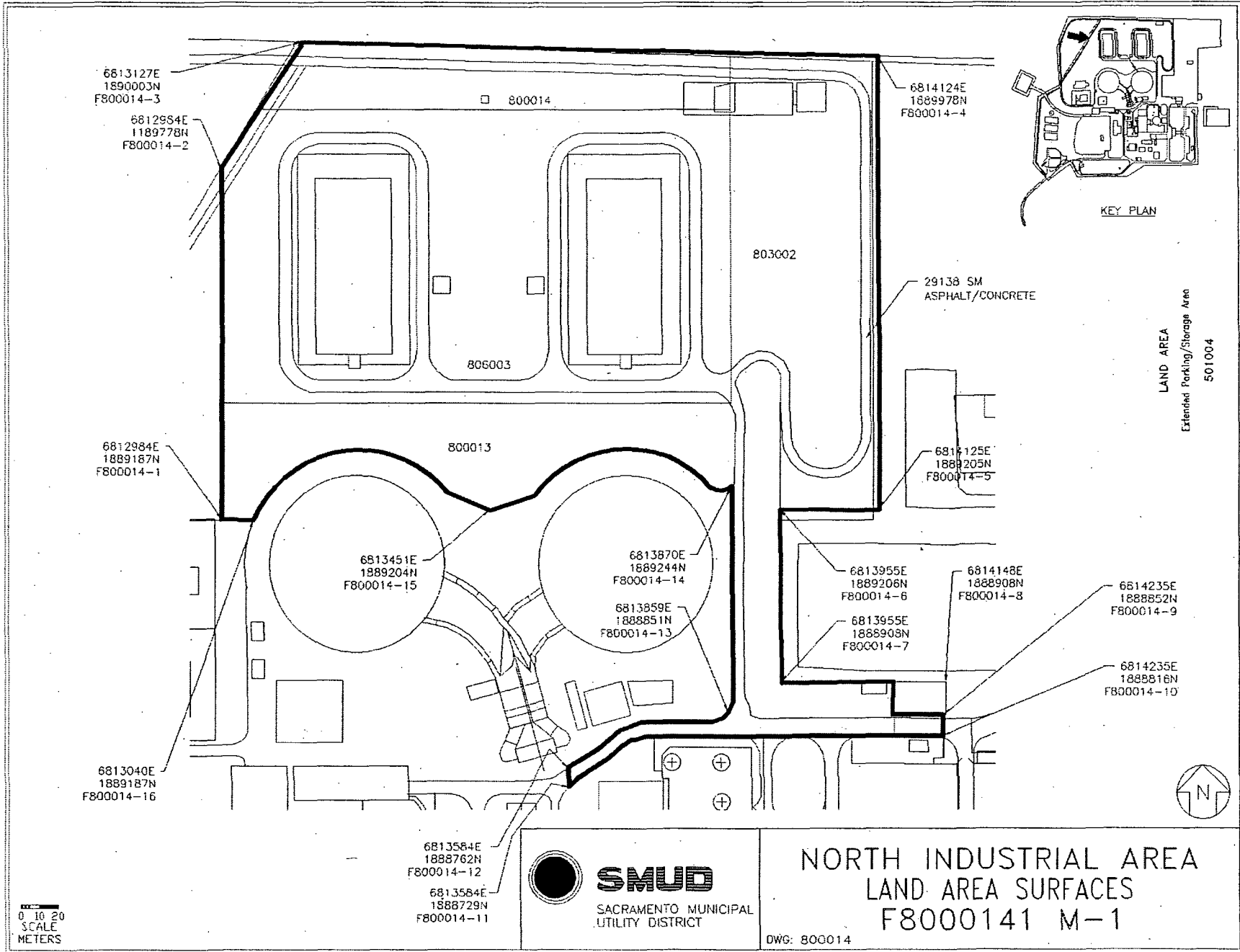
It is concluded that survey unit F8000141 meets the release criteria of 10CFR20.1402.

