

Rancho Seco
Final Status Survey Summary Report
September 26, 2008
Demin RC Storage Tank Pad
Survey Unit F8100042

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8100042, Demin RC Storage Tank Pad

Survey Unit Description:

Operating History: This area commonly referred to as the Tank Farm, surrounded the tanks used to store radioactive liquids. The Demin RC Storage Tank Pad resides within the boundaries of the Tank Farm and has been 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.

Site Characterization: Gamma scan measurements were made of the Demin RC Storage Tank Pad using the HPGe detector and the ISOCS system. These measurements confirmed the presence of plant-derived radionuclides. Scan measurements of the Demin RC Storage tank showed a mean gross activity level of 987 dpm/100 cm² and a maximum value of 1,120 dpm/100 cm. Based on the classification procedure (DSIP-0020) and levels of activity reported, the area was determined to be 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 84 m² were scanned for approximately 47% coverage. Samples of removable contamination were collected at each direct measurement location. 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:	F810	Demin RC Storage Tank Pad
Survey Unit:	0042	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m²):	177.4	
Evaluator:	D.A.Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL_{mc} (dpm/100 cm²):	N/A	Class 2
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	73	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	12.6	Class 2
Scan Area (m²):	84	
Scan Coverage (%):	47%	Class 2
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	294.5	
Relative Shift Used:	3	Uses 3.0 if Relative Shift is >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Design Min Samples N:	14	Class 2
Grid Spacing L:	3.5	Class 2

Survey Results:

A total of 16 direct measurements were made in F8100042. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Scan activity ranged from 3810 to 17650 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm ²)
F8100042-C0001BD	4373
F8100042-C0002BD	4560
F8100042-C0003BD	3693
F8100042-C0004BD	3641
F8100042-C0005BD	3470
F8100042-C0006BD	4082
F8100042-C0007BD	3890
F8100042-C0008BD	3294
F8100042-C0009BD	3756
F8100042-C0010BD	4274
F8100042-C0011BD	3750
F8100042-C0012BD	3616
F8100042-C0013BD	3206
F8100042-C0014BD	3849
F8100042-C0015BD	3097
F8100042-C0016BD	2811
Mean:	3710
Median:	3722
Standard Deviation:	473
Range:	2811 - 4560

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8100042C0001SM	-0.95
F8100042C0002SM	-2.24
F8100042C0003SM	-3.53
F8100042C0004SM	-6.11
F8100042C0005SM	-0.95
F8100042C0006SM	-3.53
F8100042C0007SM	-0.95
F8100042C0008SM	-4.82
F8100042C0009SM	-3.53
F8100042C0010SM	-3.53
F8100042C0011SM	-2.24
F8100042C0012SM	-2.24
F8100042C0013SM	-4.82
F8100042C0014SM	-4.82
F8100042C0015SM	-4.82
F8100042C0016SM	10.68
Mean:	-2.4
Median:	-3.53
Standard Deviation:	3.83
Range:	-6.11 to 10.68

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 4. The sample mean and median values were less than the DCGL. The sample standard deviation was greater than the design standard deviation. However, since both values of sigma resulted in a relative shift greater than three (3), no additional samples were required.

Table 4. Data Assessment Results

Survey Results Parameter	Value	Comment
Material Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Ambient Background Used (dpm/100 cm ²):	N/A	
Actual Direct Measurements (N):	16	
Median (dpm/100 cm ²):	3722	
Mean (dpm/100 cm ²):	3710	
Direct Measurement Standard Deviation	473	Based on samples and backgrounds.
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	473	
Maximum (dpm/100 cm ²):	4560	
Material Type:	N/A	
Sign Test Final N Value:	16	Background Subtract Not Applied
S+ Value:	16	
Critical Value:	11	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	Class 2 Both values of sigma result in relative shift greater than three so no additional samples required
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	
Total Standard Deviation <= Sigma:	Investigate	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	Sufficient sample were taken
Does the Survey Unit Pass All Criteria?	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 structure 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 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. No direct measurements exceeded the DCGL of 43000 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of 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.

