UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

February 1, 2008

Mr. James Shetler, Assistant General Manager
Energy Supply
Sacramento Municipal Utility District
6201 'S' Street
P.O. Box 15830
Sacramento, California 95852

SUBJECT: NRC INSPECTION REPORT 050-00312/07-006

Dear Mr. Shetler:

An NRC inspection was conducted on December 10-13, 2007, at your Rancho Seco Nuclear Generating Station. On January 10, 2008, after reviewing additional information provided by your staff, a telephonic exit briefing was conducted with the Plant Manager. The enclosed report presents the scope and results of the inspection. The inspection determined that you were conducting decommissioning activities in compliance with license and regulatory requirements.

The inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection included reviews of your organization management and cost controls, safety reviews, design changes, modifications, decommissioning performance, occupational radiation exposure, and final surveys.

Also enclosed is a copy of the Oak Ridge Institute for Science and Education (ORISE) report on the confirmatory survey results conducted during the October 15 through 18, 2007, inspection. The ORISE independent measurements confirmed the results of your final status surveys for the locations surveyed in the Turbine and Auxiliary Buildings and the soil sample that was collected from the retention basins.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/Adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Should you have any questions concerning this inspection, please contact Mr. Emilio Garcia, Health Physicist, at (530) 756-3910 or the undersigned at (817) 860-8197.

Sincerely,

Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

Docket No.: 050-00312
License No.: DPR-54

Enclosures:
1. NRC Inspection Report 050-00312/07-006
   (w/Attachments 1 & 2)
2. ORISE Survey Report DCN 1695-SR-01-1

cc w/enclosures:
Thomas A. Baxter, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, DC 20037

QA/Licensing Superintendent
Rancho Seco Nuclear Generating Station
14440 Twin Cities Road
Herald, CA 95638-9799

Sacramento County Board
of Supervisors
700 H. Street, Suite 2450
Sacramento, CA 95814

Assistant General Counsel
Sacramento Municipal Utility District
6201 S Street
P.O. Box 15830
Sacramento, CA 95852-1830

Radiation Program Director
California Radiologic Health Branch
State Department of Health Services
P.O. Box 997414 (MS 7610)
Sacramento, CA 95899-7414

Site Document Control Supervisor
Sacramento Municipal Utility District
Rancho Seco Nuclear Generating Station
14440 Twin Cities Road
Herald, CA 95638-9799

Commissioner's Office
California Energy Commission
1516 Ninth Street (MS 34)
Sacramento, CA 95814-5512

bcc w/Enclosure 1 (via ADAMS distribution):
LDWert
CLCain
JBHickman, FSME/DWMEP/DURLD
ACMcMurtray, NSIR/DPR/DDEP/LI
JEWhitten
EMGarcia
RLKellar
MHerrera
MS-B File

SUNSI Review Complete: EMG ADAMS: ■Yes □No Initials: EMG
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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00312
License No.:	DPR-54
Report No.:	050-00312/07-006
Licensee:	Sacramento Municipal Utility District
Facility:	Rancho Seco Nuclear Generating Station
Location:	14440 Twin Cities Road Herald, California
Dates:	December 10, 2007, through January 10, 2008
Inspector:	Emilio M. Garcia, Health Physicist Nuclear Materials Safety Branch B
Approved By:	Jack E. Whitten, Chief Nuclear Materials Safety Branch B
Attachments:	Supplemental Information Partial List of Documents Reviewed

Enclosure 1

EXECUTIVE SUMMARY

Rancho Seco Nuclear Generating Station
NRC Inspection Report 050-00312/07-006

This inspection was a routine, announced inspection of decommissioning activities being conducted at the Rancho Seco Nuclear Generating Station. Areas inspected included organization, management and cost controls, safety reviews, design changes, and modifications; decommissioning performance; occupational radiation exposure; and final surveys.

Organization, Management and Cost Controls

- All managerial positions were staffed with experienced individuals familiar with their job responsibilities and the existing organization was consistent with that described in the Rancho Seco Quality Manual (Section 1.1).

- The licensee had maintained their program for plant personnel to identify safety concerns (Section 1.2).

Safety Reviews, Design Changes, and Modifications

- Safety evaluations were conducted in accordance with the licensee's procedures and applicable regulations. Training conducted by the licensee of the safety screen reviewers, and Commitment Management Review Group (CMRG) members and its alternates, met applicable requirements (Section 2).

