
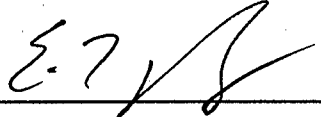


Rancho Seco
Final Status Survey Summary Report
July 14, 2008
Pump Alley floor and soil walls
Survey Unit F8130421

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FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130421, Pump Alley floor and soil walls

Survey Unit Description:

Operating History: The Auxiliary Building is a reinforced concrete structure that contained the RadWaste processing and supporting systems. The building contained six main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements on the -29' elevation showed a mean gross activity level of 544,756 dpm/100 cm² and a maximum value of 11,370,000 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the Pump Alley of the auxiliary building was determined to be a Class 1 area.

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 determined using a random-start, fixed grid pattern and 144.1 m² were scanned for 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:	F813	Pump Alley floor and soil walls
Survey Unit:	0421	Open Land Area
Class:	1	LTP Table 5-4
SU Area (m²):	144.1	
Evaluator:	D.A.Tallman	
DCGL for Cs-137 surrogate (pCi/g):	52.6	
DCGL for Co-60 (pCi/g):	12.6	
Area Factor:	2.91/3.01	Class 1
Design DCGL_{mc} (pCi/g):	153/37.9	Class 1
LBGR (pCi/g):	25.6	Adjusted
Design Sigma (pCi/g):	15.9	characterization samples of soil exposed during remediation resulting in the complete removal of concrete floor and sub floors
Type I Error:	0.05	
Type II Error:	0.05	
Sample Area (m²):	6.9	Class 1
Total Area Scanned (m²):	144.1	
Scan Coverage (%):	100%	Class 1
Z_{1-α} :	1.645	
Z_{1-β} :	1.645	
Sign P:	0.945201	
Calculated Relative Shift:	1.6	
Relative Shift Used:	1.6	Uses 3.0 if Rel Shift >3
N-Value:	14	
Design N-Value + 20%:	17	NUREG-1575 Table 5-5
Grid Spacing L:	2.6	Class 1

Survey Results:

A total of 21 direct measurements were made in F8130421. The results are shown in Table 2-1. Statistical data including the mean, median, and standard deviation are shown in Table 2-2. All of the direct measurements were less than Unity. Multiple scan measurements indicated areas of elevated activity. Scan activity ranged from 10992 to 46812 cpm and no background subtracted. Soil samples were counted to the MDC's shown in Table 2-1 of Attachment 2.

Table 2-1. Direct Measurement Results

(all activity values in pCi/g)

