

Rancho Seco
Final Status Survey Summary Report
March 28, 2008
Subsurface Vaults
Survey Unit F8570001

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FSS Engineer

Reviewed By: [Signature] Date: 3/31/08
Lead FSS Engineer

Approved By: [Signature] Date: 5-7-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8570001, Subsurface Vaults

Survey Unit Description:

There are 106 identified subsurface vaults which provide access to duct boxes which formerly carried electrical cables across the site. Most of the electrical conductors were put in place during construction and the vaults were normally maintained closed. The interior surface of the vaults are considered to be class 3 structures.

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. A risk-based approach was used for determining the percent of vaults to be surveyed (60% of the vaults in class 1 and class 2 soils were surveyed and 8% of the vaults in class 3 soils were surveyed). The vaults constituted a confined space hazard to personnel so in situ gamma spectroscopy was used to preclude personnel entry into the vaults. An in situ measurement was obtained in 19 of the vaults and 197 m² were scanned for approximately 9% coverage. 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:	F857	Subsurface Vaults
Survey Unit:	0001	Structure
Class:	3	LTP Table 5-4
SU Area (m²):	2153	
Evaluator:	Erin L. Brown	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 3
Design DCGL_{mc} (dpm/100 cm²):	N/A	Class 3
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	87	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	N/A	Class 3
Scan Area (m²):	197	
Scan Coverage (%):	9%	Class 3
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	247.1	
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 3
Grid Spacing L:	N/A	Class 3

Survey Results:

A total of 19 direct measurements were made in F8570001. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL and ranged from 262 to 625 dpm/100 cm². None of the measurements indicated areas of elevated activity.

One liquid sample was obtained during the final survey. The liquid sample contained Cs¹³⁷ activity of 0.06pCi/ml (with an MDC of 0.01pCi/ml for both Co⁶⁰ and Cs¹³⁷). The sample was obtained from a fire vault which is located in a Class 1 soil.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm ²)
F8570001- F8570001C0001GS	436
F8570001- F8570001C0002GS	385
F8570001- F8570001C0003GS	404
F8570001- F8570001C0004GS	409
F8570001- F8570001C0005GS	625
F8570001- F8570001C0006GS	419
F8570001- F8570001C0007GS	353
F8570001- F8570001M0008GS	375
F8570001- F8570001M0009GS	404
F8570001- F8570001M0010GS	416
F8570001- F8570001C0011GS	326
F8570001- F8570001C0012GS	330
F8570001- F8570001C0013GS	378
F8570001- F8570001C0014GS	375
F8570001- F8570001C0015GS	340
F8570001- F8570001C0016GS	339
F8570001- F8570001C0017GS	413

F8570001- F8570001C0018GS	603
F8570001- F8570001C0019GS	262
Mean:	400
Median:	385
Standard Deviation:	87
Range:	262 - 625

Survey Unit Data Assessment:

The survey design required 19 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 the same as the design standard deviation so 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):	19	
Median (dpm/100 cm ²):	385	
Mean (dpm/100 cm ²):	400	
Direct Measurement Standard Deviation	87	
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	87	
Maximum (dpm/100 cm ²):	625	
Material Type:	N/A	
Sign Test Final N Value:	19	
S+ Value:	19	
Critical Value:	13	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	
Total Standard Deviation <= Sigma:	Yes	Class 3
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	Yes	

Survey Unit Investigations and Results:

No investigations were required 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), the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 3 structure survey and the sample results are consistent with that classification. The variability of the survey results was the same as 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. No direct measurements exceeded the DCGL of 43000 dpm/100 cm². 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.

