ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

March 12, 2008

Mr. John Hickman
Mail Stop: T-8F5
Office of Federal and State Materials
and Environmental Management Programs
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

SUBJECT: INTERIM LETTER REPORT—CONFIRMATORY SURVEY RESULTS FOR ACTIVITIES PERFORMED IN DECEMBER 2007; RANCHO SECO NUCLEAR GENERATING STATION, HERALD, CALIFORNIA DCN 1695-SR-02-0 (DOCKET NO. 50-312, RFTA NO. 06-003)

Dear Mr. Hickman:

The Oak Ridge Institute for Science and Education (ORISE) performed confirmatory survey activities on the Auxiliary Building structural surfaces (Rooms 18, 50 and 53 and Vaults 30, 31, 34 and 35), portions of the Acid Waste Piping system, and two exterior soil areas [Outfall Area and the Regenerant Hold-Up Tank (RHUT) Auxiliary Building Soil Area] at the Rancho Seco Nuclear Generating Station in Herald, California on December 10 through 13, 2007. These survey activities were requested and approved by the U.S. Nuclear Regulatory Commission (NRC). Enclosed is an interim letter report that summarizes ORISE's survey procedures and preliminary results of the confirmatory survey. The surveys included beta and gamma surface scans, direct measurements for total net beta activity, and smears for removable alpha and beta activity within the Auxiliary Building; embedded piping gamma scans within the Auxiliary Building; and limited gamma scans and the collection of soil samples in the Outfall and RHUT Auxiliary Boiler Land Areas.

If you have any questions, please direct them to me at 865.576.0065 or Sarah Roberts at 865.241.8893.

Sincerely,

Wade C. Adams

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ORISE Health Physicist/Project Leader
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WCA:bf

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INTERIM LETTER REPORT
CONFIRMATORY SURVEY RESULTS
FOR ACTIVITIES PERFORMED IN DECEMBER 2007
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

INTRODUCTION

The Sacramento Municipal Utility District (SMUD) operated the Rancho Seco Nuclear Generating Station (RSNGS) from 1976 to 1989 under Atomic Energy Commission Docket Number 50-312 and License Number DPR-54. In August 1989, SMUD notified the U.S. Nuclear Regulatory Commission (NRC) that they shut down RSNGS permanently. In May 1991, SMUD submitted the Rancho Seco Decommissioning Plan which was approved by the NRC in March 1995. SMUD began decommissioning activities in February 1997 and completed transfer of all the spent nuclear fuel in August 2002 (SMUD 2006a).

In April 2006, SMUD submitted a license termination plan (LTP) that was recently approved by the NRC on November 26, 2007 (SMUD 2006a and NRC 2007). SMUD currently is conducting decontamination efforts and performing final status surveys (FSS) on the remaining structural surfaces and in open land areas.

The NRC requested that the Independent Environmental Assessment and Verification (IEAV) Program of the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory surveys of structural surfaces and the Acid Waste System drains in the Auxiliary Building at the RSNGS (Figures 1 and 2). While on site, the NRC site representative also requested that ORISE perform cursory gamma surface scans and collect soil samples at the Outfall Area and the Regenerant Hold-Up Tank Auxiliary Boiler Land Area (RHUT Area). The confirmatory surveys were performed during the period of December 10 through 13, 2007.

PROCEDURES

Confirmatory surveys were performed in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2007a). The site-specific survey plan follows the guidance provided in the IEAV Survey Procedures and Quality Program Manuals (ORISE 2007b and ORAU 2007).

In the Auxiliary Building, ORISE judgmentally selected four of the eight vaults (Figures 3 through 5), three rooms (Figures 6 through 8), two Acid Waste System drains (Figures 9 and 10), and various pipe penetrations for confirmatory surveys based upon preliminary FSS results. At the request of the NRC site representative, ORISE also performed limited radiological surveys of the Outfall and RHUT Areas (Figures 11 and 12).

SURFACE SCANS

Auxiliary Building Structural Surfaces

Gamma surface scans were performed using sodium iodide, thallium-activated [NaI(Tl)] gamma scintillation detectors coupled to ratemeters with audible indicators. Beta surface scans were performed using large area gas proportional, hand-held gas proportional, and Geiger-Muller (GM)

detectors coupled to ratemeter-scalers with audible indicators. Particular attention was given to cracks, joints, embedded piping openings and horizontal surfaces in the evaluated structural surfaces where material may have accumulated.

Drains and Pipe Penetrations

Limited qualitative gamma scans were performed in portions of two 2" inner diameter (ID) Acid Waste Systems drain lines on the -20 foot level elevation and in numerous pipe penetrations within the vaults and rooms that were part of these survey activities. ORISE recorded the gamma scan range for the Acid Waste System drains and the pipe penetrations. Gamma scans were performed using a cesium iodide, thallium-activated [CsI(Tl)] gamma scintillation detector coupled to a ratemeter with an audible indicator.

Outfall and RHUT Areas

Gamma scans of the soils within the excavated Outfall Area and immediately adjacent to the excavated area and within the RHUT Area were performed using a NaI(Tl) gamma scintillation detector coupled to a ratemeter with an audible indicator.

SURFACE ACTIVITY MEASUREMENTS

Based on beta and gamma surface scan results, direct measurements for beta activity were performed at 26 judgmentally-selected locations on the evaluated structural surfaces within the Auxiliary Building which were available for confirmatory survey activities. Direct measurements were performed using hand-held gas proportional detectors coupled to ratemeters-scalers. A smear sample for determining removable gross alpha and gross beta activity levels was collected from each direct measurement location. Direct measurement and smear locations are indicated on Figures 4 through 8.

SOIL SAMPLING

Based on gamma scan results, ORISE judgmentally collected two soil samples from the Outfall Area; one sample to the east and one sample to the west, both immediately adjacent to the remediated portion of the Outfall Area. Also based on ORISE gamma scan results, ORISE asked SMUD personnel to collect a soil sample from an area of elevated gamma radiation (suspected to possibly be a discrete particle) in the RHUT Area and to provide analytical results to ORISE.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Radiological data and sample media were returned to the ORISE laboratory in Oak Ridge, Tennessee for analysis and interpretation. Radioassays were performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2007c). The soil samples were analyzed by gamma spectroscopy for the primary radionuclides-of-concern (ROC), Co-60 and Cs-137. However, spectra were also reviewed for additional gamma-emitting fission and activation products associated with the RSNGS and other identifiable total absorption peaks. The soil sample results were reported in units of picocuries per gram (pCi/g). Smear samples were analyzed for gross alpha and gross beta activity using a low-background gas proportional counter. Smear results and direct measurements for total surface activity were converted to units of disintegrations per minute per 100 square centimeters (dpm/100 cm^2). Since a pipe detector efficiency was not required,

embedded piping scan data were reported in units of counts per minute (cpm) to compare with SMUD's gross gamma cpm results.

FINDINGS AND RESULTS

AUXILIARY BUILDING STRUCTURAL SURFACES

The scan percent coverage and room area classifications are provided in Table 1. Beta surface scans determined that localized areas of residual elevated beta-gamma surface activity were present on floor and lower wall surfaces within the evaluated survey units (SUs). With the exception of direct measurement Location 14 in Room 18, residual surface activity was limited to small areas that were interspersed throughout the rooms. Due to the elevated beta and gamma surface activity levels determined at Location 14, SMUD and NRC personnel were notified and SMUD personnel remediated the location.

Beta measurements were performed at locations of residual elevated beta-gamma surface activity detected during surface scans. With one exception, total net beta activity measurements ranged from 130 to 16,000 dpm/100 cm^2. The one exception was at Location 14 in Room 18, which had a total net beta activity of 110,000 dpm/100 cm^2. It was determined that the residual beta activity was due to a discrete particle (0.22 pCi/g of Cs-137 and 0.0008 pCi/g of Co-60)[1]; the discrete particle was removed and the post-remedial total net beta activity was 1,100 dpm/100 cm^2. Removable gross alpha and gross beta activity ranged from 0 to 5 and -3 to 8 dpm/100 cm^2. Surface activity and removable activity level results are presented in Table 2.

DRAINS AND PIPE PENETRATIONS

A comparison of ORISE and SMUD gamma scan results for the Acid Waste System Drain Line 4-2-15 indicated elevated gamma radiation levels at approximately the same length/depth and levels as reported by SMUD personnel in the preliminary final status survey (FSS) data packages. However, gamma scans of Acid Waste System Drain Line 4-1-12, Segment 1 (originally numbered incorrectly by SMUD as Drain Line 4-1-13) indicated a large discrepancy between ORISE and SMUD data in the gamma scan range for the 0 to 8 foot portion of the pipe. SMUD's results, although more conservative than ORISE's results, were thirteen times higher than the ORISE results. The reason for this discrepancy is unclear and ORISE recommends further evaluation of this drain line during a future confirmatory survey trip. The ORISE confirmatory and SMUD gamma scan ranges are provided in Table 3.