	Cs137				Co60				
Sample ID	MDA	Activity	Uncertainty	Unity Value	MDA	Activity	Uncertainty	Unity Value	Unity Total
F8130421S0001SS	7.16E-02	3.99E00	1.98E-01	0.0758	8.85E-02	<8.85E-02		0.007	0.0829
F8130421S0002SS	9.48E-02	5.93E00	2.48E-01	0.1127	6.70E-02	2.94E-01	5.30E-02	0.0234	0.1361
F8130421S0003SS	1.07E-01	9.53E00	3.16E-01	0.1813	1.00E-01	<1.00E-01		0.0079	0.1892
F8130421S0004SS	8.85E-02	3.67E00	2.05E-01	0.0698	8.48E-02	3.10E-01	5.93E-02	0.0246	0.0943
F8130421S0005SS	1.34E-01	2.47E01	5.25E-01	0.469	7.26E-02	2.44E-01	5.45E-02	0.0194	0.4884
F8130421S0006SS	8.25E-02	1.79E00	1.54E-01	0.0341	1.44E-01	<1.44E-01		0.0114	0.0455
F8130421S0007SS	1.29E-01	7.12E00	2.90E-01	0.1354	1.00E-01	1.45E00	1.14E-01	0.1151	0.2505
F8130421S0008SS	1.23E-01	1.68E01	4.22E-01	0.3199	7.43E-02	3.32E-01	5.73E-02	0.0264	0.3463
F8130421S0009SS	1.36E-01	2.77E01	5.42E-01	0.5261	7.21E-02	3.82E-01	5.92E-02	0.0303	0.5565
F8130421S0010SS	9.61E-02	1.19E01	3.56E-01	0.2253	7.13E-02	3.17E-01	5.69E-02	0.0252	0.2505
F8130421S0011SS	7.80E-02	3.99E00	2.02E-01	0.0759	1.08E-01	<1.08E-01		0.0086	0.0845
F8130421S0012SS	8.67E-02	2.32E00	1.65E-01	0.0442	1.05E-01	<1.05E-01		0.0083	0.0525
F8130421S0013SS	1.21E-01	1.64E01	4.02E-01	0.3121	5.93E-02	4.27E-01	6.03E-02	0.0339	0.346
F8130421S0014SS	6.95E-02	1.76E00	1.32E-01	0.0335	5.45E-02	<5.45E-02	2.77E-02	0.0043	0.0378
F8130421S0015SS	6.56E-02	4.09E-01	7.16E-02	0.0078	6.95E-02	<6.95E-02		0.0055	0.0133
F8130421S0016SS	5.61E-02	2.63E00	1.57E-01	0.05	8.00E-02	<8.00E-02		0.0063	0.0564
F8130421S0017SS	8.01E-02	2.67E00	1.61E-01	0.0508	8.45E-02	<8.45E-02		0.0067	0.0576
F8130421S0018SS	7.17E-02	3.03E00	1.69E-01	0.0576	4.61E-02	2.13E-01	4.51E-02	0.0169	0.0744
F8130421S0019SS	6.16E-02	1.01E00	1.01E-01	0.0192	6.17E-02	<6.17E-02		0.0049	0.0241
F8130421S0020SS	1.01E-01	8.80E00	3.18E-01	0.1673	8.79E-02	<8.79E-02		0.007	0.1743
F8130421S0021SS	7.88E-02	3.67E00	1.90E-01	0.0698	6.78E-02	<6.78E-02		0.0054	0.0752

Table 2-2. Direct Measurements Results Summary

	Cs137 Activity (pCi/g)	Co60 Activity (pCi/g)	Cs137 Unity	Co60 Unity	Unity Total
DCGLw	52.6	12.6			
Mean	7.61E00	2.39E-01	0.1447	0.019	0.1636
Median	3.99E00	1.08E-01	0.0758	0.0086	0.0845
Standard Deviation	7.75E00	3.02E-01	0.1473	0.024	0.1555
Cs137 Activity Range (pCi/g)		4.09E-01 to 2.77E01			
Co60 Activity Range (pCi/g)		5.45E-02 to 1.45E00			
Cs137 Unity Range		0.0078 to 0.5261			
Co60 Unity Range		0.0043 to 0.1151			
Total Unity Range		0.0133 to 0.5565			
Sample Count		21			

Survey Unit Data Assessment:

The survey design required 21 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):	21	Class 1
Median (Unity):	0.085	
Mean (Unity):	0.164	
Direct Measurement Std Deviation (Unity):	0.155	
Maximum (Unity):	0.556	
Sign Test Final N Value:	21	
S+ Value:	21	
Critical Value:	14	
Sufficient Samples Collected:	Yes	
Maximum Value < Unitized DCGL:	Yes	
Median Value < Unitized DCGL:	Yes	
Mean Value < Unitized DCGL:	Yes	
Maximum Value < DCGL_{emc} (Unity):	Yes	
Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	Yes	

Survey Unit Investigations and Results:

Numerous investigations of multiple scan grids were required for the scan survey measurements and the results are reported in Attachment 3. Any areas found exceeding the DCGLw were remediated so that all as-left activity levels are below the DCGLw. Since no as-left levels exceed the DCGLw the EMC unity calculation was not performed and the EMC Unity Sum is indicated as N/A in Table 3-1.

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 1 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. Potential areas of elevated activity were detected and evaluated as shown in Attachment 3. Therefore the EMC criterion was met.