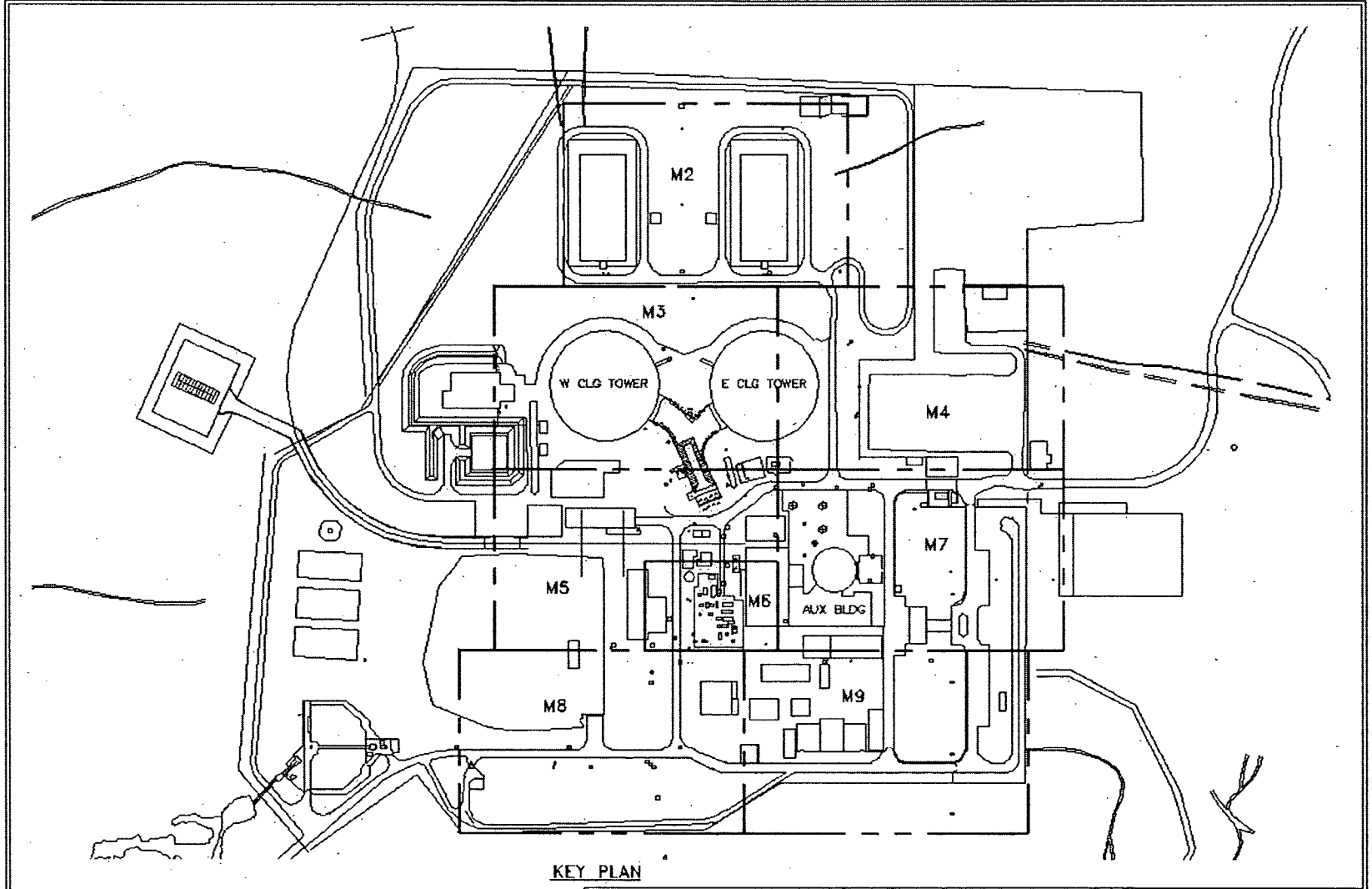
It is concluded that survey unit F8570001 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