Gamma scans of numerous pipe penetrations within the evaluated SUs indicated that gamma radiation levels ranged from 200 to 1,200 cpm. For comparison, the CsI(Tl) detector background range for the conduits along the east side of the Turbine Building at the +40 level elevation ranged from 200 to 800 cpm. The ORISE gamma scan ranges for the pipe penetrations are also provided in Table 3.

OUTFALL AND RHUT AREAS

Gamma scans of the remediated portion of the Outfall Area and the immediately adjacent areas detected residual elevated gamma radiation levels to the west and east of the remediated portion of

[1] Electronic mail from G. Pillsbury (SMUD) to W. Adams (ORISE); January 14, 2008.

the Outfall Area. A soil sample was collected from each of these locations. The radionuclide concentrations for the two soil samples collected immediately adjacent to the remediated portion of the Outfall Area ranged from 0.32 to 0.49 pCi/g for Co-60 and 34.9 to 47.1 pCi/g for Cs-137. The confirmatory radionuclide concentrations for the soil samples are provided in Table 4.

Gamma scans of the RHUT Area indicated that the vast majority of the surface soil was at background levels. The one exception was along the west perimeter of the area where a small location indicated elevated gamma radiation levels at approximately 40 times the average background. SMUD and NRC personnel were notified of this finding and SMUD personnel remediated the location and collected a soil sample. SMUD analyzed the RHUT soil sample and determined that the sample contained 66 pCi/g of Co-60. The sample was further divided and SMUD isolated a discrete particle that was counted as a point source and reported the particle activity as 0.485 μCi of Co-60; the recount of the soil sample (minus the discrete particle) indicated background levels.[2]

COMPARISON OF SURVEY RESULTS WITH GUIDELINES

STRUCTURAL SURFACE ACTIVITY LEVELS

The major contaminants identified by SMUD at RSNGS are beta-gamma emitters—fission and activation products—resulting from reactor operation. Cesium-137 and Co-60 have been identified during characterization as the predominant radionuclides present on structural surfaces. SMUD developed site-specific derived concentration guideline levels (DCGLs), which were recently approved by the NRC, based on a dose modeling to future occupants not to exceed 25 mrem/year total effective dose equivalent (TEDE) as presented in Section 6 of the LTP (SMUD 2006a and NRC 2007). The DCGLs for surfaces were modified by SMUD to reflect the ratio of radionuclide concentrations (account for the presence of unmeasured contaminants based on contaminant ratios) in the specific SUs that were being evaluated. The applicable surface activity guidelines for the evaluated structural surfaces for these surveys are provided in Table 5. These DCGLs were provided in the preliminary FSS data packages for each evaluated SU and were derived from the LTP and decommissioning technical basis document (DTBD)-05-015 (SMUD 2006a and b).

Confirmatory survey data for Auxiliary Building structural surfaces were compared with the site-specific DCGL for the evaluated Auxiliary Building SUs. One of the 26 direct beta activity measurement results on the concrete structural surfaces exceeded the Gross Beta DCGL of 43,000 dpm/100 cm^2. Using the gross activity DCGL as determined in DTBD-05-015 (SMUD 2006b) and the area factor determined for each SU, SMUD calculated Design DCGL elevated measurement comparison ($DCGL_{EMC}$) values which are also provided in Table 5. All confirmatory direct surface activity measurements on the Auxiliary Building structural surfaces in the evaluated SUs were within the site-specific SU $DCGL_{EMC}$ as provided by SMUD in the preliminary FSS data packages. However, it was determined that the elevated beta surface activity at Location 14 in Room 18 was from a discrete Cs-137 and Co-60 particle; hence, the particle was remediated by SMUD personnel while ORISE was on site and a confirmatory, post-remediation direct measurement was performed with the results being well within the gross activity DCGL.

[2] Electronic mail from E. Ronningen (SMUD) to W. Adams (ORISE), RE: RHUT Area Contamination; December 20, 2007.

DRAIN LINES AND PIPE PENETRATIONS

Co-60 is the primary ROC within the embedded piping. SMUD has established a dose-based restriction for embedded piping not to exceed 25 mrem/year that assumes a building occupancy scenario within rooms where embedded piping is present. The corresponding modeled DCGL is 100,000 dpm/100 cm^2. SMUD's grouting action level for embedded piping is 21,000 dpm/100 cm^2 (SMUD 2007).

ORISE's confirmatory drain line and pipe penetration results were not directly compared to the embedded piping DCGL; instead, since ORISE and SMUD used the same Ludlum Model 44-159 CsI(Tl) detector, ORISE compared gross gamma scan readings with either SMUD's preliminary FSS data package gamma scan results for each surveyed pipe at various depths or with background levels as determined during a previous ORISE confirmatory survey (ORISE 2007d).

Confirmatory survey data for the Acid Waste System drain lines were compared with the preliminary FSS data package gross gamma cpm results. The confirmatory gamma scan results indicated that ORISE gross gamma radiation levels within the drain line pipes were consistent with the SMUD preliminary FSS data package results for Drain Line 4-2-15. SMUD's gross gamma cpm results for Drain Line 4-1-12, Segment 1 were thirteen times higher than the ORISE gross gamma cpm results; the results for this drain line need to be re-evaluated during the next ORISE confirmatory survey. Gamma scans of the other evaluated Auxiliary Building pipe penetrations that were part of these survey activities did not detect gamma radiation levels in excess of the detector background.

SOIL SAMPLES

Table 6-5 (Table 6) from the LTP provides the single nuclide DCGL's for soil at RSNGS. The $DCGL_w$ is 12.6 pCi/g for Co-60 and 52.8 pCi/g for Cs-137 (SMUD 2006a). The Outfall Area soil sample concentrations were below the respective single radionuclide DCGLs. The soil sample collected by SMUD personnel from the location of elevated residual gamma radiation detected by ORISE personnel in the RHUT Area was analyzed by SMUD; SMUD's analyses indicated that the sample (containing 66 pCi/g of Co-60) exceeded the DCGL for Co-60. The sample was further divided and a discrete particle containing 0.485 μCi of Co-60 was identified by SMUD.

SUMMARY

During the period of December 10 through 13, 2007, ORISE performed confirmatory radiological survey activities which included beta and gamma surface scans, beta activity direct measurements, and removable gross alpha and gross beta activity measurements on structural surfaces within the Auxiliary Building; gamma scans within Auxiliary Building embedded piping; and, gamma scans and the collection of soil samples from the Outfall and RHUT Areas.

Beta and gamma surface scans identified several areas of elevated beta surface activity on the structural surfaces of the evaluated SUs with the Auxiliary Building. With one exception, additional investigation of these locations indicated that the majority of the elevated surface activity levels were attributable to localized areas of residual beta-gamma radiation within the matrix of the concrete media. In general, the elevated surface activity was limited to small areas that were interspersed throughout the rooms. The one exception was a discrete particle of Cs-137 and Co-60 that was found in Room 18. Direct measurements were performed at 26 locations. As mentioned above,

only one direct measurement exceeded the site-specific gross beta DCGL but all were within the $DCGL_{EMC}$ criteria. A review of the preliminary FSS data package for Room 18 indicated that SMUD personnel did not identify the elevated residual beta and gamma radiation levels from Location 14 in Room 18. Therefore, the results of the confirmatory survey activities for the evaluated structural surfaces of Room 18 in the Auxiliary Building did not confirm the radiological status of the SU as presented in the licensee's preliminary Room 18 FSS data package. SMUD personnel were notified and are investigating the confirmatory finding in Room 18. The confirmatory survey results for Rooms 50 and 53 are in agreement with the radiological status of these SUs as presented in the licensee's preliminary FSS data packages.

Gamma surface scans of the evaluated Auxiliary Building pipe penetrations did not indicate any areas of elevated gamma radiation levels; the scan results within Acid Waste System Drain Line 4-2-15 were consistent with the results presented in the preliminary FSS data packages for that drain. However, the gamma scan results for Acid Waste System Drain Line 4-1-12, Segment 1 were not in agreement with the preliminary FSS results. Further investigations by SMUD indicated that Drain Line 4-1-13 had been removed and the preliminary FSS results for Drain Line 4-1-12, Segment 1 were erroneously reported as the results for 4-1-13 (Refer to Figure 9). Due to this discrepancy, SMUD re-surveyed Segments 1 and 2 of Drain Line 4-1-12 and provided preliminary results to ORISE on February 12, 2008.[3] SMUD's gamma scan range for the 0 to 8 foot length of Segment 1 is thirteen times higher and not in agreement with ORISE's gamma scan results (Table 3). Based on the discrepancy between the ORISE confirmatory and SMUD FSS gamma scan ranges and the confusion with the incorrect numbering of the drain line, ORISE recommends that a side-by-side instrument comparison be performed in this drain line during a subsequent confirmatory survey trip.

The soil sample results from the Outfall Area were below the individual radionuclide DCGLs and meet the soil release criteria. The SMUD radiological analyses of the soil sample from the RHUT area exceeded the soil DCGL for Co-60. SMUD personnel are performing further investigations within the RHUT Area.