Conclusion:

The FSS of this survey unit was properly designed as a Class 1 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 Unity. The investigations required were performed and documented.

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.

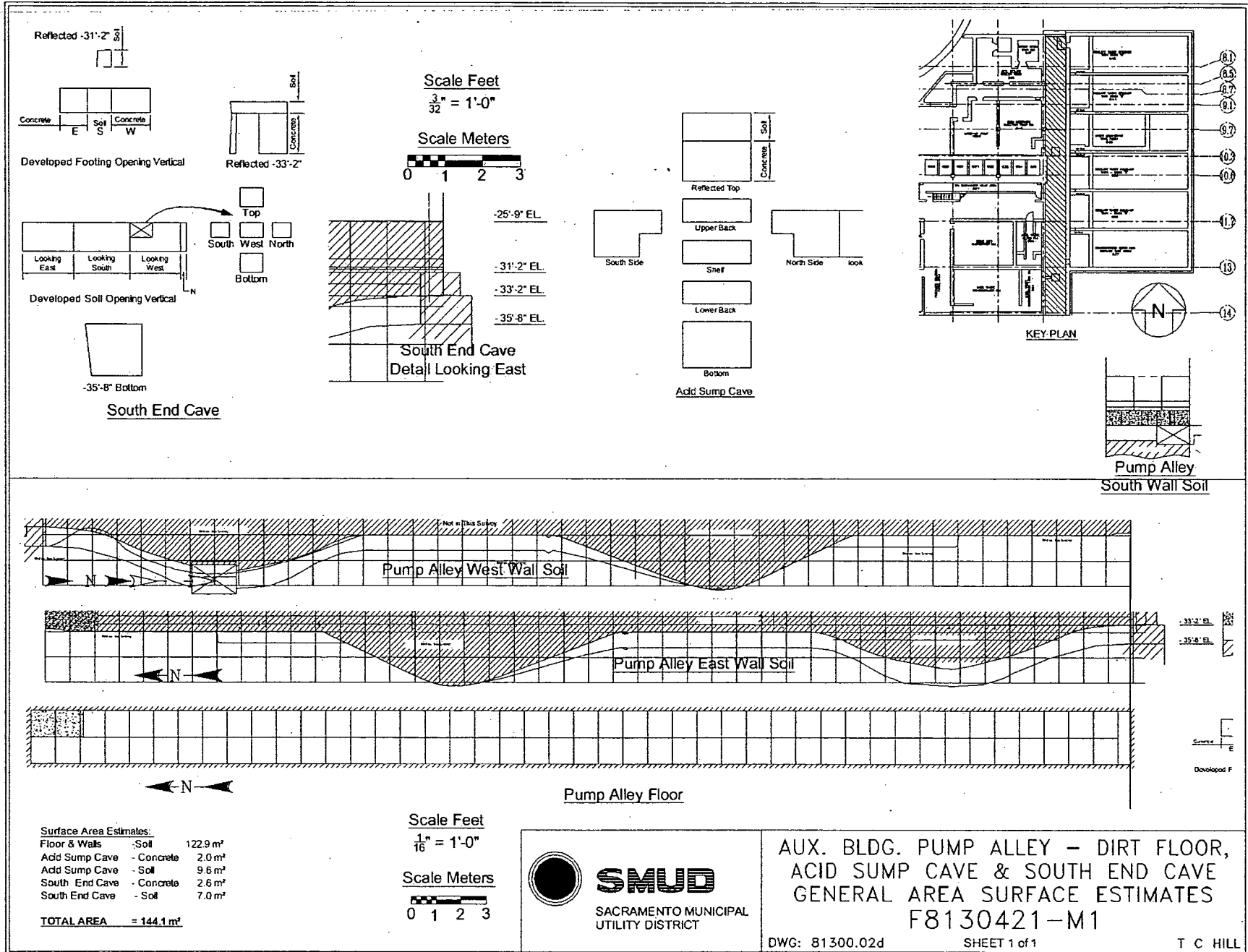
It is concluded that survey unit F8130421 meets the release criteria of 10CFR20.1402.