March 28, 2008

Survey Unit F8570001



KEY PLAN

0 10 20 30 40 50
SCALE
METERS



SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

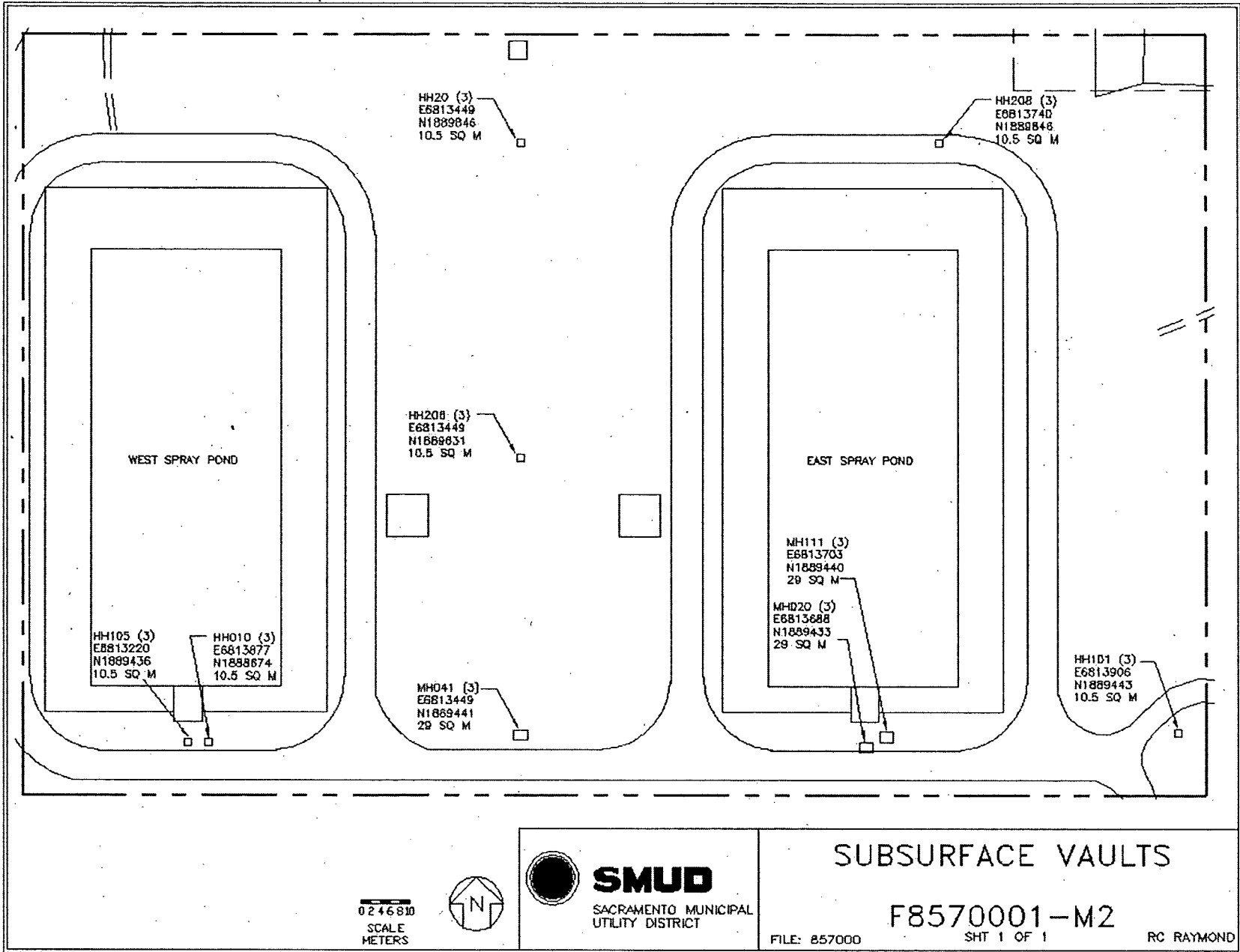
SUBSURFACE VAULTS


F8570001-M1

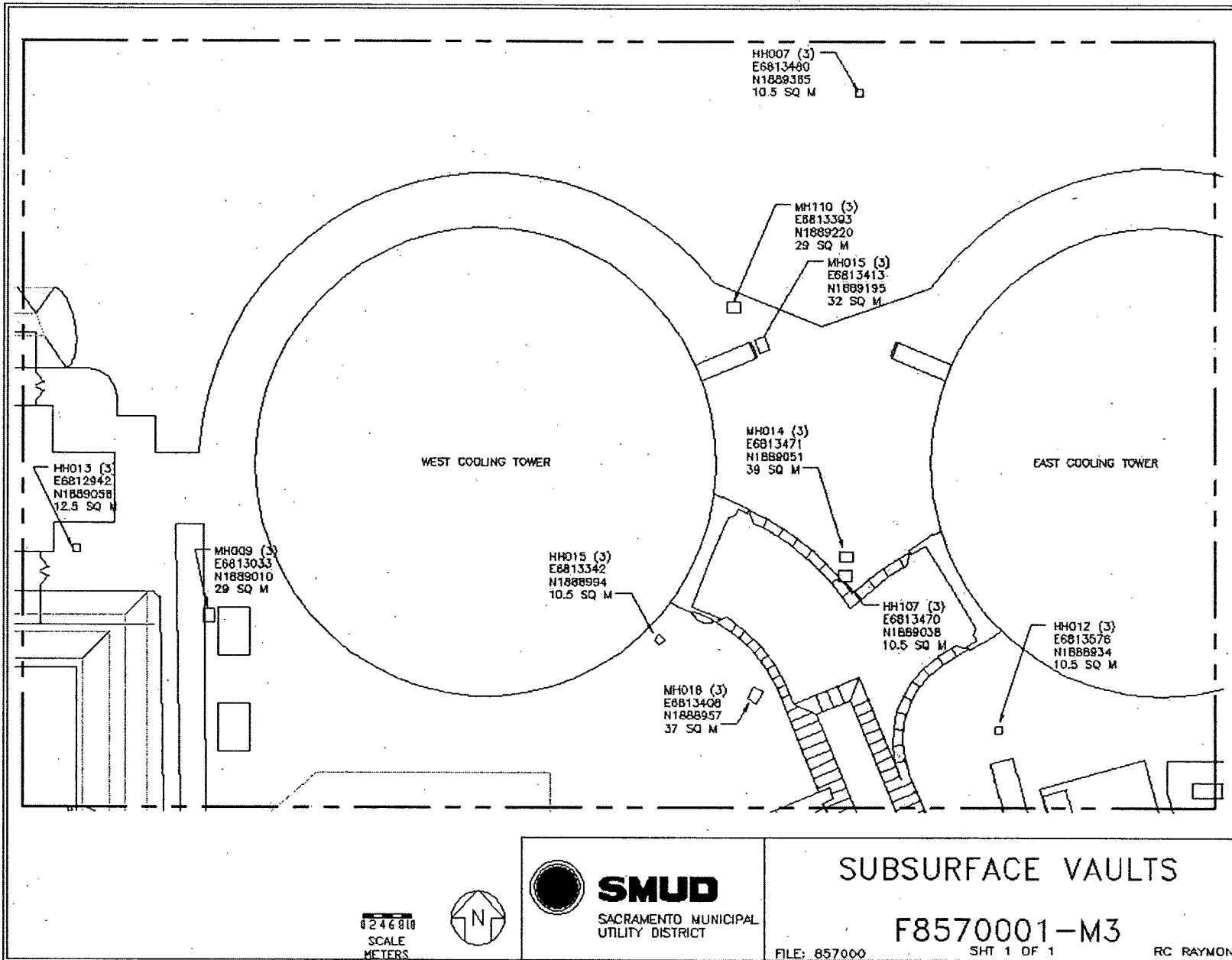