[3] Electronic mail from E. Ronningen (SMUD) to W. Adams (ORISE), RE: Survey of Acid Waste Line 4-1-12; February 12, 2008.

FIGURES

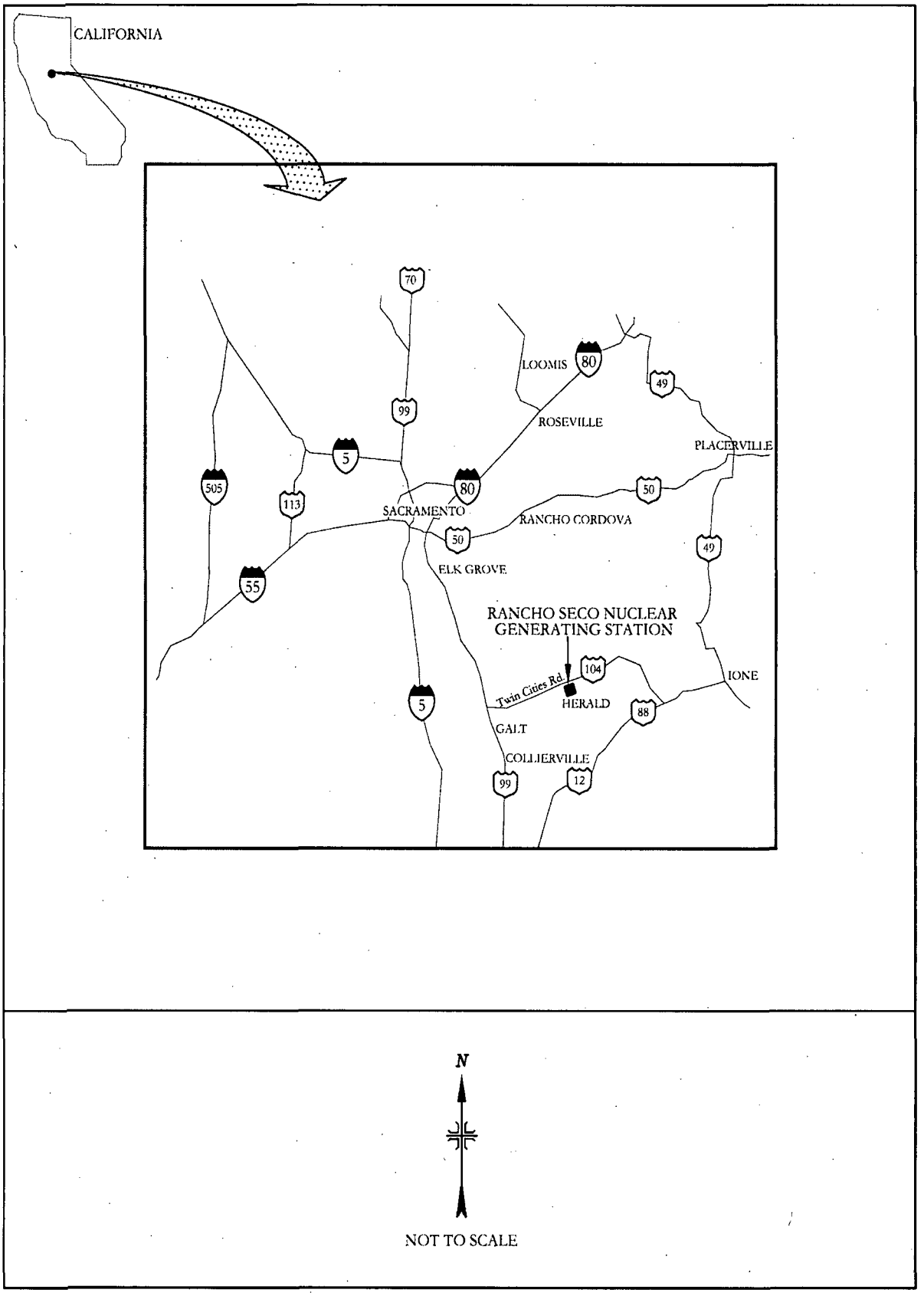

Figure 1: Location of Rancho Seco Nuclear Generating Station, Herald, California

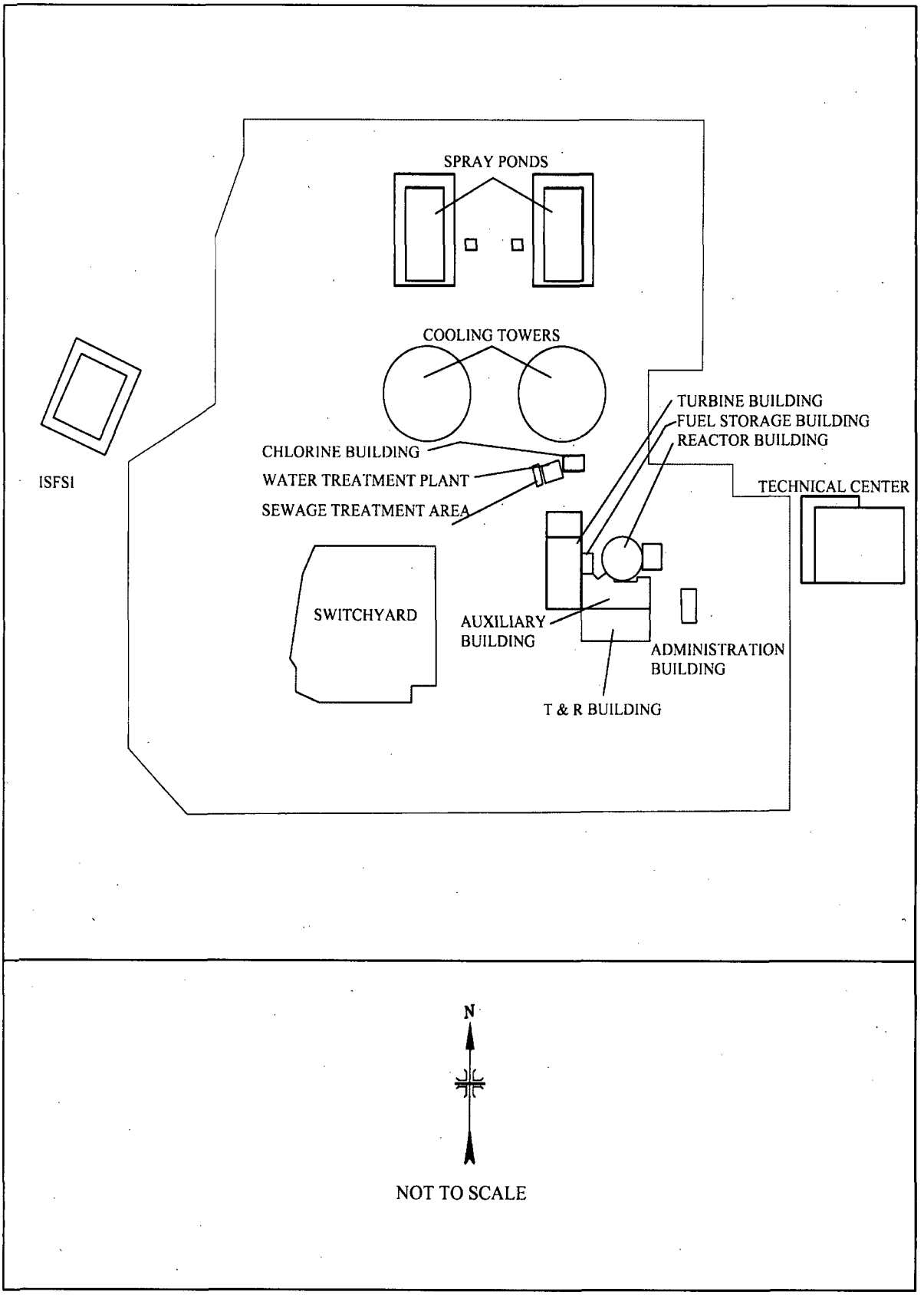

Figure 2: Plot Plan of the Industrial Area at Rancho Seco Nuclear Generating Station