Decommissioning Performance and Status Review

- The licensee continued to dismantle and remove contaminated components and to remediate contaminated surfaces in a safe manner. Approximately 16.5 million pounds of concrete and steel from the reactor building had been shipped offsite to a low level radioactive waste disposal site. Final status surveys had been completed on 177 of 294 survey units (Section 3).

Occupational Radiation Exposure

- The inspector concluded that the licensee had an acceptable method to evaluate tools and equipment for contamination before being released for unrestricted use (Section 4).

Inspection of Final Surveys

- Confirmatory measurements on selected surfaces of the auxiliary building were conducted by the Oak Ridge Institute for Science and Education (ORISE) staff. Two soil samples were collected from the wetland area outside of the industrial area and near the effluent stream and sent offsite for analysis. Two discrete particles were identified by ORISE staff while taking confirmatory surveys. One particle was located in the waste gas decay tank room and the second particle was located in the soil at a

location in an area where the regenerate hold up tank and the auxiliary boiler room were previously located. The licensee, after becoming aware of the existence of these discrete particles, opened a potential deviation from quality report to evaluate the unexpected contamination uncovered in areas that had undergone final status surveys. The results of the ORISE surveys conducted during this inspection will be reported at a later date (Section 5).

- The results of survey activities conducted by ORISE during the October 15 through 18, 2007, site inspection were documented on a report issued on December 21, 2007, with a copy attached as Enclosure 2. The ORISE surveys confirmed the accuracy of the licensee's final status survey results for the locations surveyed (Section 5).

Report Details

Summary of Facility Status

The Rancho Seco Nuclear Generating Station was permanently shut down in June 1989. All spent reactor fuel has been moved to an onsite Independent Spent Fuel Storage Installation (ISFSI). At the time of this inspection, the licensee was conducting decommissioning under the provisions of the incremental decommissioning option of Rancho Seco's Post Shutdown Decommissioning Activities Report dated March 20, 1997.

Decommissioning work activities included the auxiliary building, reactor building, spent fuel building and exterior areas. All major components and equipment had been removed, packaged and shipped offsite for disposal. In the auxiliary building, remediation and final status surveys continued. In the reactor building, the concrete and steel removal project was under way with approximately 25 million pounds of the concrete and steel being brought down from its original location pending processing and disposal. In the fuel handling building, the vertical walls were being remediated with ¼ to 4 inches of the surface being removed. Approximately 60 percent of survey units had been completed.

1 Organization, Management and Cost Controls (IP 36801)

1.1 Organization

a. Inspection Scope

The inspector compared the licensee's organizational structure against the requirements of the Rancho Seco Quality Manual (RSQM), Section I, Organization.

b. Observations and Findings

The licensee's organization remained as previously described in Inspection Report Number 050-00312/2007-003, performed August 13 through 16, 2007. The RSQM, Section I, Organization, was last revised on April 19, 2007. Procedure RSAP 0101, "Nuclear Organization Responsibilities and Authorities," was last revised by the licensee on January 2, 2007. The licensee's organizational structure was determined to be consistent with the organization described in the RSQM.

The Defueled Safety Analysis Report (DSAR), Section 6.1, and the ISFSI Safety Analysis Report (SAR), Volume 1, Section 9, also provide requirements for the organizational structure. During the previous inspection, the inspector identified that the organizational structure provided in the DSAR and ISFSI SAR were not up-to-date. The licensee plans to routinely update the DSAR and ISFSI SAR during calender year (CY) 2008.

At the time of this inspection, all of the managerial positions were staffed with experienced individuals, each having many years of service with the licensee. The managers interviewed by the inspector were familiar with their responsibilities.

c. Conclusion

All managerial positions were staffed with experienced individuals familiar with their job responsibilities and the existing organization was consistent with that described in the RSQM.

1.2 Employee Safety Concern Program

a. Inspection Scope

The inspector reviewed the licensee's employee safety concern program.

b. Observations and Findings

The employee safety concern program was part of the licensee's problem identification and resolution process described in Rancho Seco Administrative Procedure RSAP-1308, "Potential Deviation from Quality," also known as the PDQ process. The inspector selected three site personnel to interview regarding their knowledge of the PDQ process. These individuals indicated that they felt comfortable bringing safety concerns to their supervisors. All of the employees were aware that they could initiate the PDQ process or alternatively bring concerns to the NRC's attention. These individuals also confirmed they had received training on the safety concern program while working for the licensee.