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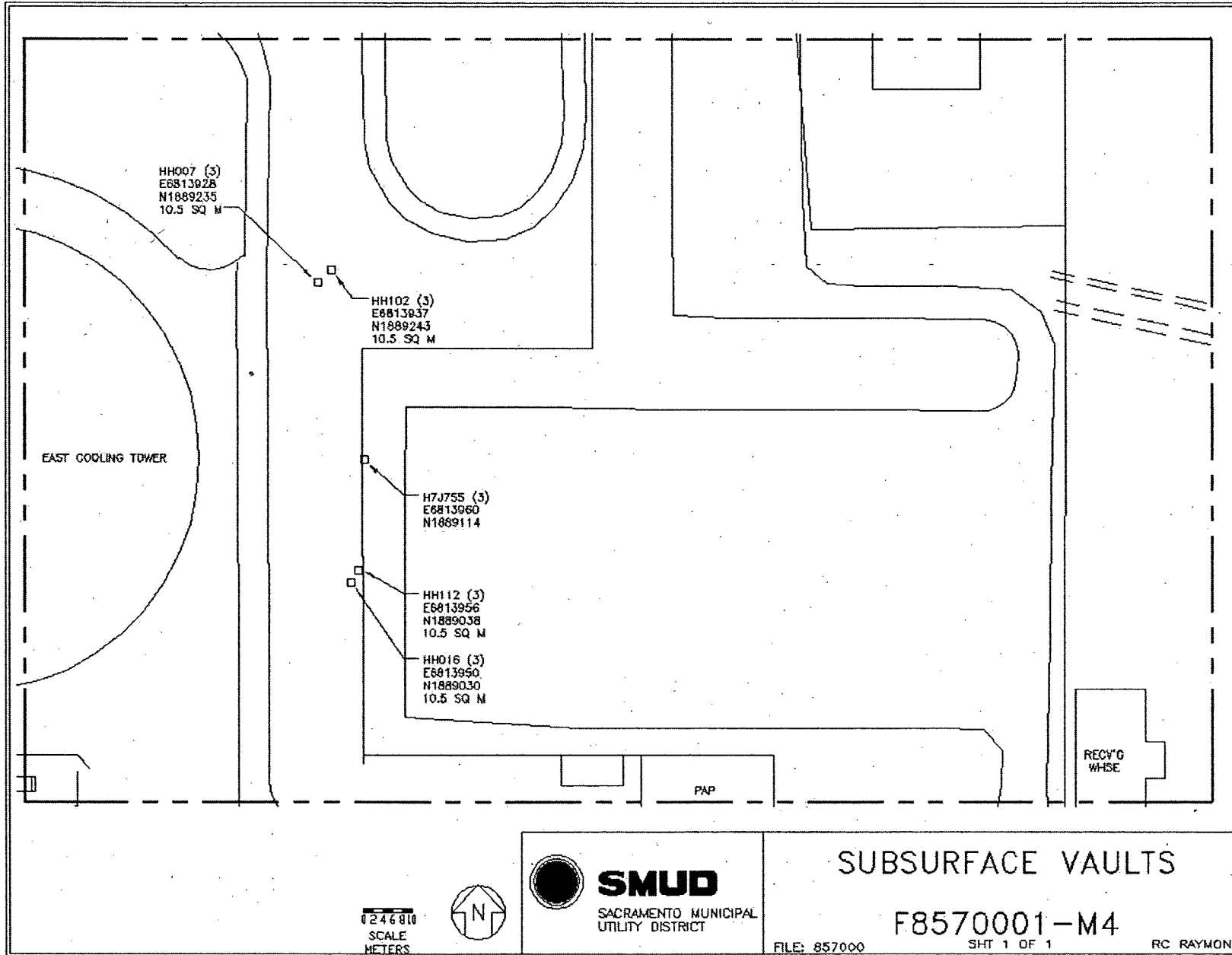
SHT 1 OF 1

RC RAYMOND



 <p>SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT</p>	<p>SUBSURFACE VAULTS</p> <p>F8570001-M2</p> <p>FILE: 857000 SHT 1 OF 1 RC RAYMOND</p>
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SCALE
METERS