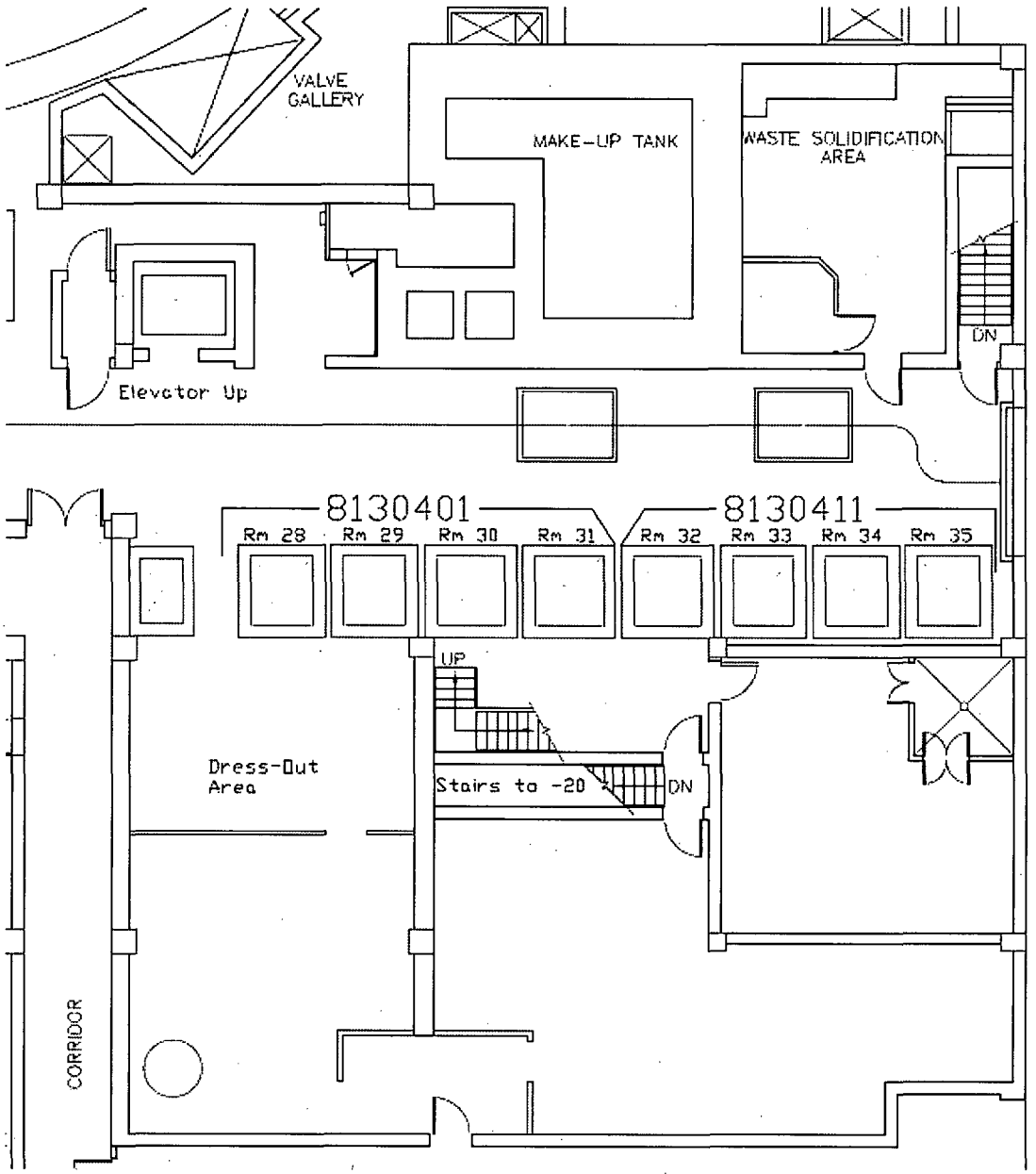

Figure provided by SMUD.

Figure 3: Plot Plan of Auxiliary Building Vaults – Survey Units F8130401 and F8130411

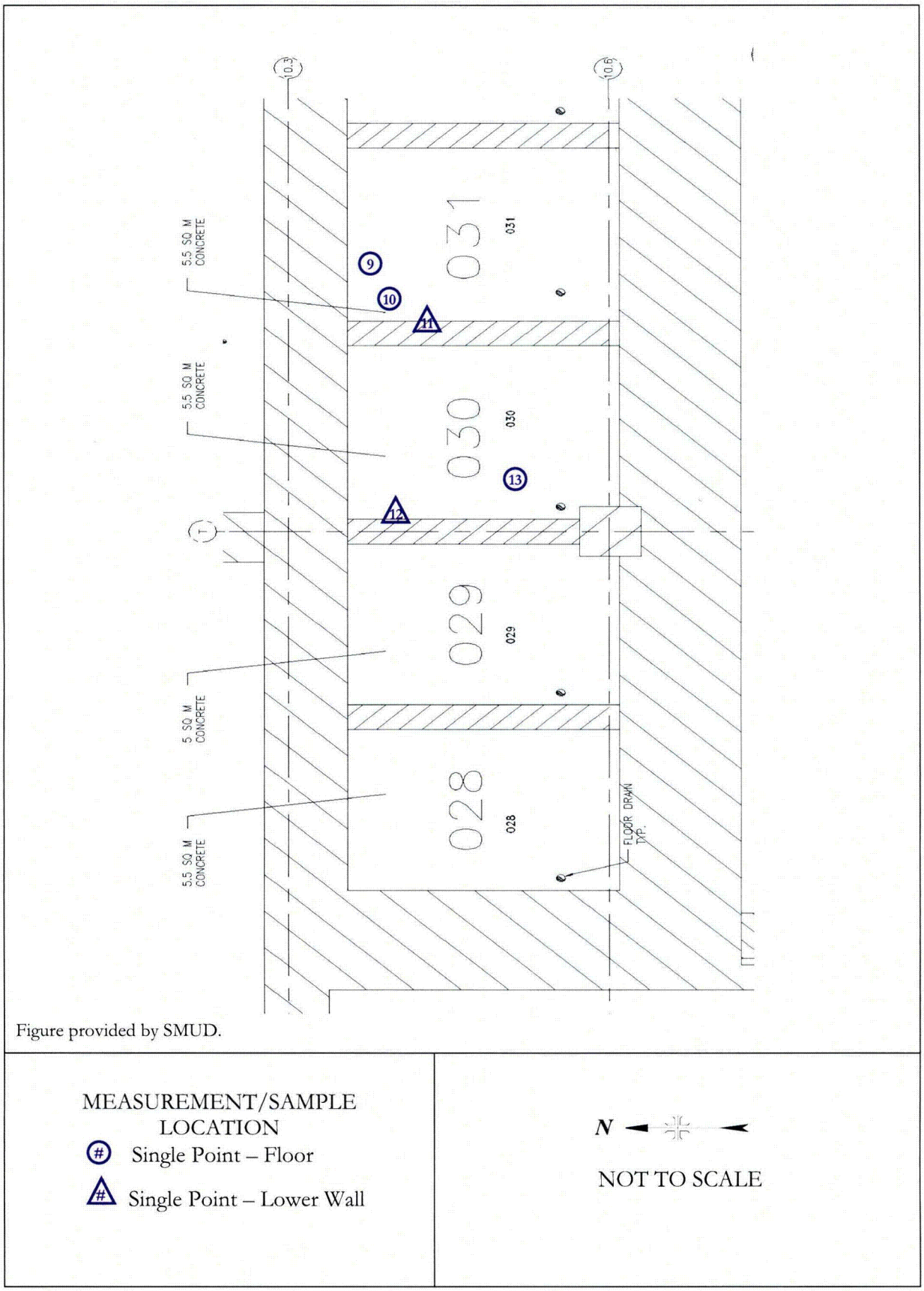

Figure provided by SMUD.

Figure 4: Survey Unit F8130401, Vaults 30 and 31 – Direct Measurement and Sample Locations