As of December 10, 2007, a total of 19 PDQs had been opened in CY 2007. None of the issues raised in the PDQ process had been submitted anonymously. All of the PDQs had been reviewed by the Commitment Management Review Group (CMRG) and were either closed or being resolved.

c. Conclusion

The licensee had maintained their program for plant personnel to identify safety concerns, and personnel had received training on the safety problem identification and resolution concern program.

2 Safety Reviews, Design Changes, and Modifications (IP 37801)

2.1 Inspection Scope

The inspector reviewed selected 10 CFR 50.59 safety evaluations conducted since the previous inspection of this program area.

2.2 Observations and Findings

The licensee had not conducted a design change to the facility since this area was last inspected on August 16, 2007. Three full 10 CFR 50.59 evaluations had been performed since the last inspection in this area. These evaluations included: Revision 2 to Decommissioning Survey Implementing Procedure DSIP-0120, FSS (Final Status

Survey) Data Processing and Reporting; Revision 3 to DSIP-0101, Final Status Survey Package Design and Preparation; and Revision 2 to DSIP-0310, Surface Soil, Subsurface Soil, and Other Bulk Media Sampling and Preparation. None of the reviews concluded that prior NRC approval was required prior to implementation of the change. Records of the CMRG meetings reviewed by the inspector indicated that these safety evaluation packages had been reviewed, discussed, and unanimously approved by the CMRG. Records maintained by the licensee indicated that CMRG members and alternates had been trained as qualified 10 CFR 50.59 reviewers.

The inspector reviewed the safety screening packages for the 3 procedure revisions that did not require a full safety evaluation. The packages were complete and had been reviewed in accordance with 10 CFR 50.59 requirements. The packages were signed by both a qualified reviewer and a second level reviewer. All reviewers were on the list of qualified reviewers that was maintained by the licensee. Training records reviewed indicated that they had successfully completed initial training as a 10 CFR 50.59 reviewer or they had received refresher training within the last 12 months.

2.3 Conclusion

Safety evaluations were conducted in accordance with the licensee's procedures and applicable regulations. Training of safety screen reviewers, and CMRG members and alternates, met applicable requirements.

3 Decommissioning Performance and Status Review (IP 71801)

3.1 Inspection Scope

The inspector interviewed cognizant personnel, reviewed selected documents, and toured portions of the site to observe work activities. The work activities observed included housekeeping, safety practices, fire loading, and radiological controls.

3.2 Observations and Findings

The inspector conducted tours of the auxiliary, fuel handling, turbine, and reactor buildings and observed dismantlement and decommissioning activities in progress. Decommissioning work activities observed by the inspector during the tour was conducted in a safe and orderly manner. The inspector conducted independent radiological surveys using a Ludlum Model 2401-EC survey meter (NRC No. 21175G, calibration due date July 10, 2008). Radiological controls implemented by the licensee, including postings and barriers, were observed to be in place. Good housekeeping and fire protection practices were implemented by the licensee in the areas toured by the inspector.

The licensee's reactor building concrete and steel removal project was in progress. As of December 8, 2007, approximately 25.0 million pounds of concrete and steel had been removed by the contractor. Approximately 17.7 million pounds had been packaged for shipment and 16.5 million pounds shipped to a low level radioactive waste disposal site. The licensee estimated that an additional 11 million pounds remained on site to be

demolished. This decommissioning project continues with the licensee and contractor's staff working two 10-hour shifts, Monday through Friday. As of December 13, 2007, 17 of the 35 rail shipments of concrete and steel originating from the reactor building that were planned by the licensee had occurred. When question by the inspector about the status of the reactor building concrete and steel removal project, the licensee indicated the project was expected to be completed by mid-May 2008. The licensee's schedule anticipates the last of the final status surveys will be completed by the end of September 2008 and the last final status survey report will be submitted to the NRC by the end of October 2008.

In the fuel handling building, remediation continued with the licensee removing from ¼ to 4 inches of contaminated concrete from the wall surfaces. During the onsite inspection, the licensee projected that it would complete remediation of the fuel handling building by December 21, 2007.