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UTILITY DISTRICT

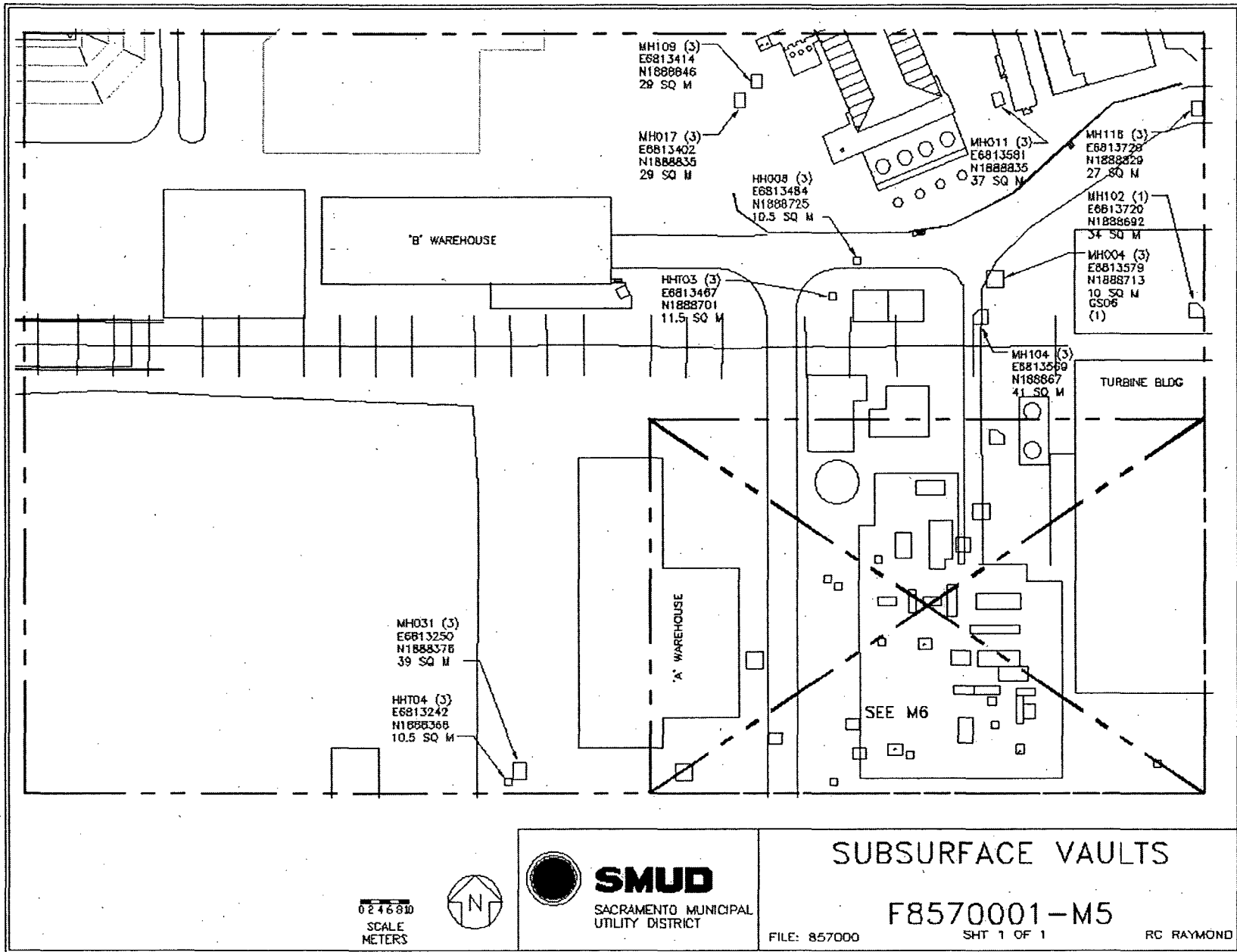
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SHT 1 OF 1