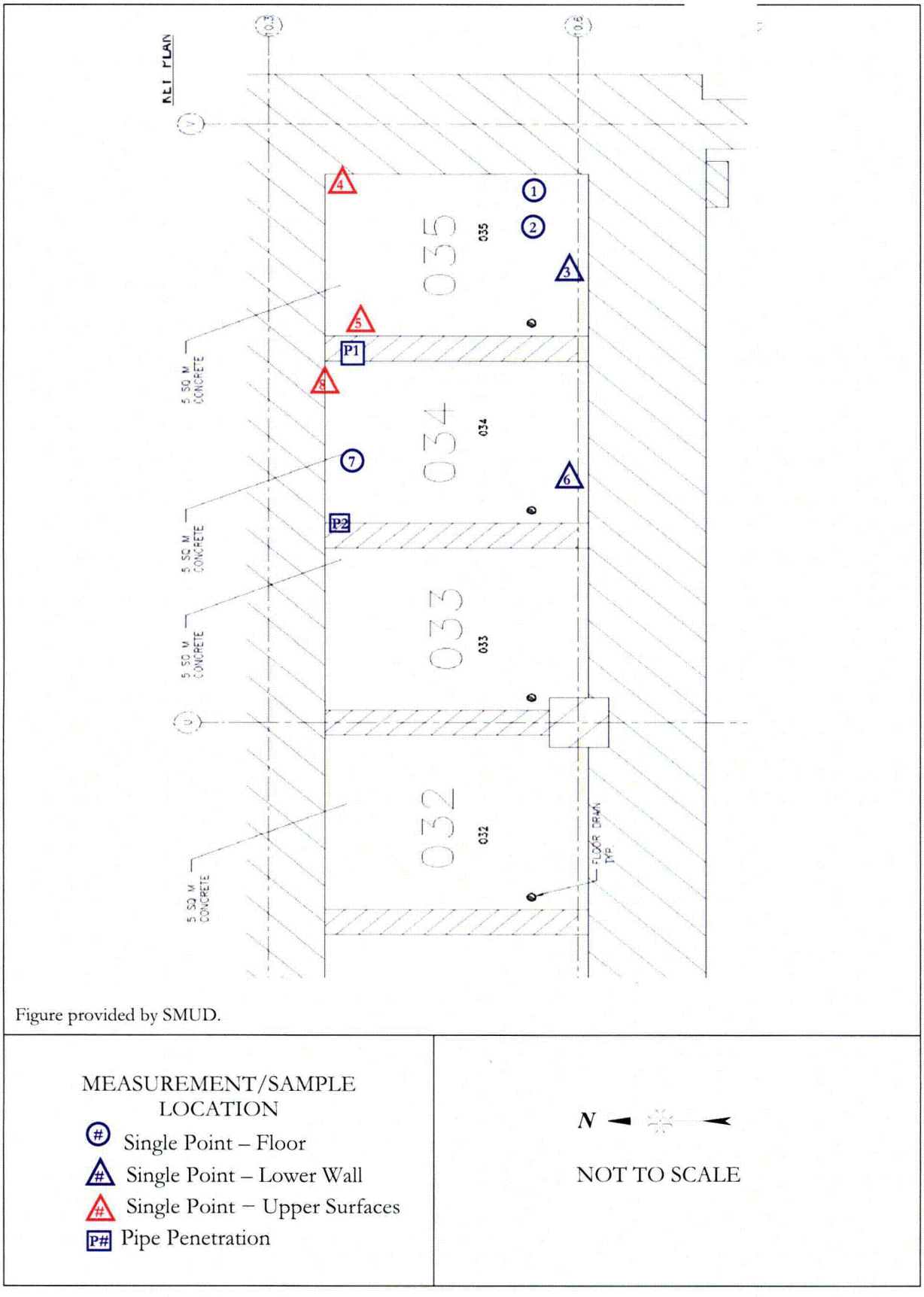

Figure provided by SMUD.

Figure 5: Survey Unit F8130411, Vaults 34 and 35 – Direct Measurement and Sample Locations

Figure Provided by SMUD

Figure 6: Survey Unit F8130201, Room 18 – Direct Measurement and Sample Locations

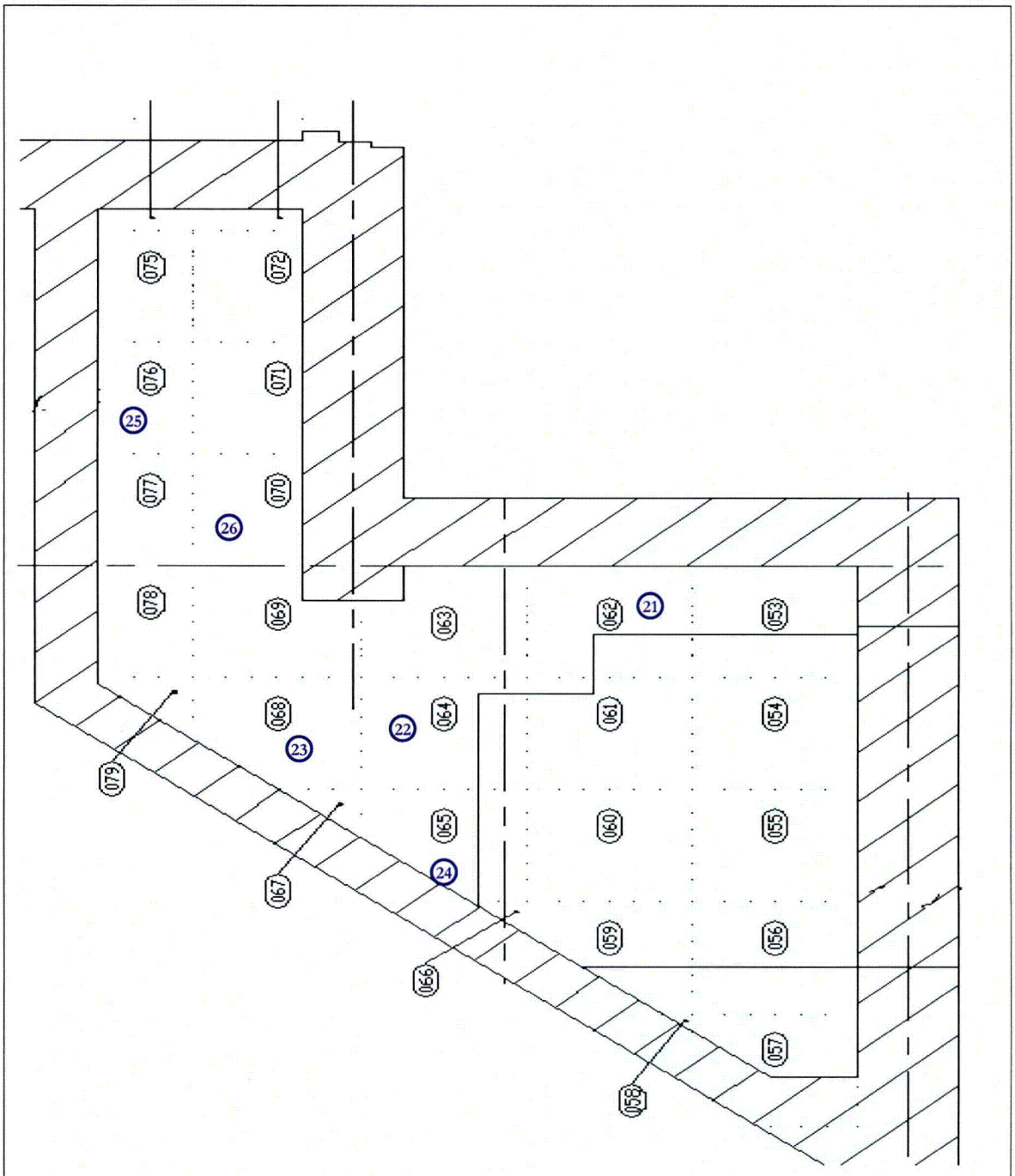

Figure provided by SMUD

MEASUREMENT/SAMPLE LOCATION

(#) Single Point - Floor

N

NOT TO SCALE

Figure 7: Survey Unit F8130681, Room 50 – Direct Measurement and Sample Locations

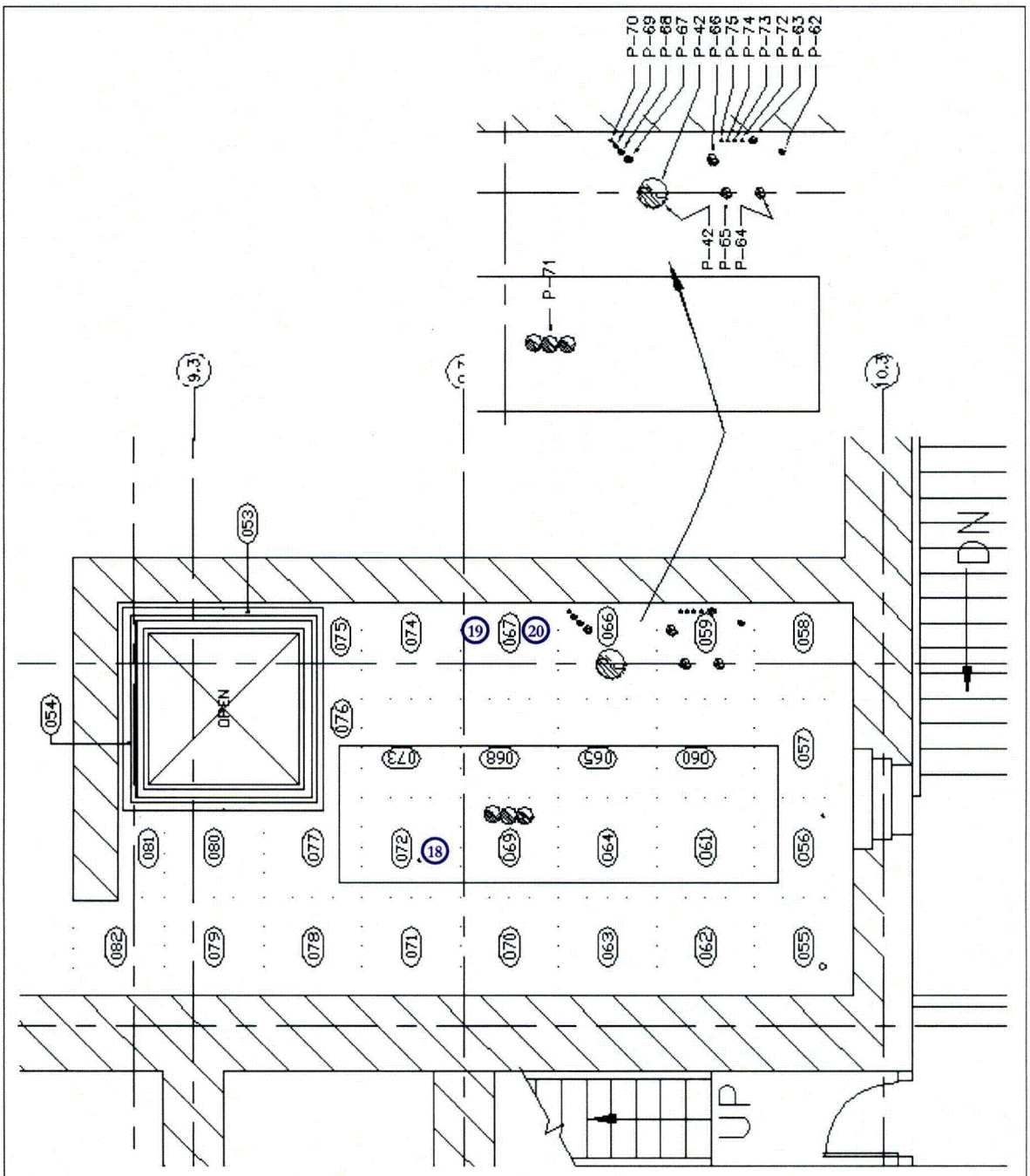

Figure provided by SMUD.