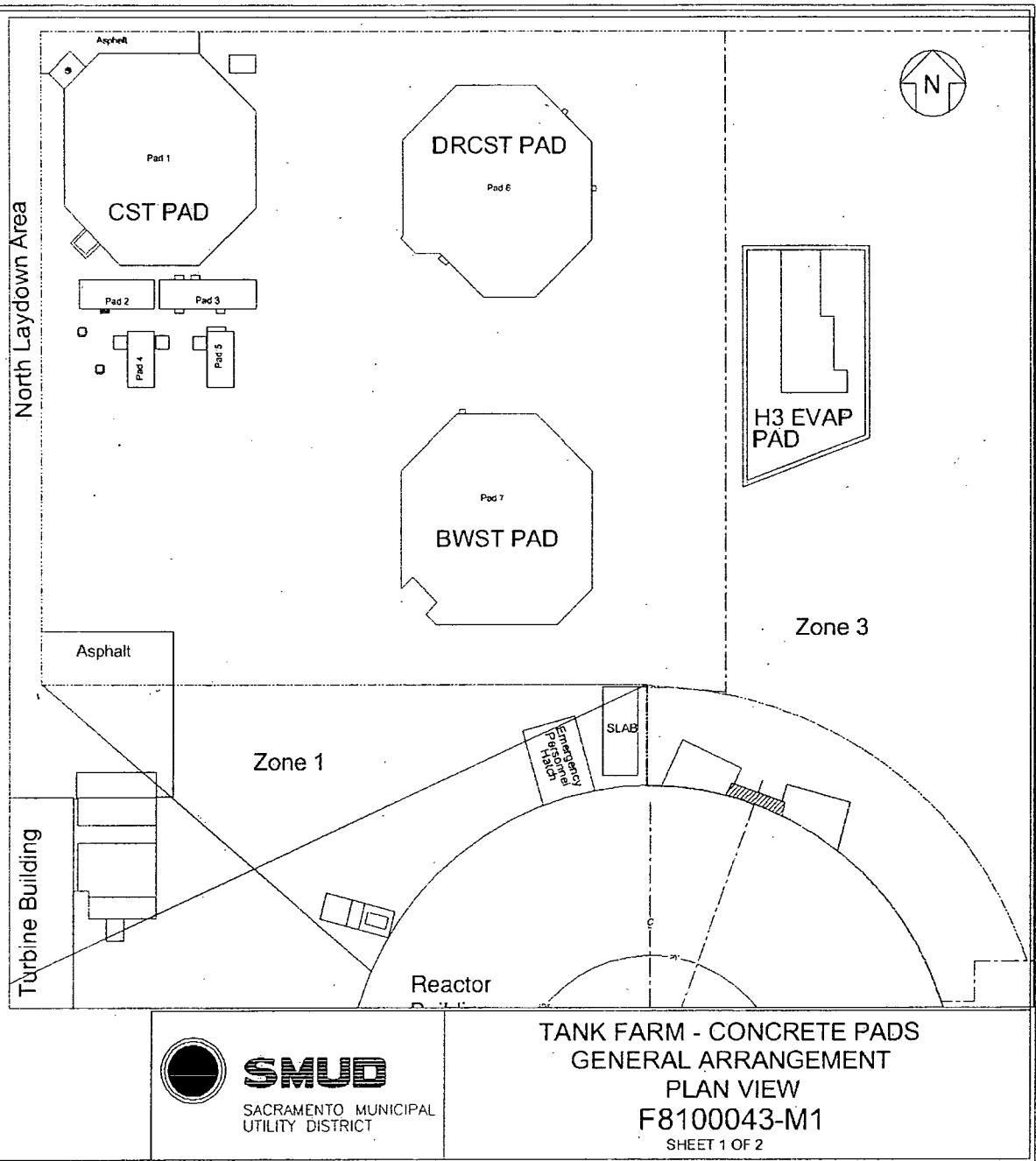
It is concluded that survey unit F8100042 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