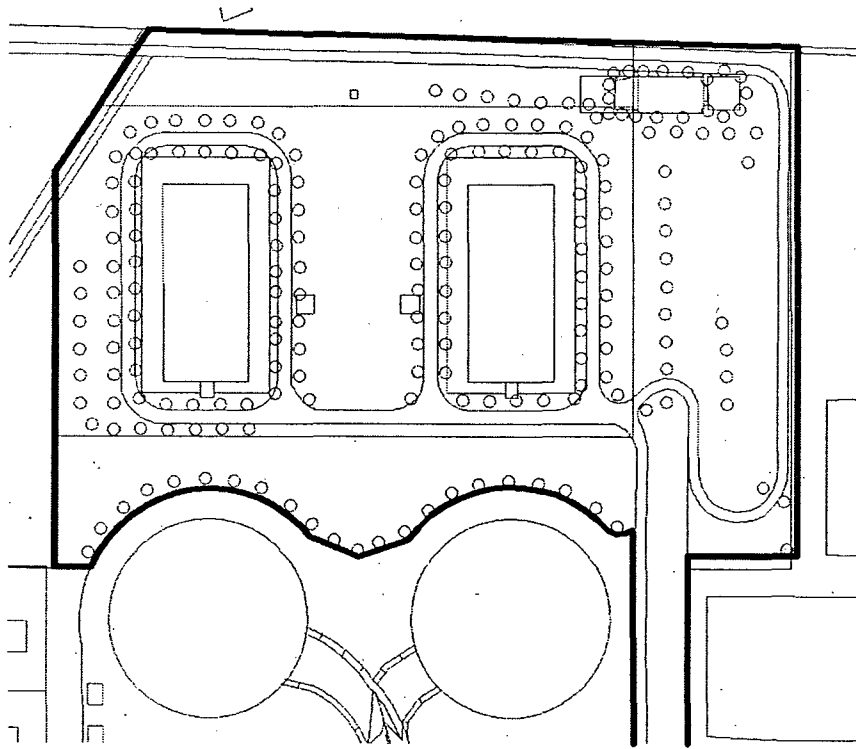
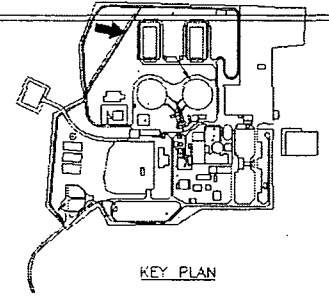
Attachment 1