MEASUREMENT/SAMPLE LOCATION	
(#) Single Point - Floor	N NOT TO SCALE

Figure 8: Survey Unit F8130781, Room 53 – Direct Measurement and Sample Locations

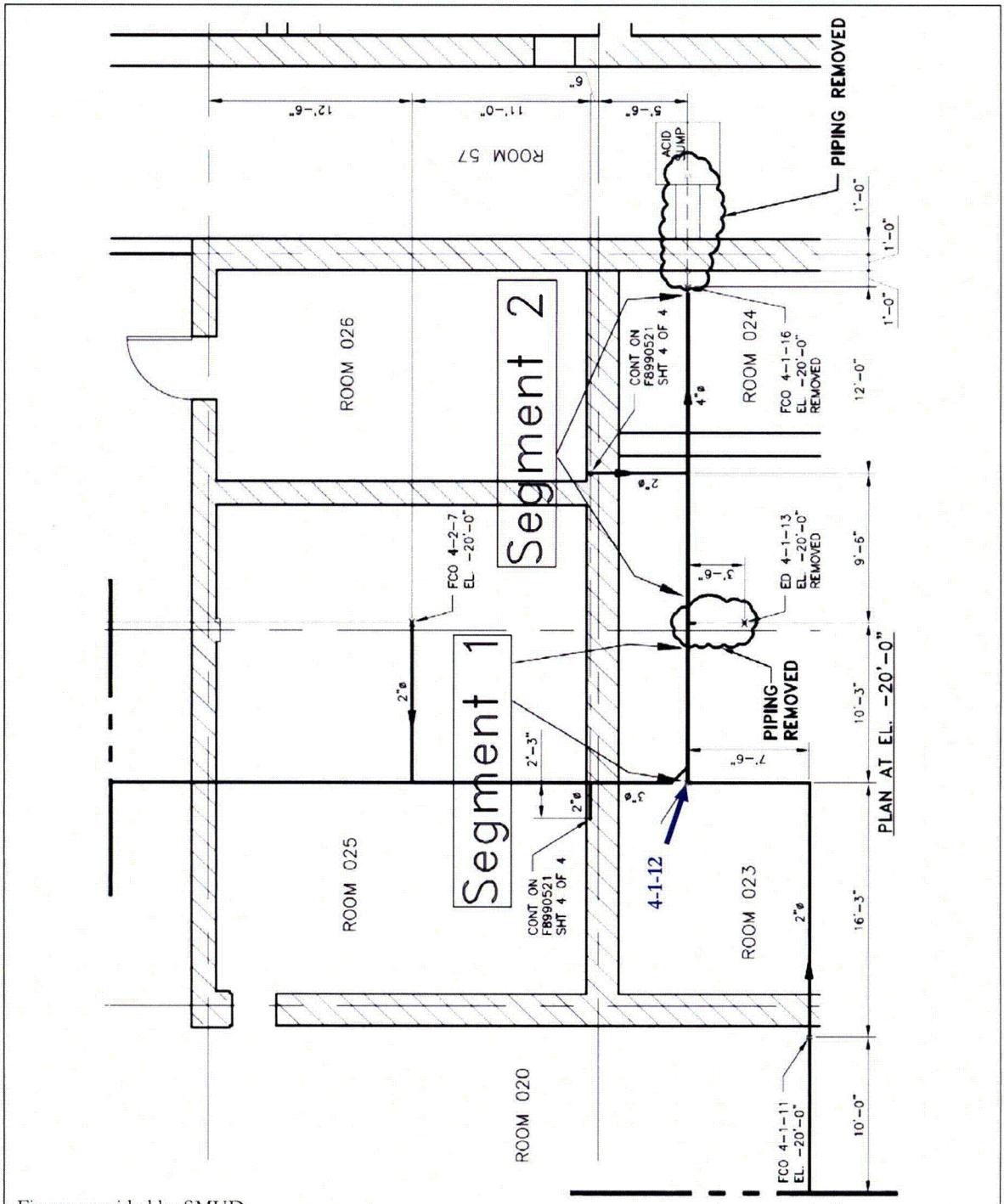

Figure provided by SMUD.

Figure 9: Survey Unit F8990521, Acid Waste Drains – Surveyed Drain 4-1-12, Segment 1

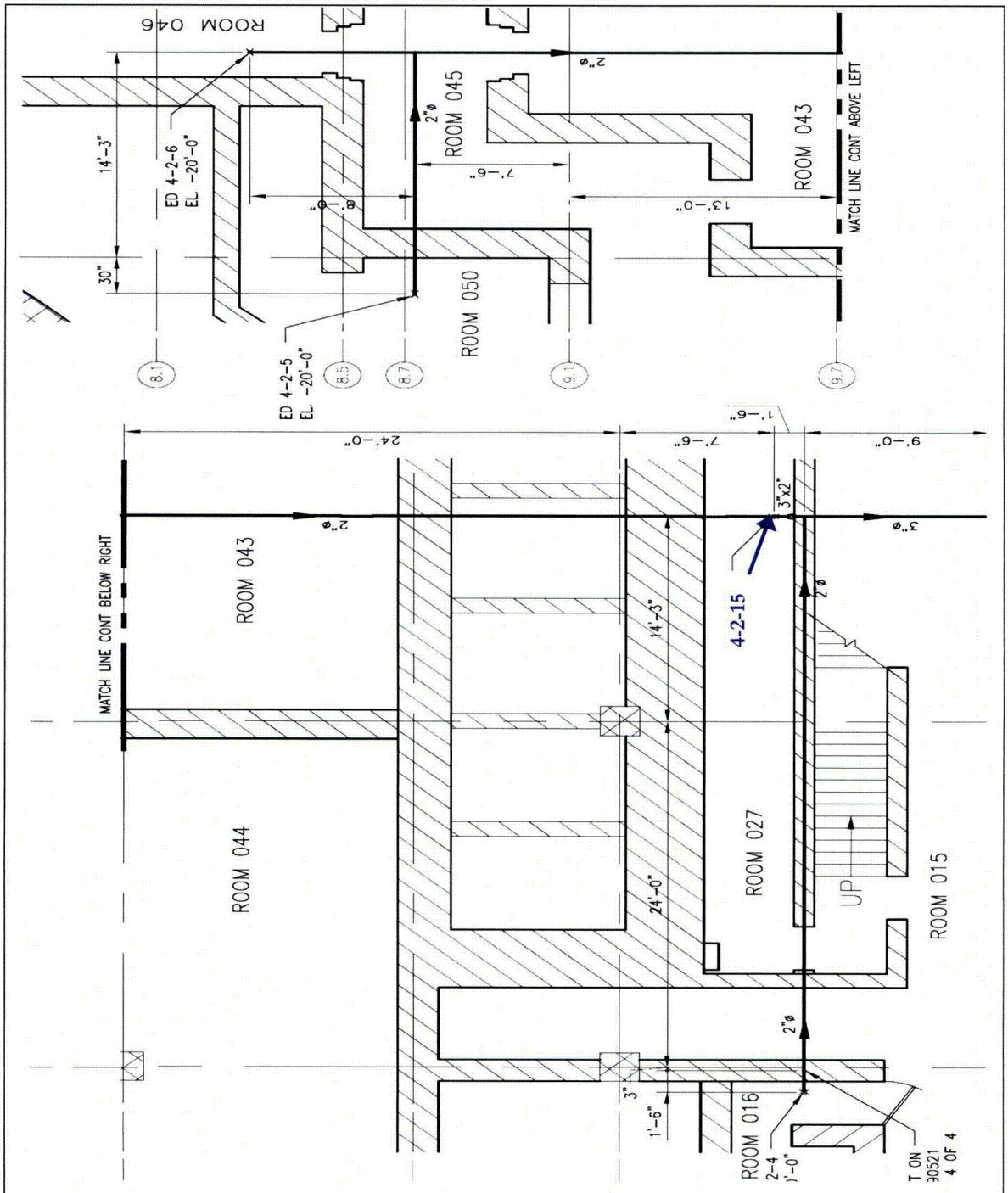

Figure provided by SMUD.