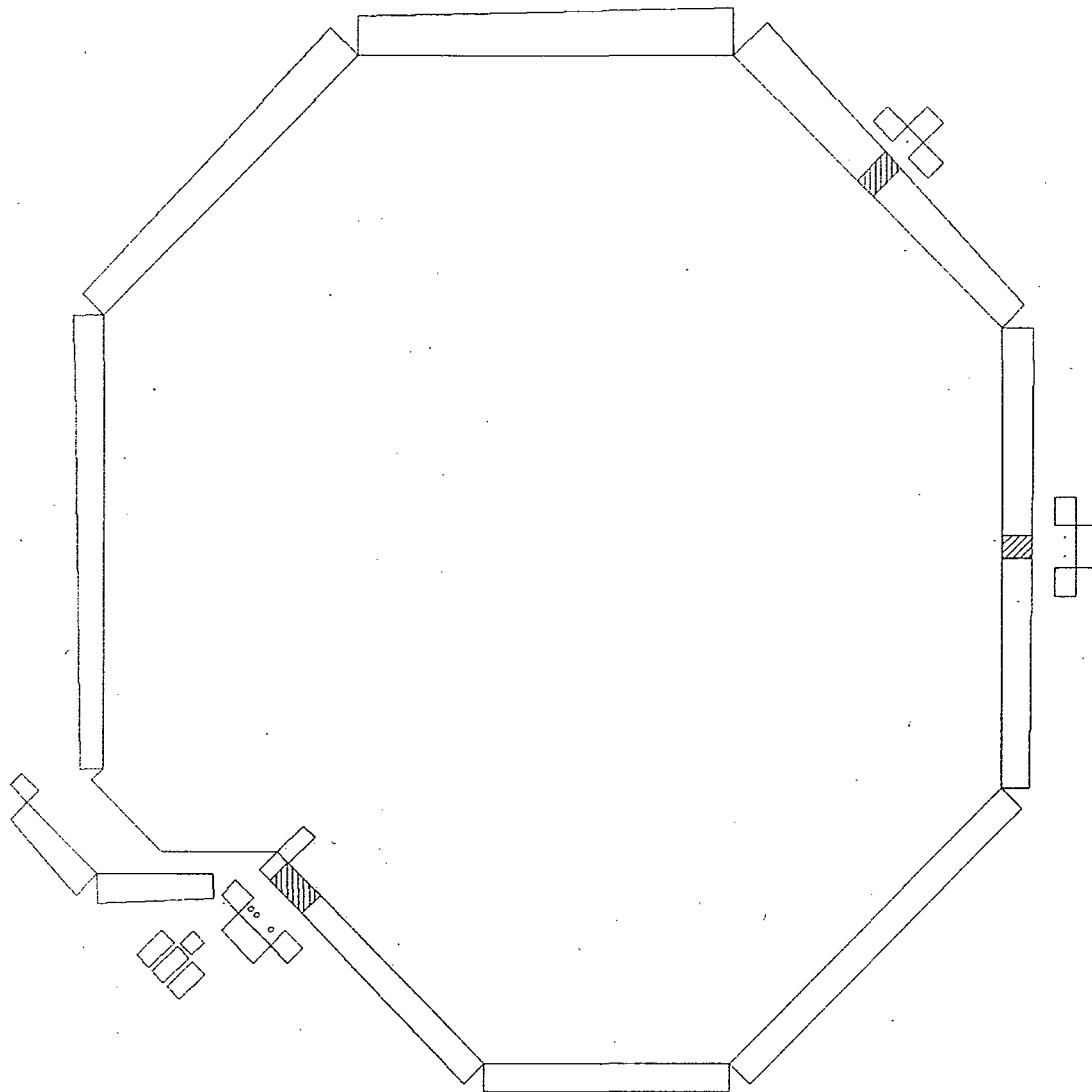
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Survey Unit F8100042