Maps

April 5, 2008

Survey Unit F8000141





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SCALE
METERS

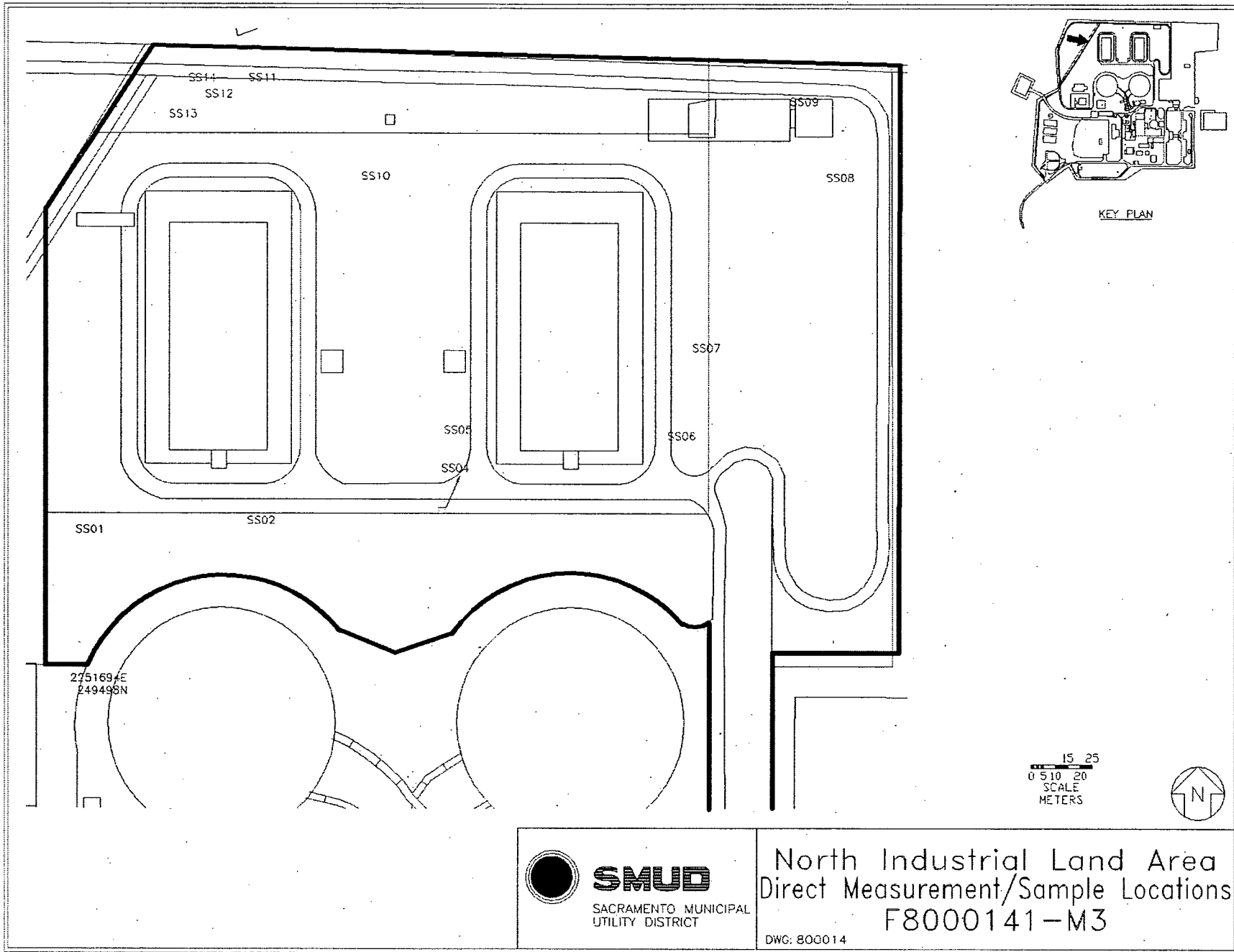


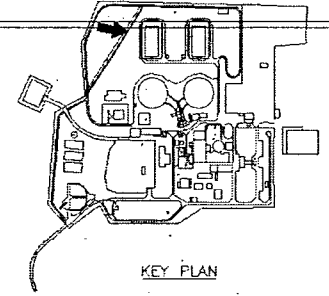
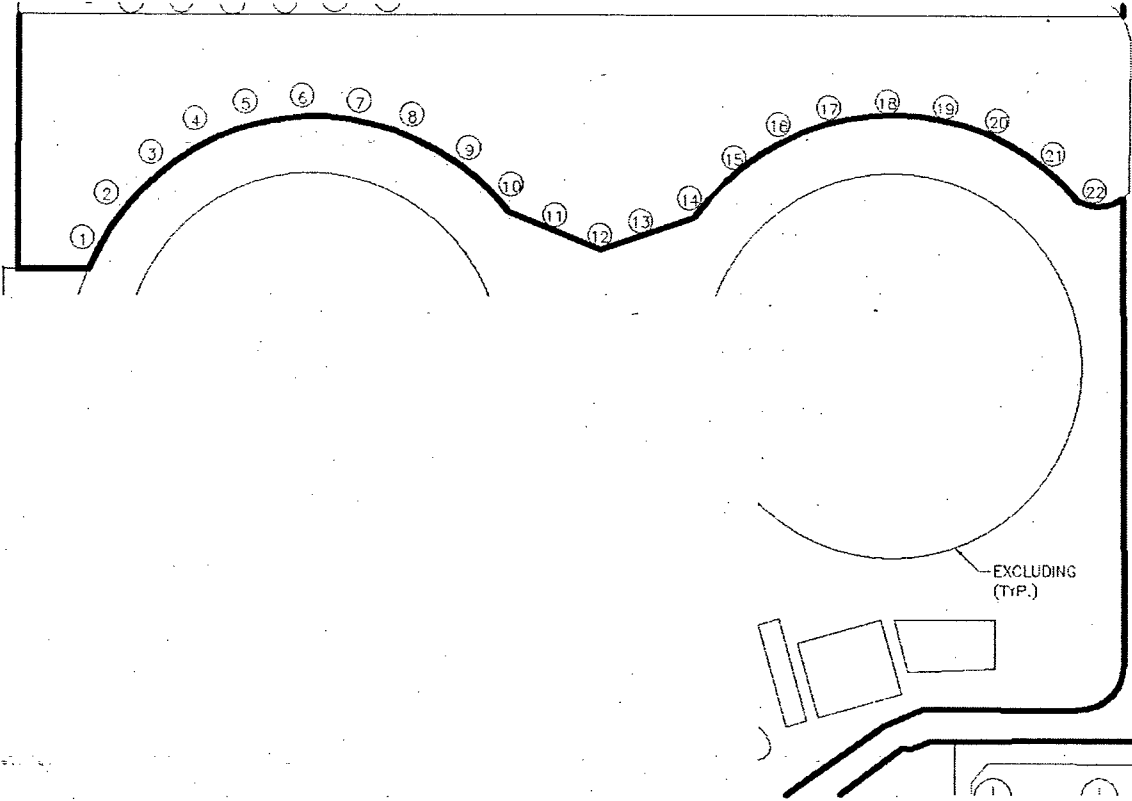
SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