MEASUREMENT LOCATION	N
# Surveyed Drain	NOT TO SCALE

Figure 10: Survey Unit F8990521, Acid Waste Drains – Surveyed Drain 4-2-15

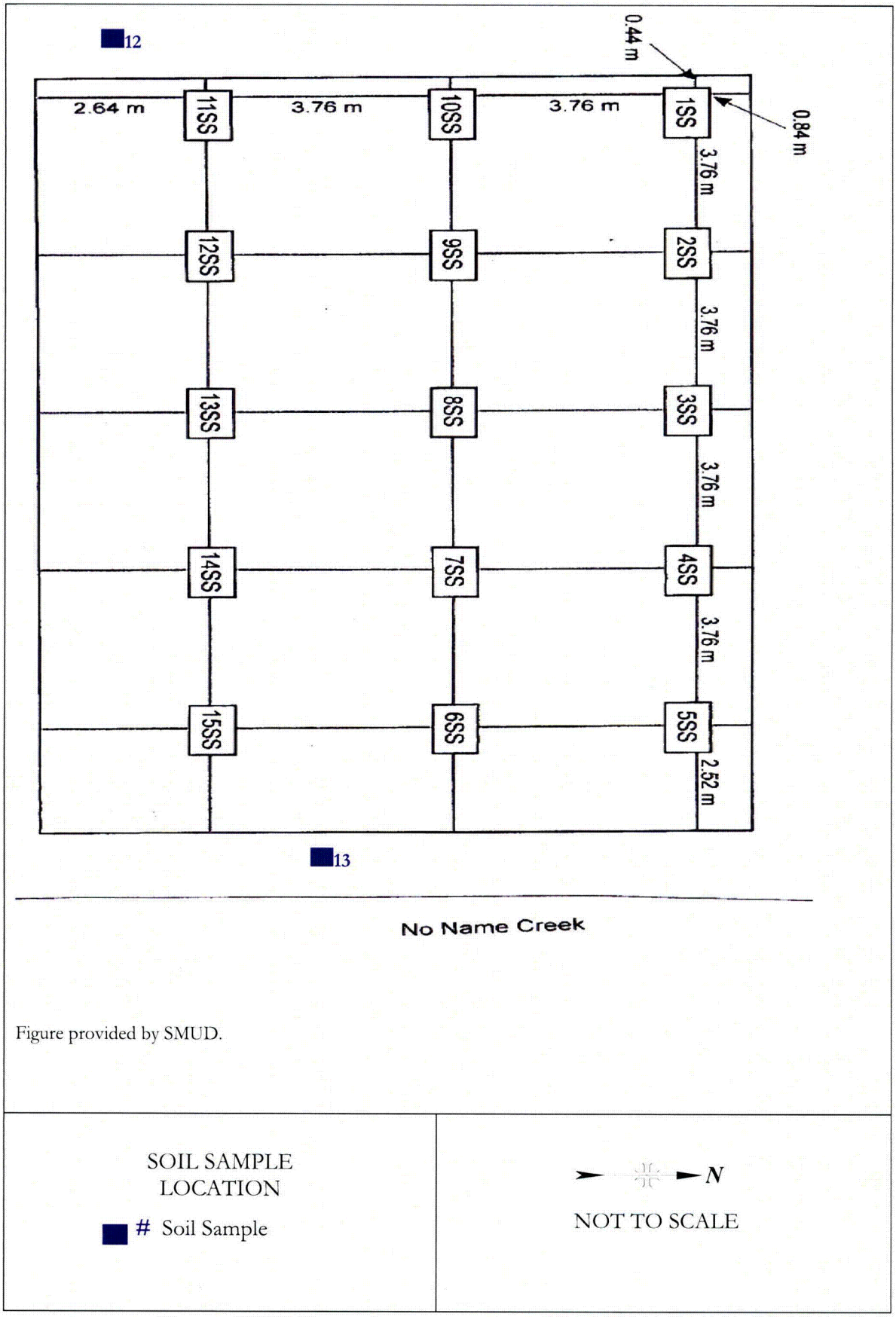

Figure provided by SMUD.

Figure 11: Outfall Area – Soil Sample Locations

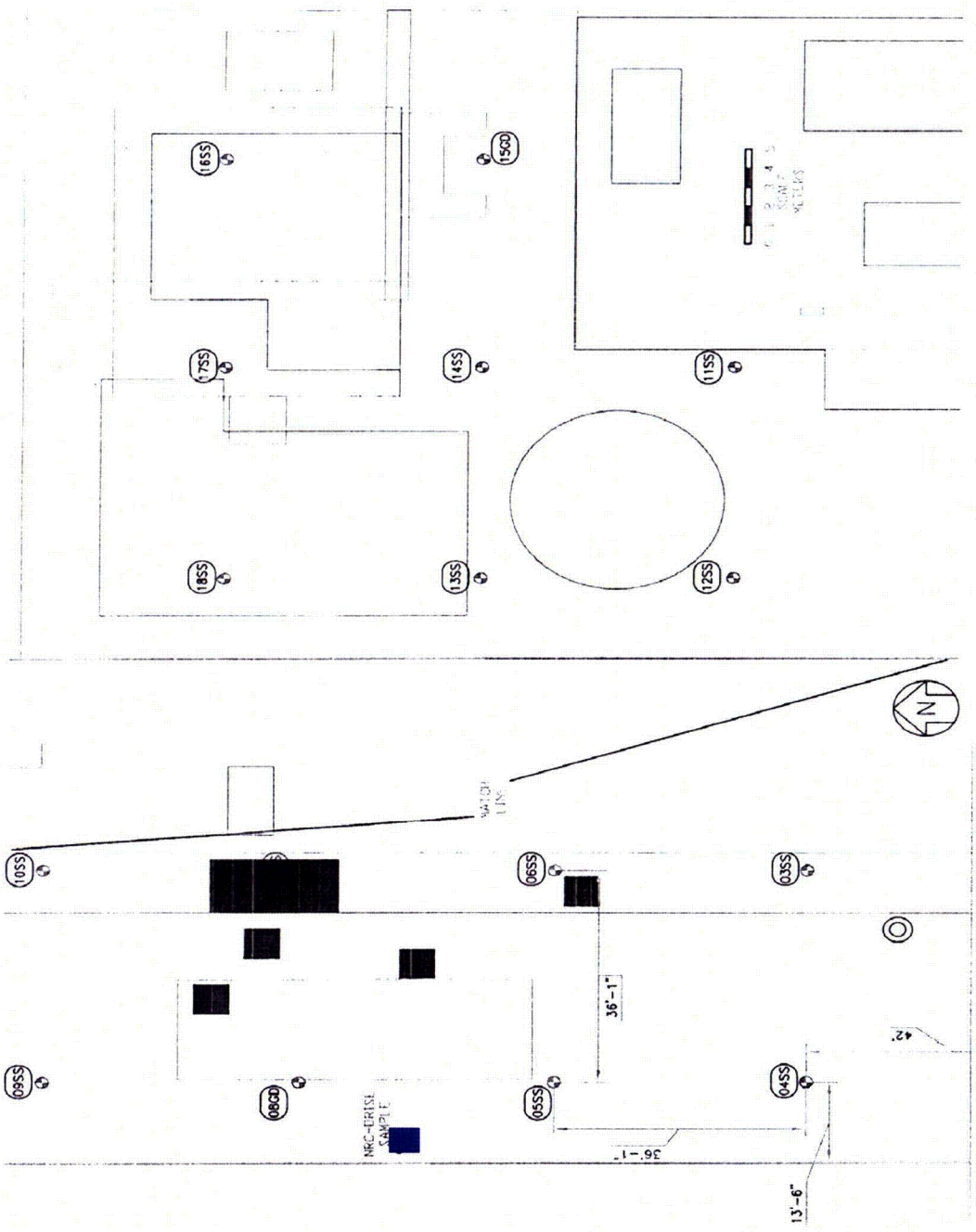

Figure provided by SMUD.

SOIL SAMPLE LOCATION	N
Soil Sample	NOT TO SCALE

Figure 12: RHUT Auxiliary Boiler Land Area – Soil Sample Locations

TABLES

TABLE 1

SURVEY UNIT CLASSIFICATION AND SCAN COVERAGE FOR SURVEYED ROOMS IN THE AUXILIARY BUILDING RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

Auxiliary Building Survey Unit/Room[a]	Class	Percent Scan Coverage			
		Gamma Floor/Lower Wall	Beta Floor	Beta Lower Wall	Beta Upper Surfaces
Vault 30	1	---[b]	100	75	5
Vault 31	1	---	100	75	5
Vault 34	1	---	100	75	---
Vault 35	1	---	100	70	---
18 FL and LW	1	100	75	50	---
18 US	2	---	---	---	---
50 FL and LW	1	100	70	50	---
50 US	2	---	---	---	---
53 FL and LW	1	100	75	50	---
53 US	2	---	---	---	---

[a]Refer to Figures 4 through 8. FL = floor, LW = lower wall and US = upper surfaces.
[b]Scans not performed.