The licensee continued to remediate areas and to complete final status surveys in the lower levels of the auxiliary building. The Dismantlement Superintendent-Operations projected that remediation work would be completed in the auxiliary building by the end of the first calender quarter of 2008. As of December 7, 2007, final status surveys in 177 of the 294 designated survey units had been completed. The final status survey data was collected by the licensee, required investigations of survey units were completed, and the data was evaluated. At the time of this inspection, the database validation effort was ongoing. The licensee submitted 51 final status surveys to the NRC. The first set was provided on November 19, 2007, shortly before the License Termination Plan (LTP) was approved on November 27, 2007.

At the time of this inspection, concrete removal packaging and disposal from the South and North waste water basins had been completed by the licensee and the area filled, contoured, and planted with grass.

3.3 Conclusion

The licensee continued to dismantle and remove contaminated components and to remediate contaminated surfaces in a safe manner. Approximately 16.5 million pounds of concrete and steel from the reactor building had been shipped to a low level radioactive waste disposal site. Final status surveys had been completed on 177 of 294 survey units.

4 Occupational Radiation Exposure (IP 83750)

4.1 Inspection Scope

The inspector reviewed the licensee's method for surveying equipment for contamination prior to being released for unrestricted use.

4.2 Observations and Findings

Radiation Control Manual procedure RP.305.09A, Removal of Tools and Equipment from Controlled Areas, was used by the licensee for evaluating materials to be released for unrestricted used. The inspector reviewed a spreadsheet maintained by the licensee of surveys documented. The licensee provided the inspector with a printout of the list of surveys conducted for free release of materials. In CY 2007 as of the December 13, 2007, the spreadsheet identified 74 surveys that were noted as "release" surveys. Some items listed on the printout had multiples surveys. These free release surveys included large area swipes, direct frisking, and as-needed inaccessible surface contamination evaluations. Photographs of areas surveyed were often included in the survey records.

The inspector reviewed the records for free release surveys on a man-lift, a bob cat, a front end loader, a C-van, a welder, and an excavator. No problems were identified with any of these survey records. A detailed reviewed of the free release survey records for the excavator is noted below.

The inspector reviewed the unrestricted use release survey records for a John Deere 120C excavator number 634090 that was surveyed for contamination during the period of August 16 through 23, 2007. Survey records indicated that this excavator had been used in the spent fuel building remediation project. Survey records also identified three technicians who had performed parts of the decontamination and release surveys. The survey records noted that the John Deere excavator had been used for remediation activities in the spent fuel building (walls and floors) and these areas had contamination levels ranging up to 10,000 disintegrations per minute per 100 centimeters square. The surveys on the excavator were performed by the technicians using large area swipes and direct frisking with a survey instrument. Records reviewed by the inspector included the survey instruments used in conducting the release surveys. The inspector confirmed the survey instruments used by the licensee were not due for calibration. While conducting the release surveys, contamination was found by the technicians on the cab and portions of the tracks of the excavator. The records indicated that the contamination was removed from the excavator, and these areas were re-surveyed following decontamination and found to be not detectable from background. The excavator was released for unrestricted use to the rental company.

To evaluate for contamination on inaccessible surfaces on the excavator, the hydraulic oil was sampled and analyzed for contamination. Additionally, the radiator and air filter on the excavator's engine were directly frisked using a radiation survey instrument. No contamination was found in the hydraulic oil, radiator, or air filter.

4.3 Conclusion

The inspector concluded that the licensee had an acceptable method to evaluate tools and equipment for release for unrestricted use.

5 Inspection of Final Surveys (IP 83801)

5.1 Inspection Scope

Independent confirmatory radiological measurements were performed by ORISE on imbedded piping and on surfaces of the auxiliary building. Two soil samples were collected from the wetland area outside the industrial area and near the effluent stream.

5.2 Observations and Findings

On April 12, 2006, the licensee submitted their LTP to the NRC. This LTP included proposed Derived Concentration Guide Lines (DCGLs) for meeting the public dose limits after license termination. On November 27, 2007, the NRC issued License Amendment Number 133 that approved the licensee's LTP and the respective DCGLs.