Vertical
Surface
Details



Surface Area Estimates	
Concrete	176.1 m ²
Steel	1.3 m ²
Total	177.4 m²

Scale Feet

$\frac{1}{8}" = 1'-0"$

Scale Meters

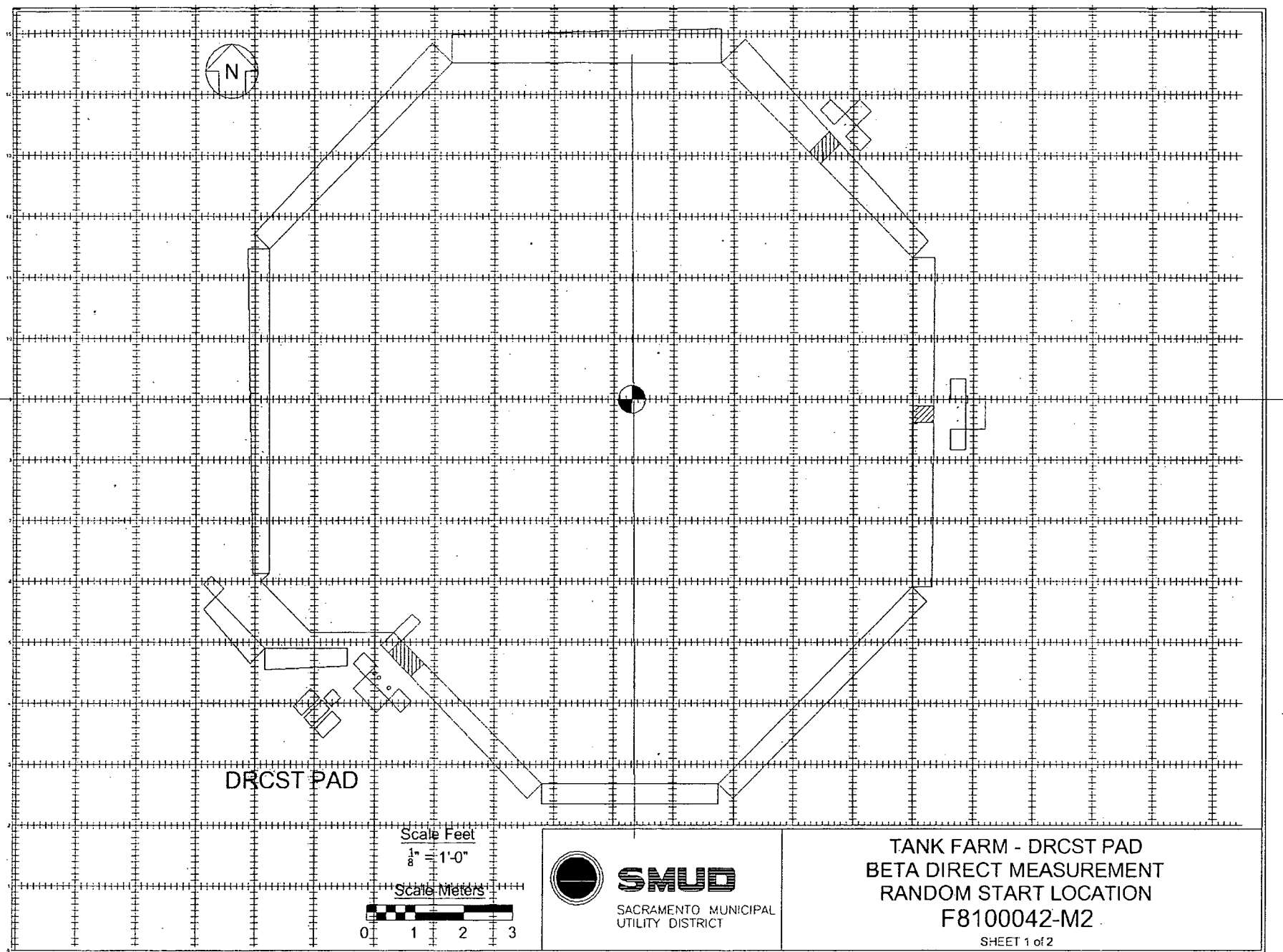


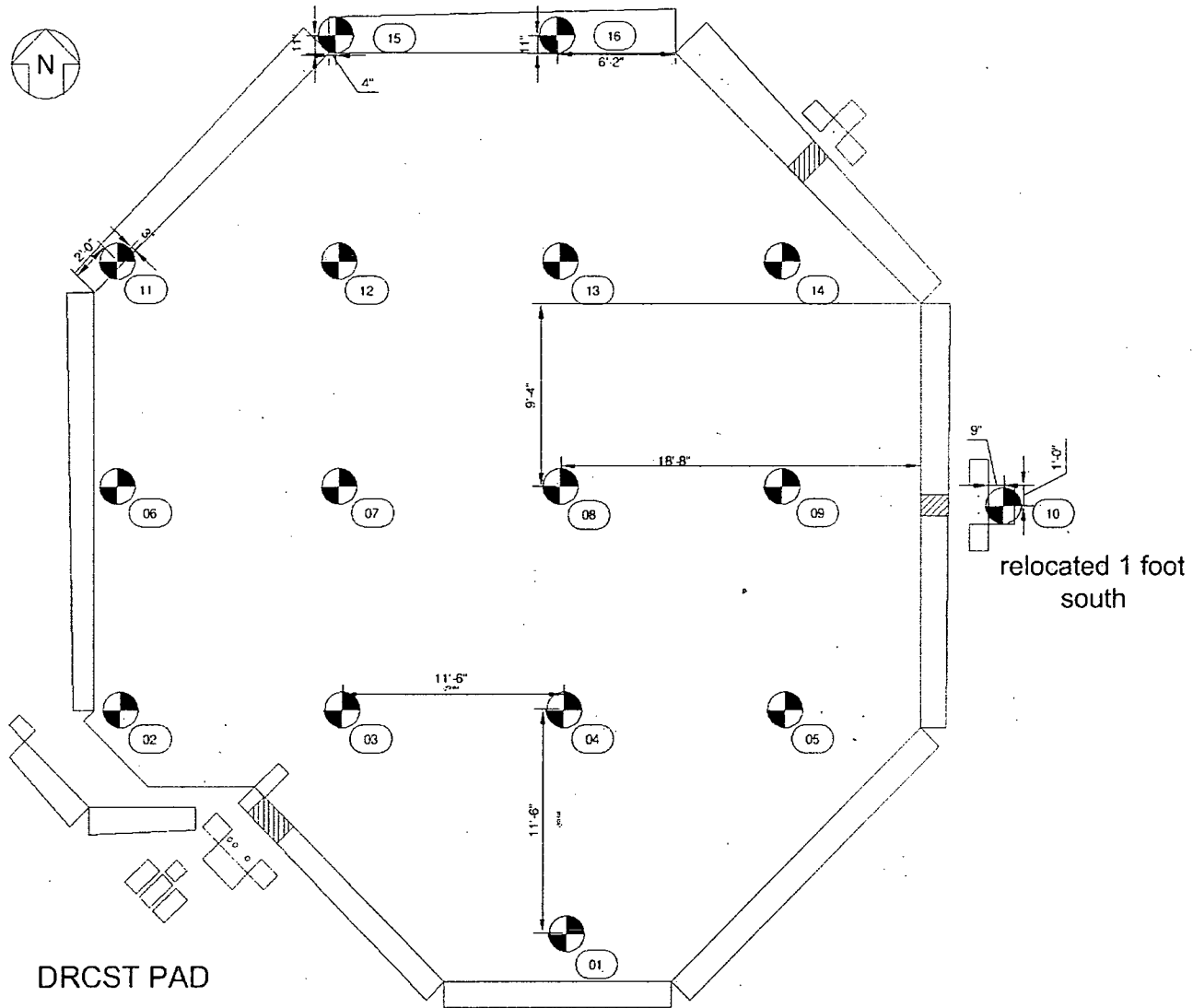
SMUD

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UTILITY DISTRICT

TANK FARM - DRCST PAD
PLAN / ELEVATION VIEW
SURFACE AREA ESTIMATE
F8100042-M1

SHEET 2 of 2