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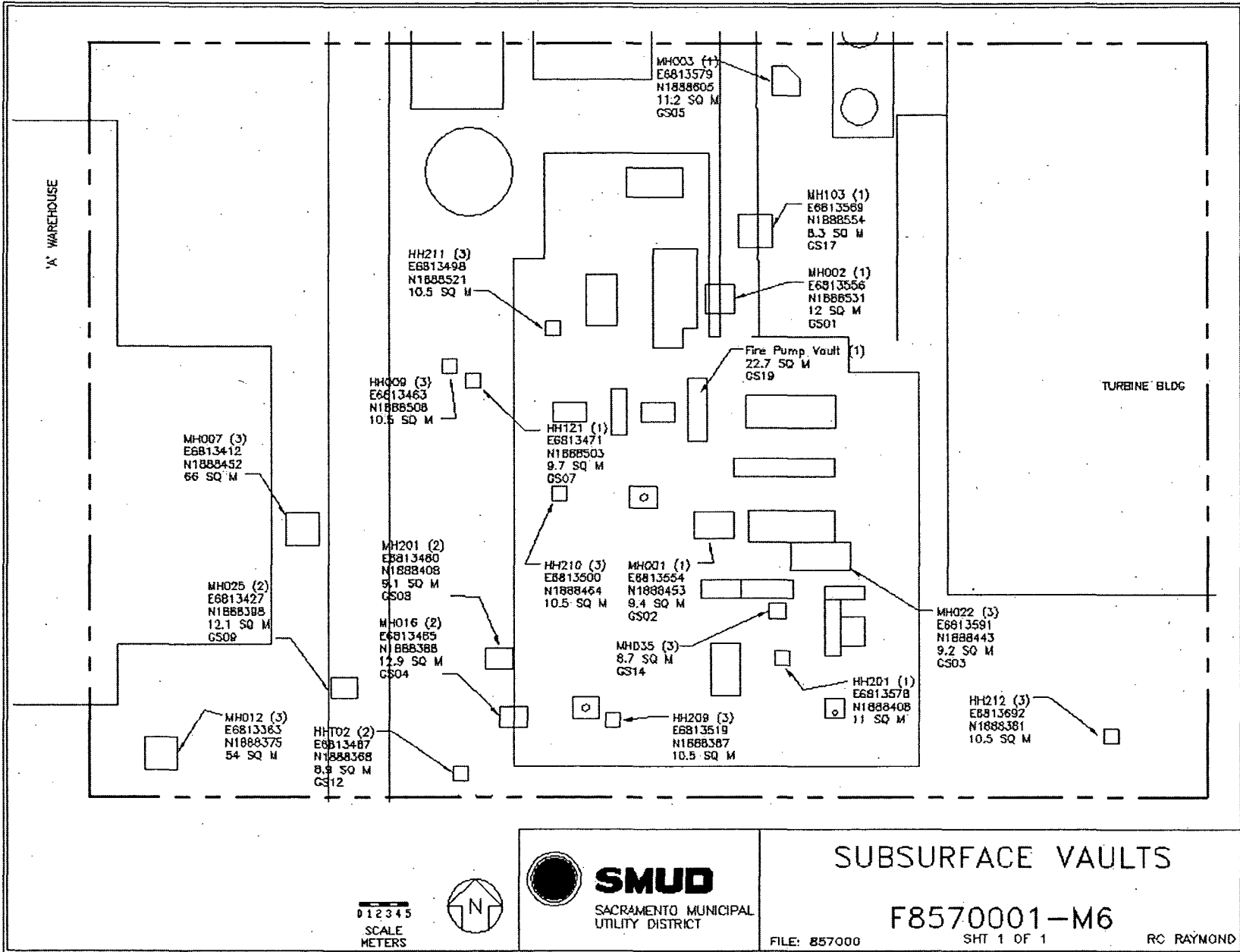
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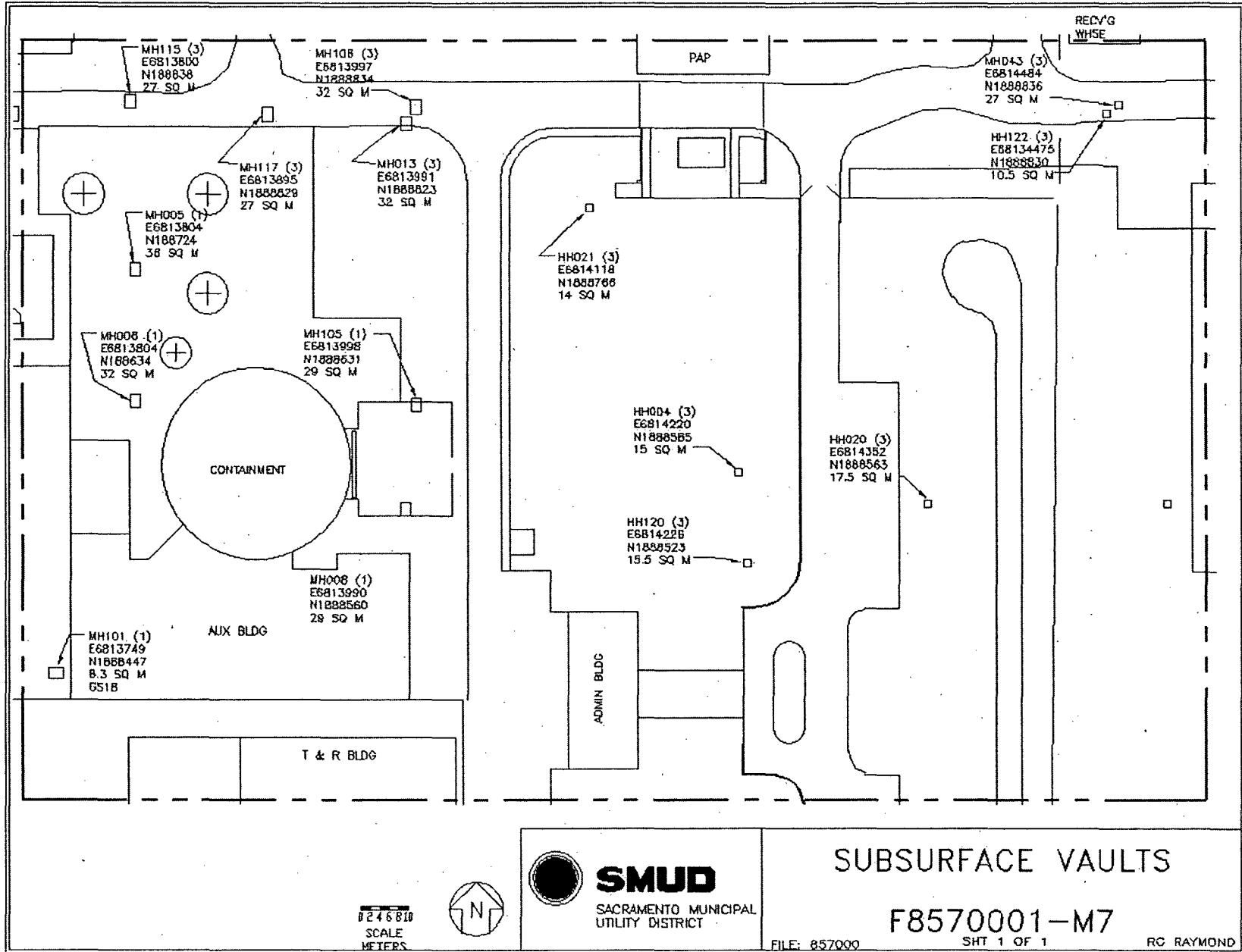
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UTILITY DISTRICT