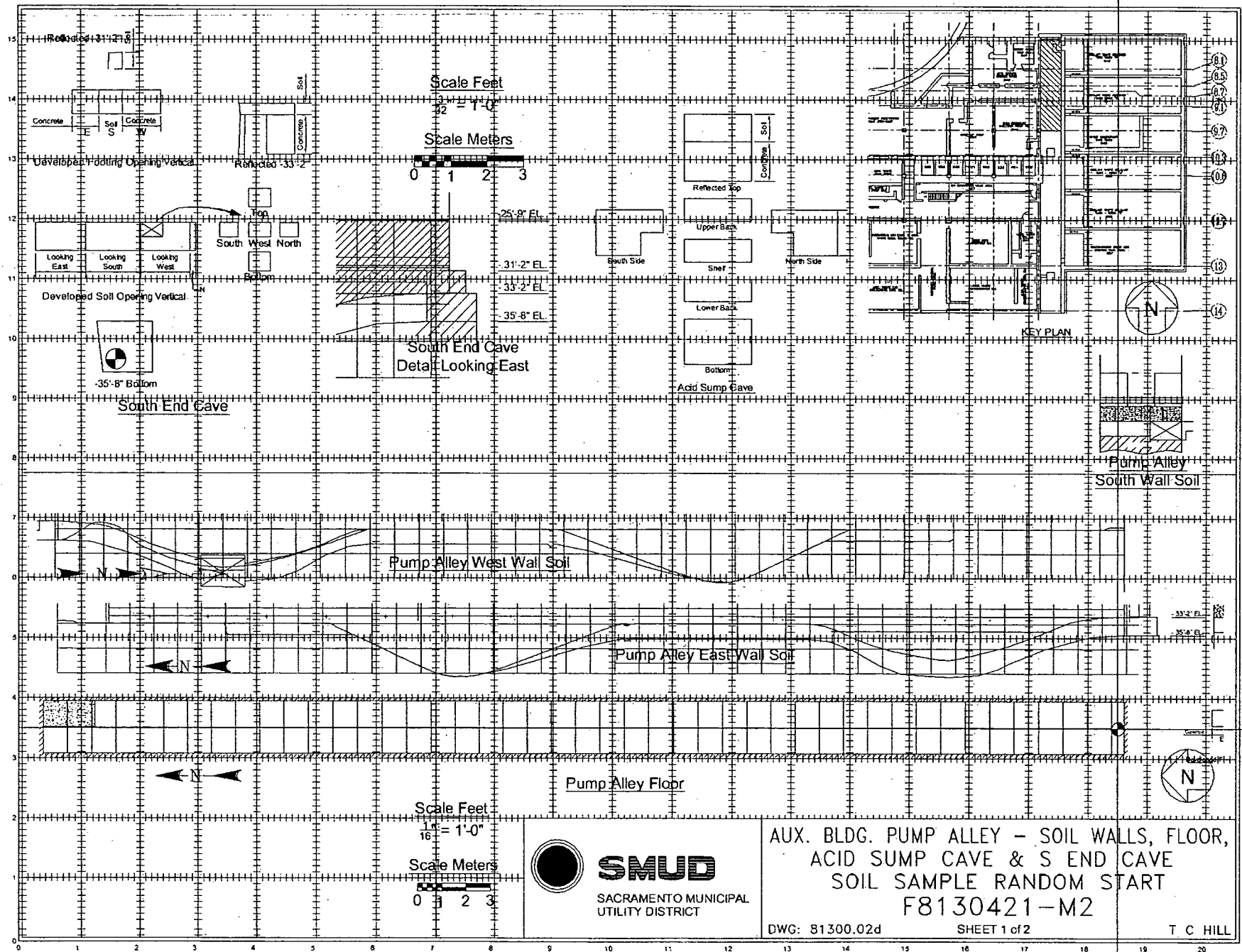
Attachment 1

Maps

July 14, 2008

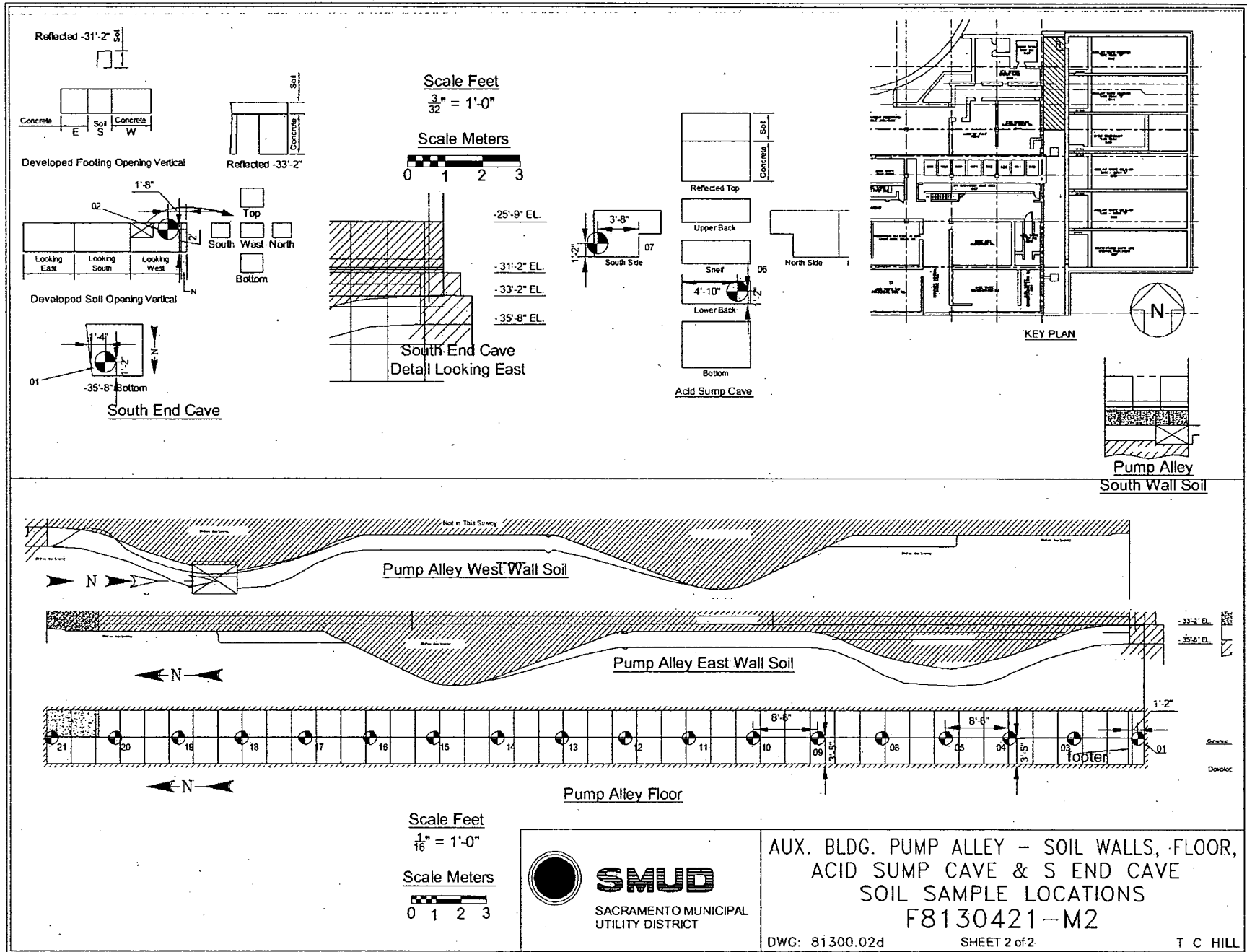
Survey Unit F8130421

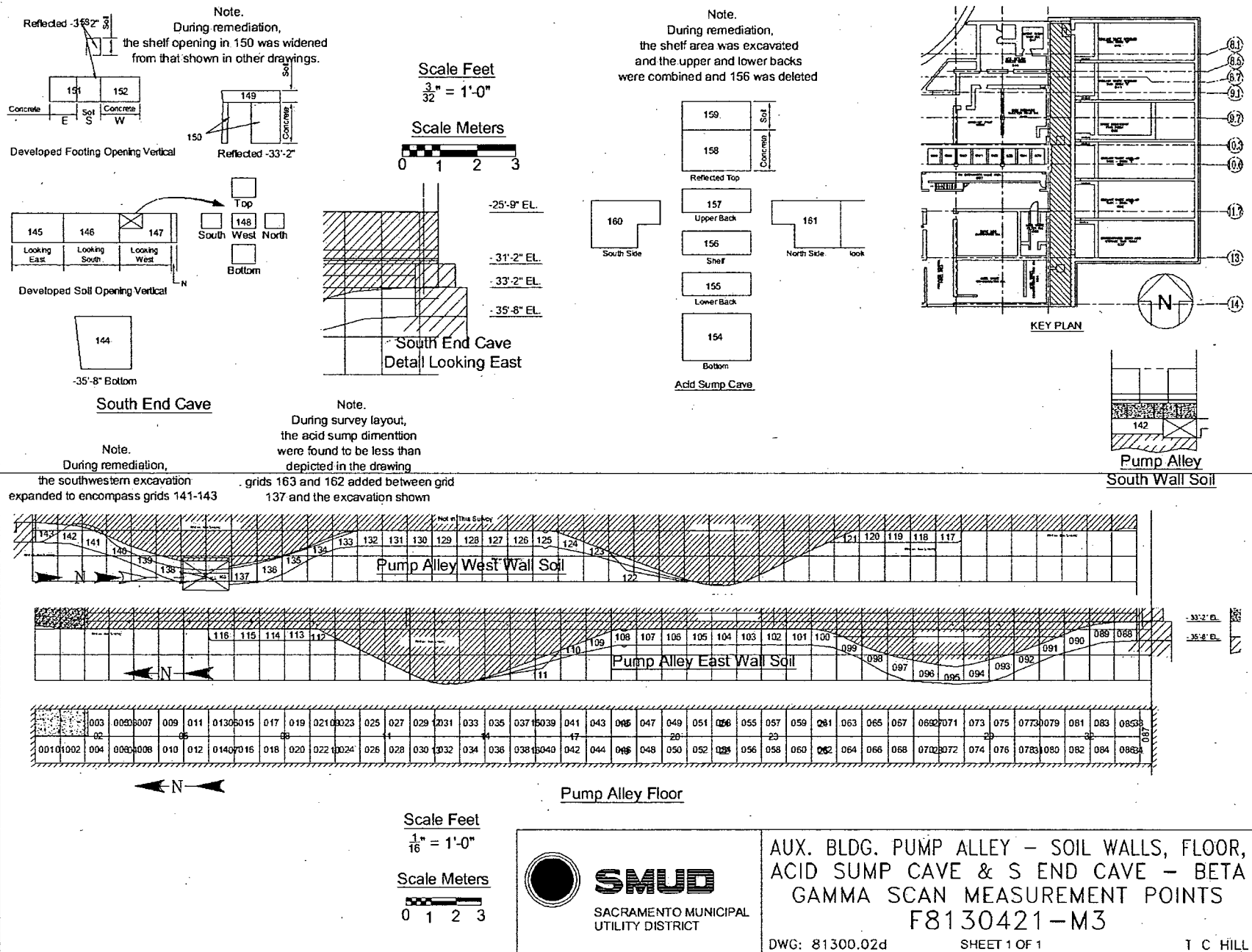




AUX. BLDG. PUMP ALLEY - SOIL WALLS, FLOOR,
ACID SUMP CAVE & S END CAVE
SOIL SAMPLE RANDOM START
F8130421-M2

DWG: 81300.02d SHEET 1 of 2 T C HILL





Attachment 2

Instrumentation

July 14, 2008

Survey Unit F8130421

Table 2-1. Survey Unit Instrumentation

Instrument	Detector Model No.	Detector Serial No.	MDC
HPGe	N/A	05069128	Soil – 1.36E-1 pCi/g Cs-137 1.44E-1 pCi/g Co-60