DWG: 800014

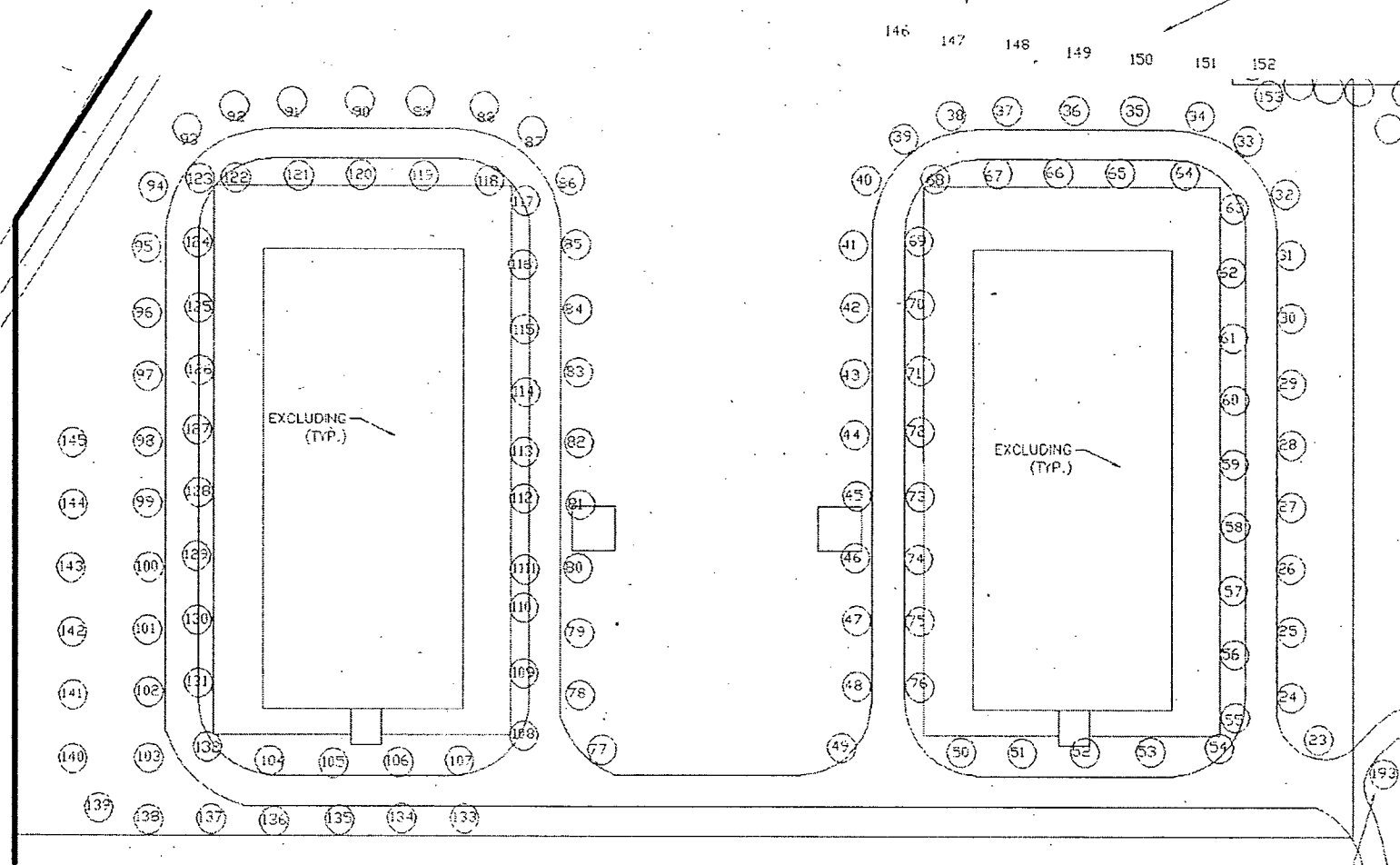
North Industrial Land Area
Scan Locations (Overview)
F8000141-M2