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SHT 1 OF 1

RC RAYMOND





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UTILITY DISTRICT

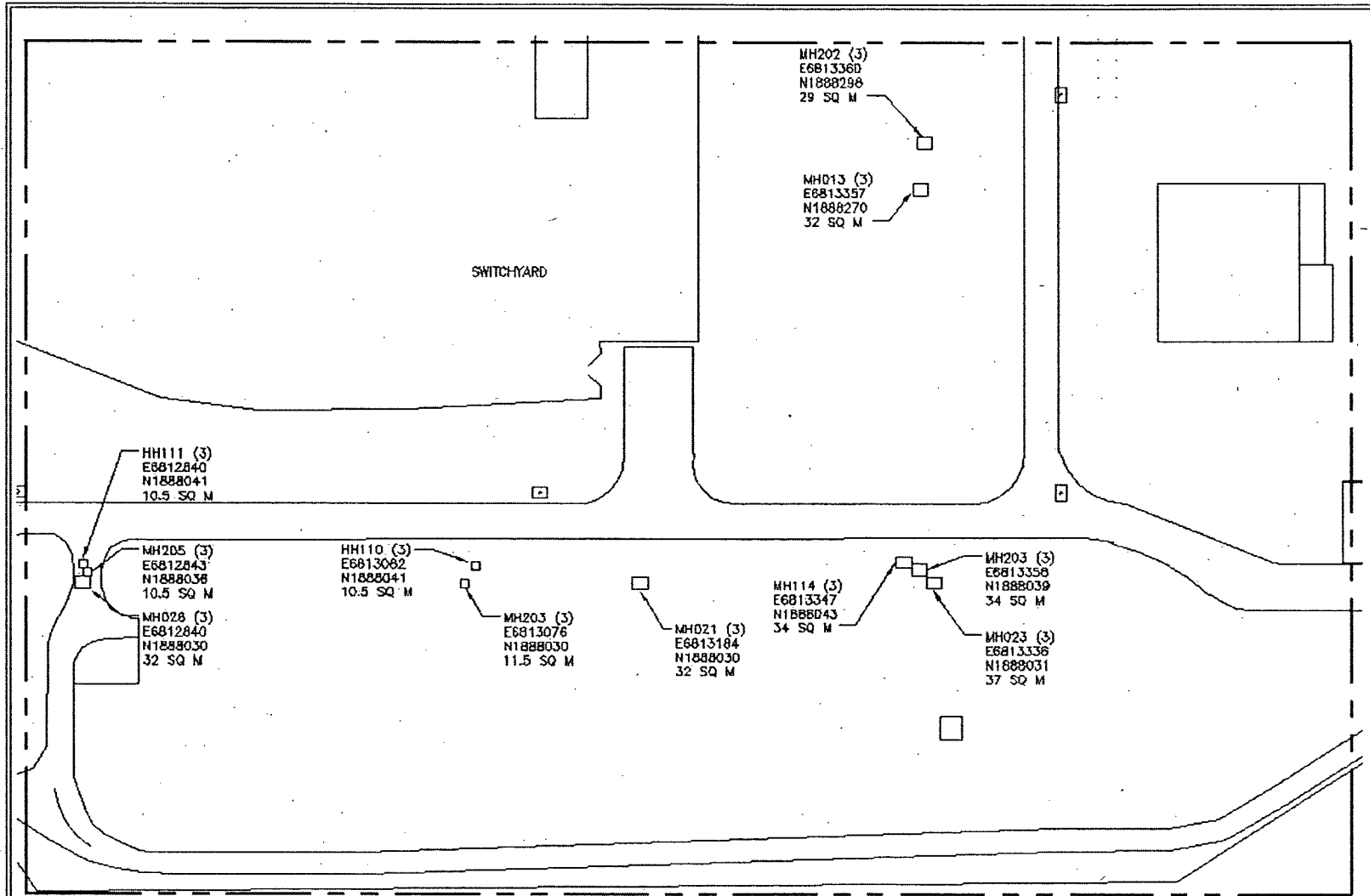
SUBSURFACE VAULTS

F8570001-M7

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SHT 1 OF 1

RC RAYMOND



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SACRAMENTO MUNICIPAL
UTILITY DISTRICT