Representatives from ORISE, working as the NRC's contractor, reviewed records of final status surveys taken on imbedded piping and on surfaces in the auxiliary building. At the NRC's request, ORISE personnel conducted independent confirmatory radiological measurements of selected locations and compared their survey results with the licensee. In addition, ORISE collected two soil samples from the wetland area outside of the industrial area and near the effluent stream. These samples will be analyzed at the ORISE laboratory and the results of these surveys will be reported to the licensee at a later date under separate correspondence.

On December 12, 2007, while conducting confirmatory surveys in Room 18, the waste gas decay tank room located at the minus 20 feet elevation of the auxiliary building, ORISE personnel identified a small particle (approximately 4 millimeters in size) with elevated radiation levels. However, the licensee, when conducting its release surveys, had not previously identified the small particle. The licensee had remediated this room and subsequently performed its FSS without identifying the small particle. It was not clear to the licensee at the time of the inspection how the contaminated particle came to be located in this room. In response, the licensee opened Radiological Protection Occurrence Report number 07-06.

On December 13, 2007, while preparing to collect a soil sample near where the regenerate hold-up tank and auxiliary boiler room were previously located, ORISE personnel identified a second small particle with elevated radiation levels. The licensee immediately collected a soil sample from this location and analyzed it by gamma spectroscopy. This analysis of the soil collected by the licensee identified the principal radionuclide as cobalt-60.

Section 3.3.5 of the Rancho Seco LTP states, in part, "...upon completion of FSS, the area is placed under periodic routine survey by Radiation Protection to ensure no re-contamination occurs. If re-contamination is identified, an investigation will be initiated that would result in corrective actions up to and including re-performance of the FSS for that area." In response to ORISE identifying the small particle in the auxiliary building, the licensee opened PDQ report 07-020.

On October 18, 2007, during the previous inspection, a representative from ORISE collected a soil sample from the West end of the retention basins near the mixing box. At the request of the NRC inspector, the soil sample collected consisted mostly of compacted clay soils. The inspector, in assessing the licensee's procedures for collecting soil samples, interviewed two Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) trained radiation protection technicians. The technicians, when interviewed about the techniques they used in collecting soil samples, stated that if a clump of soil would not pass through their sieve they would survey the clump. If no radiation was detectable, the clump would then be discarded. However, both technicians stated that neither had ever encountered a clump of soil that they could not break up and put through the sieve.

The licensee was informed by the inspector of the technicians' understanding of soil sampling techniques, specifically, the rejection of portions of soil samples described above. The licensee, upon being informed about the potential rejection of portions of a soil sample materials by the technicians, opened a PDQ report to identify and correct any potential problems associated with the licensee's soil sampling process. The licensee's PDQ report concluded that MARSSIM trained radiation protection technicians currently performing soil sampling had not been excluding compacted clay soils from the samples. However, to clarify that any part of the soil sample should not be rejected, the licensee took additional corrective actions. The applicable procedure DSIP-0310, Surface Soil, Subsurface Soil, and Other Bulk Media Sampling and Preparation, was revised by the licensee to include the statement that soil samples including consolidated, hardpan, and clayey soils must include any resultant clods or clumps from the location were the soil sample is taken. The revised procedure also clarified the licensee's expectations that if the soil sample is field sieved, the soil pieces remaining in the sieve must be included in the sample. If unusual soils or soil conditions are encountered, the technician is required to notify the Final Status Survey Engineer or the Field Oversight Engineer. The inspector reviewed the previous revision of this procedure and noted that it had been silent on how to deal with consolidated, hardpan, and clayey soils.

The licensee, following the update the procedure DSIP-0310, provided training to all the MARSSIM trained radiation protection technicians currently performing soil sampling. Additional training was provided to the technician preparing the soil samples for analysis. The training focused on the specific requirement to contact the Final Status Survey Engineer or the Field Oversight Engineer should a problem be encountered when preparing soil samples. This training on the updated procedure was also provided to the Final Status Survey Engineer for continuity.

During the inspection, the inspector identified weaknesses both in the training of the licensee's two MARSSIM radiation protection technicians and the lack of specificity in the original DSIP-0310 procedure for handling consolidated spoils, hardpan, and clayey soils. However, based on the review of the licensee's decommissioning records and interviews with the technicians, the inspector concluded that there were no problems with the methods that had been used by the licensee in collecting soil samples since no soils were ever rejected from samples. Consequently, the inspector determined that the soil samples taken by the technicians interviewed were representative of the soils

present in areas sampled and included consolidated soils, hardpan, and clayey soils, and at no time were any materials (clumps or clods) rejected because they would not pass through the field sieve.