NORTHERN INDUSTRIAL AREA
LAND GAMMA SCAN LOCATIONS
F8000141-M4

SEE F8000141-M6



SEE F8000141-M7

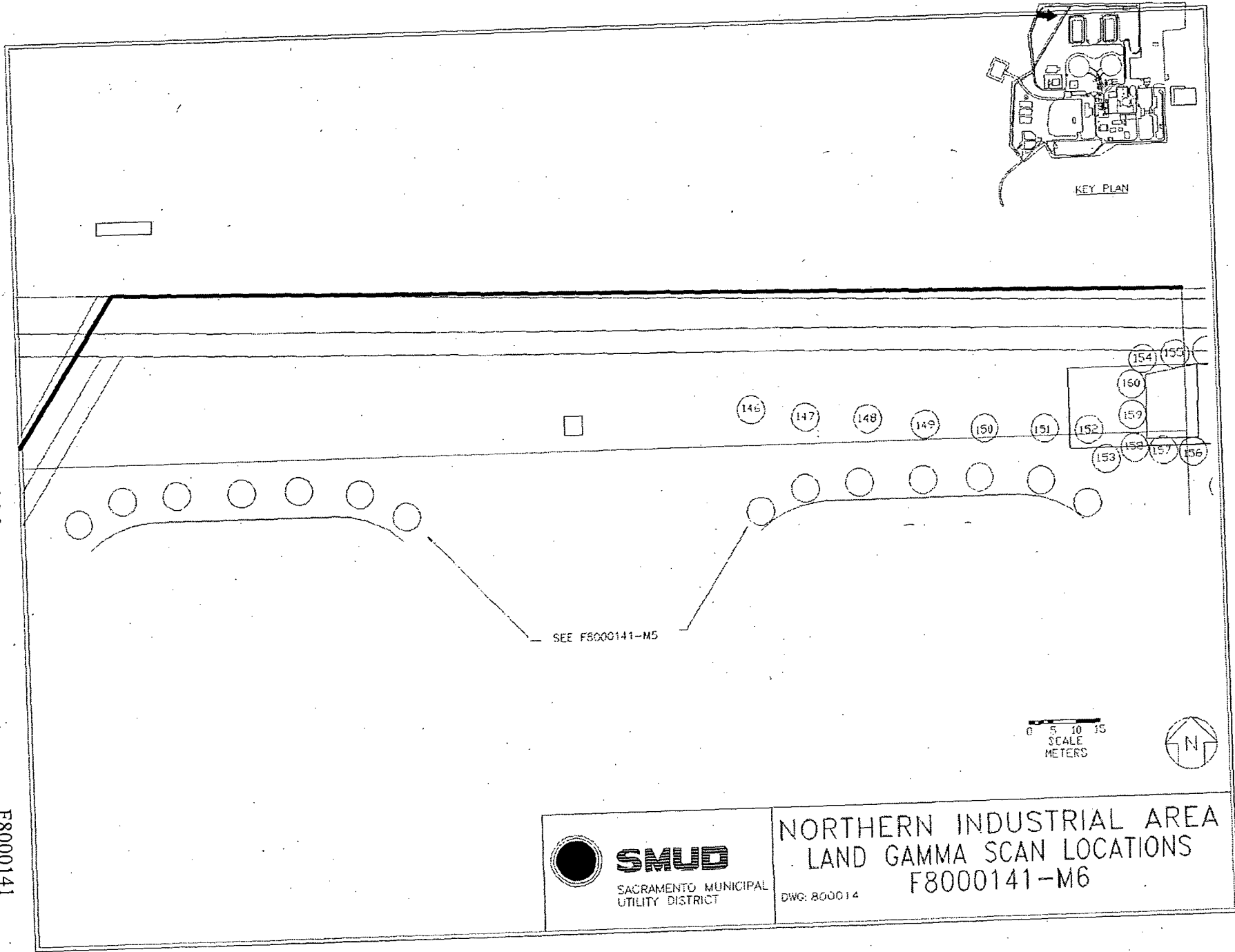



SMUD

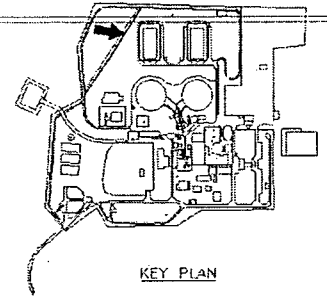
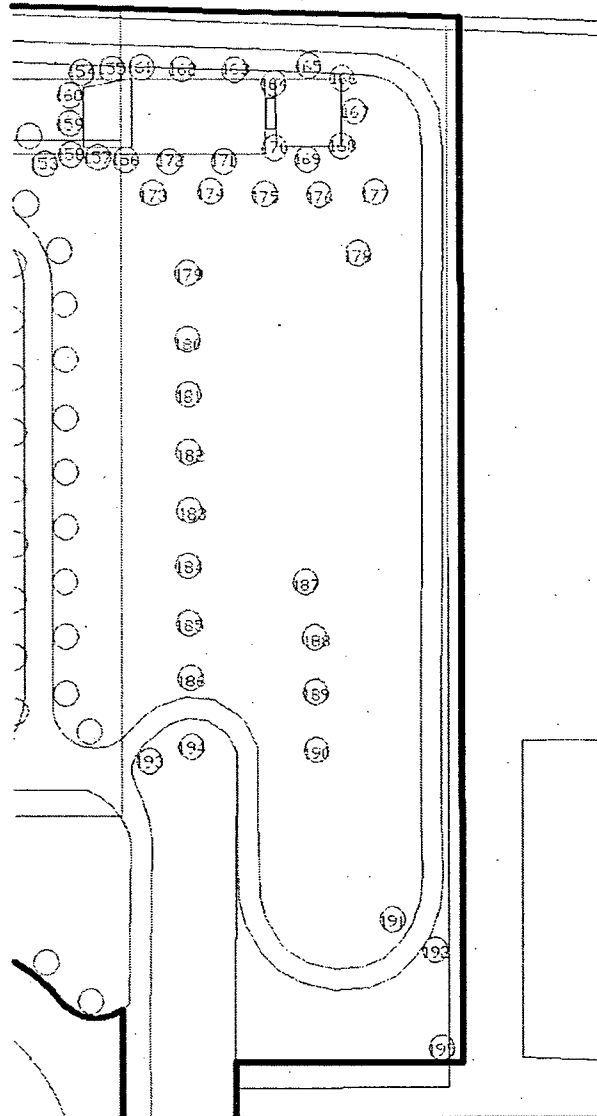
SACRAMENTO MUNICIPAL
UTILITY DISTRICT


NORTHERN INDUSTRIAL AREA
LAND GAMMA SCAN LOCATIONS
F8000141-M5

DWG-803002-01



 <p>SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT</p>	<p>NORTHERN INDUSTRIAL AREA LAND GAMMA SCAN LOCATIONS F8000141-M6 DWG: 800014</p>
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 <p>SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT</p>	<p>NORTHERN INDUSTRIAL AREA LAND GAMMA SCAN LOCATIONS F8000141-M7</p> <p>DWG: 803002-01</p>
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Attachment 2

Instrumentation

April 5, 2008

Survey Unit F8000141

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	9987008	Soil – 0.0866 pCi/g Cs-137 Soil – 0.0561 pCi/g Co-60
HPGe	N/A	05047773	Soil – 0.0936 pCi/g Cs-137 Soil – 0.0728 pCi/g Co-60
ISOCS	N/A	1983920	Soil – 0.630 pCi/g Cs-137 Soil – 0.319 pCi/g Co-60

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
ISOCS HPGe	Investigation Criteria – Scan Investigation Criteria-Direct	Soil – 23 pCi/g Cs-137 _{surr} 25.8 pCi/g
All	DCGL _w	51.6 Cs-137 12.6 Co-60

Attachment 3

Investigation

April 5, 2008

Survey Unit F8000141

(none required)

Attachment 4

Data Assessment

April 5, 2008

Survey Unit F8000141