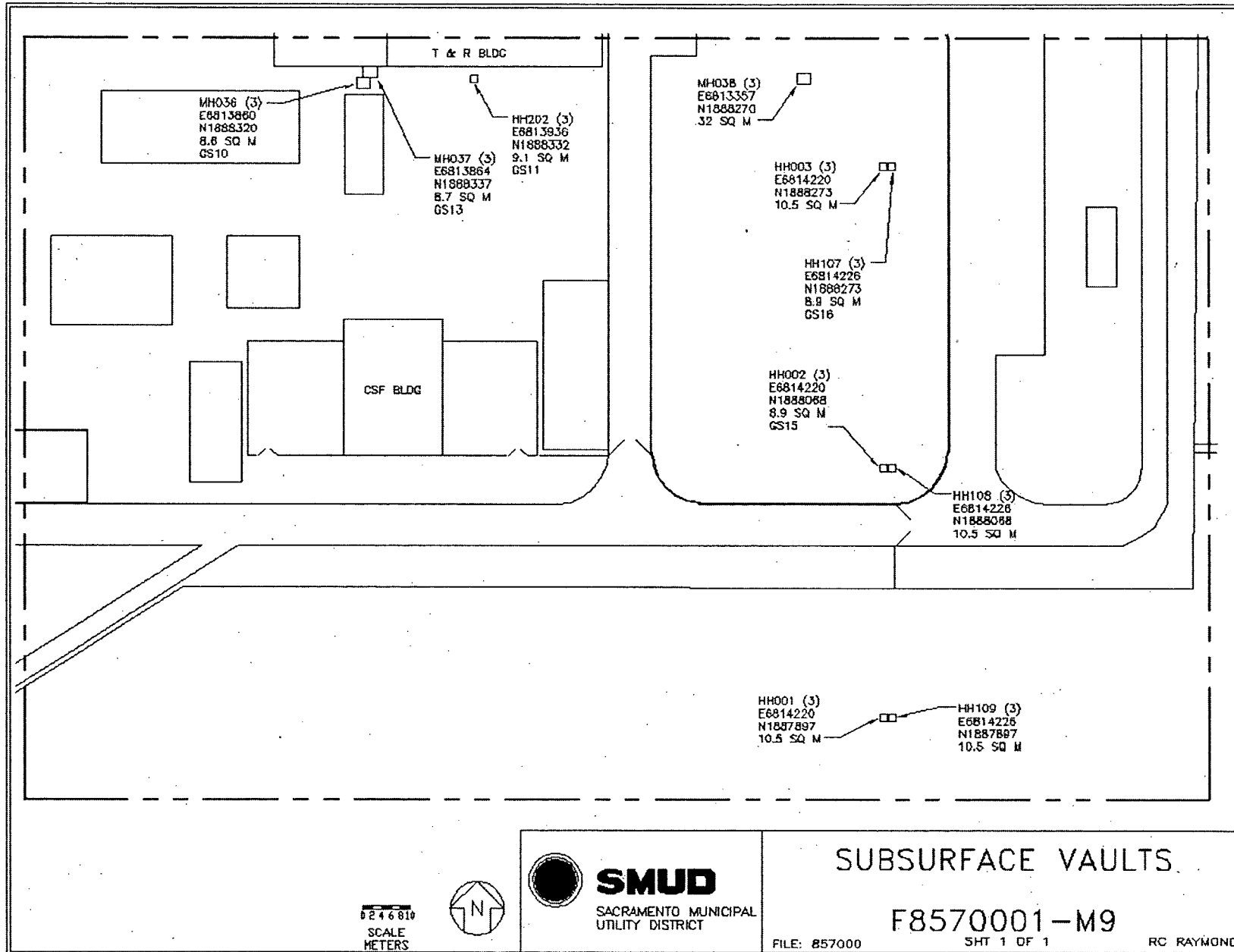
SUBSURFACE VAULTS

F8570001-M8

FILE: 857000

SHT 1 OF 1

RC RAYMOND



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SCALE
METERS



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SUBSURFACE VAULTS

F8570001-M9

FILE: 857000

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RC RAYMOND

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; N/A	HPGe; 2983947	247 (Cs ¹³⁷)	N/A
M2350; N/A	HPGe; 2983947	198 (Co ⁶⁰)	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	21500
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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