TABLE 2

SURFACE ACTIVITY LEVELS
AUXILIARY BUILDING STRUCTURAL SURFACES
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Room/ Location[a]	Surface[b]	Total Beta Activity (dpm/100 cm^2)[c]	Removable Activity (dpm/100 cm^2)		Activity Meets Gross Beta DCGL[d]
			Alpha	Beta	
Vault 30					
12	LW	740	1	2	YES
13	FL	4,700	0	-1	YES
Vault 31					
9	FL	16,000	0	8	YES
10	FL	4,300	1	1	YES
11	LW	2,600	0	1	YES
Vault 34					
6	LW	6,000	0	-1	YES
7	FL	6,100	0	7	YES
8	US	260	0	-3	YES
Vault 35					
1	FL	1,200	1	6	YES
2	FL	4,100	0	-1	YES
3	LW	2,400	0	3	YES
4	US	130	3	2	YES
5	US	170	0	3	YES
Room 18					
14 Before[e]	FL	110,000	---[f]	---	NO[e]
14 After	FL	1,100	0	2	YES
15	FL	3,400	1	3	YES
16	FL	4,200	0	6	YES
17	FL	12,000	0	2	YES
Room 50					
21	FL	12,000	0	5	YES
22	FL	14,000	0	6	YES
23	FL	5,700	0	3	YES
24	FL	10,000	0	8	YES
25	FL	15,000	0	6	YES
26	FL	14,000	0	8	YES

TABLE 2 (continued)

SURFACE ACTIVITY LEVELS
AUXILIARY BUILDING STRUCTURAL SURFACES
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Room/ Location[a]	Surface[b]	Total Beta Activity (dpm/100 cm^2)[c]	Removable Activity (dpm/100 cm^2)		Activity Meets Gross Beta DCGL[d]
			Alpha	Beta	
Room 53					
18	FL	5,400	0	4	YES
19	FL	3,700	5	1	YES
20	FL	2,500	3	6	YES

[a]Refer to Figures 3 through 8.
[b]Structural surfaces; FL = floor, LW = lower wall and US = upper surfaces.
[c]Direct measurement results rounded to two significant digits.
[d]DCGL values are provided in Table 5.
[e]Location 14 was determined to be a discrete particle that was remediated by SMUD. After remediation, the direct measurement was below the gross beta DCGL.
[f]Smear sample not collected.

TABLE 3

AUXILIARY BUILDING ACID WASTE SYSTEM DRAINS AND PIPE PENETRATIONS CONFIRMATORY GAMMA SCAN RANGES RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

Drain Line Location	Diameter (inches)	Scan Length (feet)	Gamma Scan Range (cpm)	
			ORISE	SMUD
Turbine Building Backgrounds[a]				
Conduit, East Side 1	4	1	300 to 600	---[b]
Conduit, East Side 2	4	1	300 to 600	---
Conduit, East Side 3	4	1	200 to 600	---
Conduit, East Side 4	4	1	300 to 600	---
Penetration, East Side	4	1	300 to 600	---
Exciter Pad East	4	12	200 to 800	---
Exciter Pad West	4	12	200 to 800	---
Background Range	---	---	200 to 800	---
Auxiliary Building Pipe Penetrations[c]				
Vault 30	2 to 3	5	400 to 900	NA[d]
Vault 34	2 to 3	5	600 to 1,200	NA
Room 18	2 to 14	3 to 5	200 to 800	NA
Room 53	2 to 4	2 to 3	200 to 600	NA
Auxiliary Building Acid Waste Drains[e]				
4-1-12, Segment 1[f]	2	0 to 8	400 to 1,400	510 to 19,000
4-2-15	2	0	900	990
		1	600	520
		2	800	660
		3	3,200	7,700
		4	5,000	16,000
		4.5	20,000	3,000

[a]Turbine Building embedded piping backgrounds were determined within Turbine Building conduits. This data was collected during a previous ORISE survey (ORISE 2007d).
[b]Measurements not performed by SMUD within the Turbine Building conduits.
[c]Figure not provided. Each room had numerous pipe penetrations and a portion of those penetrations were scanned.
[d]Not applicable. ORISE compared the pipe penetration scan results to background.
[e]Refer to Figures 9 and 10. SMUD data was provided in to ORISE in a preliminary FSS data package. ORISE and SMUD results were rounded to two significant digits.
[f]SMUD originally numbered incorrectly Acid Waste Drain Line 4-1-12, Segment 1 as 4-1-13. Due to discrepancies in the survey data, ORISE recommends further evaluation of this drain line and the instrumentation used to collect the preliminary FSS data.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Radionuclide Concentrations in Soil Samples (pCi/g)		
Outfall Location[a]	**Co-60**	**Cs-137**
12	0.32 ± 0.06[b]	34.9 ± 1.1
13	0.49 ± 0.08	47.1 ± 1.6

[a]Refer to Figure 11.
[b]Uncertainties represent the 95% confidence level based on total propagated uncertainties.

TABLE 5

DERIVED CONCENTRATION GUIDELINE LEVELS AND ELEVATED MEASUREMENT COMPARISONS FOR SURVEYED ROOMS IN THE AUXILIARY BUILDING
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Auxiliary Building Survey Unit/Room[a]	Class	Gross Beta DCGL[b] (dpm/100 cm^2)	Design $DCGL_{EMC}$[c] (dpm/100 cm^2)
Vault 30	1	43,000	163,400
Vault 31	1	43,000	163,400
Vault 34	1	43,000	154,800
Vault 35	1	43,000	154,800
18 FL and LW	1	43,000	137,600
18 US	2	43,000	NA[d]
50 FL and LW	1	43,000	206,400
50 US	2	43,000	NA
53 FL and LW	1	43,000	172,000
53 US	2	43,000	NA

[a]Refer to Figures 3 through 8. FL = floor, LW = lower wall and US = upper surfaces.
[b]Gross beta DCGL accounts for radionuclide fractions and hard to detects as specified in the DTBD-05-15.
[c]$DCGL_{EMC}$ provided by SMUD and accounted for area factors determined for each specific survey unit.
[d]$DCGL_{EMC}$ not required for Class 2 survey units.

TABLE 6

DERIVED CONCENTRATION GUIDELINE LEVELS FOR SOIL SAMPLES RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

Single Nuclide $DCGL_W$ Values for Detectable Radionuclides[a]		
Radionuclide	**Peak of the Mean Dose (mrem/y per pCi/g)**	**$DCGL_W$ (pCi/g)**
C-14	2.93E-06	8.33E+06
Co-60	1.93E+00	1.26E+01
Ni-63	1.60E-06	1.52E+07
Sr-90	3.76E-03	6.49E+03
Cs-134	1.09E+00	2.24E+01
Cs-137	4.62E-01	5.28E+01

[a]Table 6-5 from the License Termination Plan (SMUD 2006a).

REFERENCES

Oak Ridge Associated Universities (ORAU). Quality Program Manual for the Independent Environmental Assessment and Verification Program. Oak Ridge, Tennessee; March 1, 2007.

Oak Ridge Institute for Science and Education (ORISE). Final Confirmatory Survey Plan for the Remaining Structural Surfaces, Embedded Piping, Standing Water and Open Land Area Survey Units, Rancho Seco Nuclear Generating Station, Herald California [Docket No. 50-312; RFTA No. 06-003]. Oak Ridge, Tennessee; August 10, 2007a.

Oak Ridge Institute for Science and Education. Survey Procedures Manual for the Independent Environmental Assessment and Verification Program. Oak Ridge, Tennessee; August 3, 2007b.

Oak Ridge Institute for Science and Education. Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; June 15, 2007c.

Oak Ridge Institute for Science and Education. Revised-Confirmatory Survey Report for Portions of the Auxiliary Building Structural Surfaces and Turbine Building Embedded Piping, Rancho Seco Nuclear Generating Station, Herald, California. DCN 1695-SR-01-1. Oak Ridge, Tennessee; December 21, 2007d.

Sacramento Municipal Utility District (SMUD). License Termination Plan, Rancho Seco Nuclear Generating Station, Herald, California; April 2006a.

Sacramento Municipal Utility District. Decommissioning Technical Basis Document: Structure Nuclide Fraction and DCGLs. DTBD-05-015, Revision 0. Rancho Seco Nuclear Generating Station, Herald, California; June 2, 2006b.

Sacramento Municipal Utility District. Decommissioning Technical Basis Document: Embedded Piping Scenario and DCGL Determination Basis. DTBD-05-009, Revision No. 1.0. Rancho Seco Nuclear Generating Station, Herald, California; June 1, 2007.

U.S. Nuclear Regulatory Commission (NRC). Letter from J. Hickman (NRC-HQ) to S. Redeker (SMUD); SUBJECT: Rancho Seco Nuclear Generating Station – Issuance of Amendment RE: License Termination Plan (TAC No. J52668). Washington, DC; November 27, 2007.