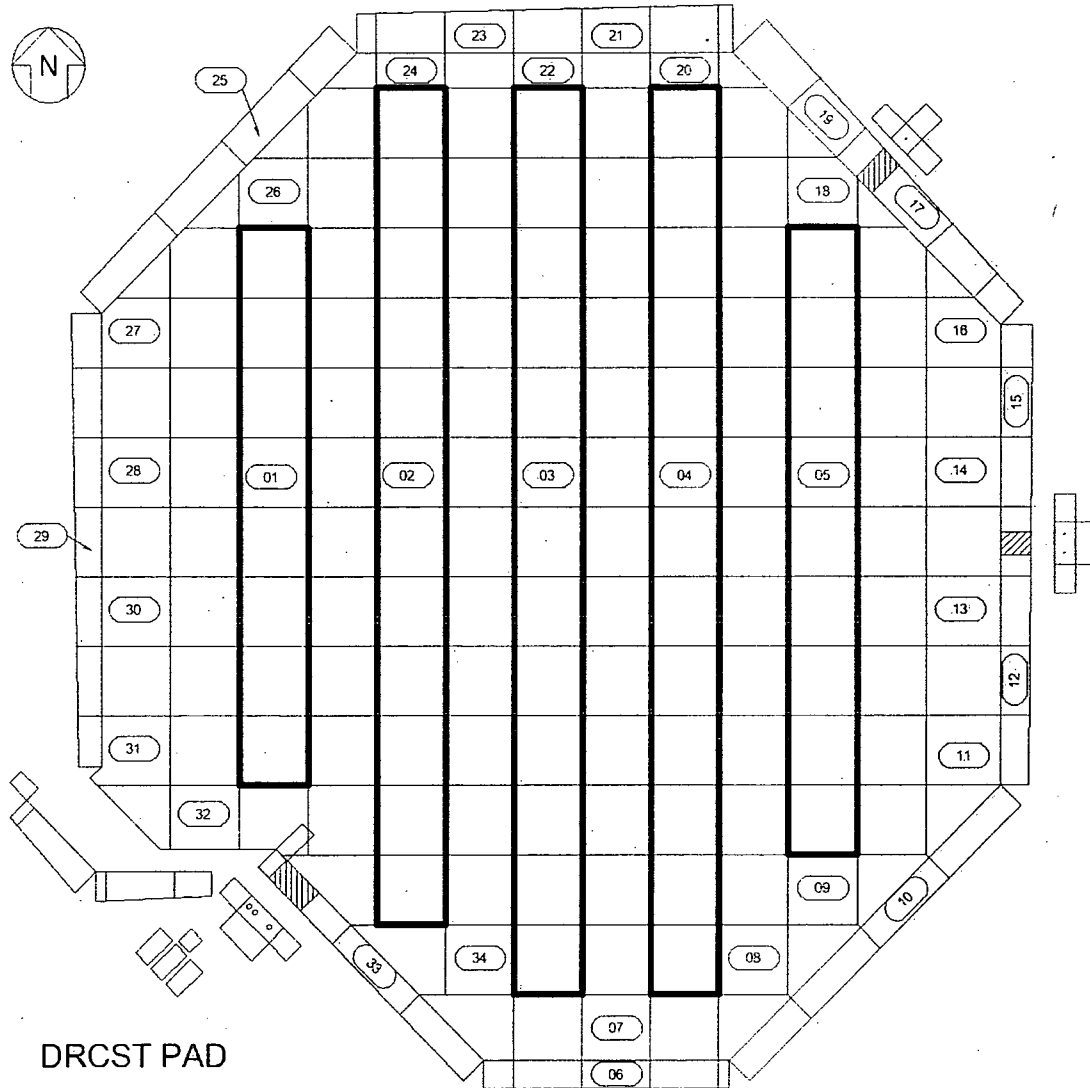


SMUD

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 UTILITY DISTRICT

TANK FARM - DRCST PAD
 BETA DIRECT
 MEASUREMENT LOCATIONS
 F8100042-M2

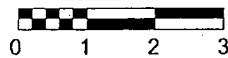
SHEET 2 of 2



Scale Feet

$\frac{1}{8}" = 1'-0"$

Scale Meters

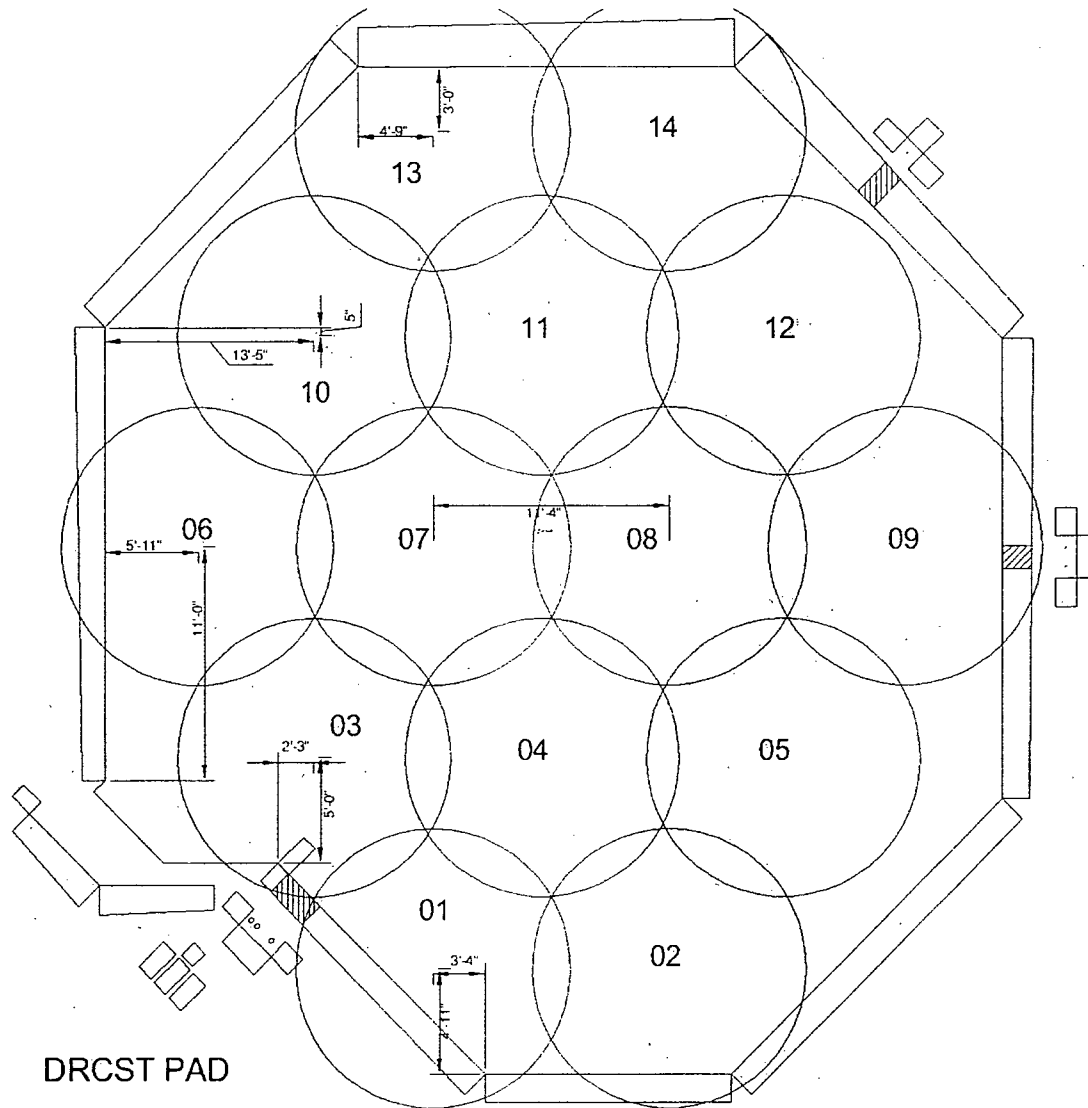


SMUD

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TANK FARM - DRCST PAD
BETA SCAN
MEASUREMENT LOCATIONS
F8100042-M3

SHEET 1 of 2



DRCST PAD

Scale Feet

$\frac{1}{8}" = 1'-0"$

Scale Meters



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SACRAMENTO MUNICIPAL
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TANK FARM - DRCST PAD
GAMMA SCAN
MEASUREMENT LOCATIONS
F8100042-M3

SHEET 2 of 2

Attachment 2

Instrumentation

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Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 193700	43-68B; 160691	433	1033
M2350; 142499	43-37; 148502	N/A	616
Tennelec; 0401171	N/A	6 dpm α , 12 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	43000
Investigation Criteria – Scan	43000
DCGL _W	43000
DCGL _{EMC}	N/A

Attachment 3
Investigation
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(none required)

Attachment 4

Data Assessment

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