Instrument Model; Serial No.	Detector Model; Serial No.	MDC (dpm/100 cm²)
M2350; 203481	44-10; 171992	16756 ¹

¹ Background 8000 cpm or less

Table 2-2. Investigation Criteria and DCGL

Instrument	Parameter	Value
M2350; 203481	44-10; 171992	20,000 cpm
All	DCGL _w	52.6 pCi/g Cs-137 12.6 pCi/g Co-60
All	DCGL _{EMC}	153 pCi/g Cs-137 37.9 pCi/g Co-60

Attachment 3

Investigation

July 14, 2008

Survey Unit F8130421

Table 3-1 Survey Unit Investigation

Grid ^A	Investigation Level ^B (cpm)	Initial Value (pCi/g)	Initial Value (cpm)	Investigation Result ^B (cpm)	Elevated Area (m ²)	Area Factor	DCGL _{emc}	Investigation Result (pCi/g Cs-137)	DCGL _{emc} Unity Fraction
33GS	20,000		20,858	12,500				1.8	0
39GS	20,000		21,282	19,000				22.0	0
59/62 GS	20,000	25.2	21,631	8,500				15.1	0
64GS	20,000	65	20,738	7,800				3.8	0
66GS	20,000		20,119	8,500				15.1	0
70GS	20,000		20,468	8,500				15.1	0
74GS	20,000	18.9	22,659	8,500				15.1	0
76GS	20,000	15	25,919	8,500				15.1	0
97/98GS	20,000		29,680	16,000				2.3	0
122/125GS	20,000		37,454	17,300				1.6	0
129GS	20,000	9.2	31,500	^C				0.7	0
132GS ^E	20,000		32,983	14,375				5.3	0
137GS ^E	20,000	83.4	25,906	7,100				1.2	0
140/153GS ^F	20,000		46,812	5,400				9.0	0
154/161GS	20,000	44	39,234	8,800				1.9	0
162GS	20,000		20,132	6,500				0.1	0
163GS ^D	20,000		17,959	7,300				10.3	0
Survey Unit Remainder					DCGL 52.6 pCi/g Cs-137 12.6 pCi/g Co-60			SU Mean =	NA
Comments: The Investigation Levels as designed were revised based on variability of local backgrounds observed. Based on LFSSE recommendations, regions greater than 30,000 cpm were remediated and resurveyed while those between 20,000 and 30,000 would be sampled and resurveyed based on the results. ^A Values noted for multiple grids series (59/62) indicate the highest observed within the stated series inclusive. ^B Investigation initiated from gamma scan surveys performed with the 44-10. The release criteria are based on the soil sample results. The investigation cpm value is provided for comparison only. ^C Post 44-10 reading not logged – technician recalled ~ 8,000 cpm ^D 163GS included in the investigation due to proximity to grids 137 and 161 where elevated activity observed with relativity comparable 44-10 readings. ^E Grids 133 and 135, reported at levels comparable to those reported in this investigation are contiguous with the reported grids 132 and 137. Remedial activities within this region are bounded by the value reported for 132 and 137. ^F Investigation Grid 78, reported at levels comparable with those reported in this investigation is contiguous with the report grids 140 and 76. Remedial activities associated with this region are bounded by the reported values for 140 and 76.									
								EMC Unity Sum	NA

Attachment 4

Data Assessment

July 14, 2008

Survey Unit F8130421