At the time of this inspection, the licensee had collected and analyzed a total of 50 final status soil samples in the North and South retention basins. Also the licensee had gamma scanned the entire area of the North and South retention basins and collected 49 In-Situ Object Counting System (ISOCS) gamma nuclide identification surveys. None of the surveys taken by the licensee identified residual radioactivity in excess of the DCGLs authorized in the licensee's LTP.

During October 15 through 18, 2007, staff from ORISE performed confirmatory surveys activities on selected rooms in the Auxiliary Building and Turbine Building on the embedded piping. Surveys taken by ORISE of the Turbine Building drains did not identify any areas of elevated radiation levels above the applicable DCGLs. Personnel from ORISE also collected a soil sample in the area of the Lower Mixing Box in the retention basin. The sample was analyzed by ORISE and found to be well below the respective single radionuclide DCGLs and met the soil release criteria. The results of these survey activities were documented in a report issued by ORISE on December 21, 2007. A copy of that report is attached.

The ORISE report also notes that their staff had identified small areas where beta activity was present above the DCGLs. The report also confirms that these areas of elevated beta activity had also been previously identified by the licensee in its FSSs. The ORISE report noted that the preliminary licensee FSS packages had identified the location of the elevated beta readings and concluded that the survey units were acceptable. The licensee determined acceptability of the areas with elevated beta readings by evaluating the survey unit using the determined DCGL for elevated measurement comparison. The ORISE surveys confirm the licensee measurements and techniques were correct in identifying these potentially contaminated areas. Consequently, the licensee's requisite actions for addressing the elevated readings were consistent with MARSSIM procedures.

5.3 Conclusion

Confirmatory measurements on selected surfaces of the auxiliary building were conducted by the ORISE staff. Two soil samples were collected from the wetland area outside of the industrial area and near the effluent stream and sent offsite for analysis. Two discrete particles were identified by ORISE staff during their surveys. One particle was located in the waste gas decay tank room. The second particle was located in the soil at a location in an area where the regenerate hold up tank and the auxiliary boiler room were previously located. The licensee opened a PDQ report to evaluate the unexpected contamination discovered in areas that had undergone final status surveys. The results of the ORISE surveys conducted during this inspection will be reported at a later date.

The results of survey activities conducted by ORISE staff during October 15 through 18, 2007, inspection were documented in a report issued on December 21, 2007. A copy of that report is attached. The ORISE surveys confirmed the accuracy of the licensee's final status surveys for the locations surveyed.

6 Exit Meeting Summary

The inspector presented the inspection results to the acting plant manager and other members of the licensee's staff on December 13, 2007. Subsequent to the site inspection additional information was requested by the inspector and reviewed at the office. A subsequent telephonic exit interview was conducted on January 10, 2008. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Sacramento Municipal Utility District

M. Bua, Radiation Protection/Chemistry Superintendent
L. Edwards, Senior Radiation Protection Technician
J. Field, Superintendent Engineer, Acting Plant Manager
C. Harris, Senior Radiation Protection Technician
W. Hawley, Dismantlement Superintendent - Operations
L. Hoist, Nuclear Document Control Supervisor
R. Jones, Supervising Quality Engineer
M. Murdock, Radiological Engineer
G. Pillsbury, Lead Radiological Engineer
S. Redeker, Manager, Nuclear Plant Closure and Decommissioning (Plant Manager)
E. Ronningen, Dismantlement Superintendent - Radiological
M. Snyder, Principal Decommissioning Radiological Engineer

INSPECTION PROCEDURES USED

IP 36801	Organization, Management and Cost Controls
IP 37801	Safety Reviews, Design Changes, and Modifications
IP 71801	Decommissioning Performance and Status Review
IP 83750	Occupational Radiation Exposure
IP 83801	Inspections of Final Surveys

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

CY	calender year
CFR	Code of Federal Regulations
CMRG	Commitment Management Review Group
DCGLs	Derived Concentration Guide Lines
DSAR	Defueled Safety Analysis Report
DSIP	Decommissioning Survey Implementing Procedure +
FSS	Final Status Survey
IP	Inspection Procedure
ISFSI	Independent Spent Fuel Storage Installation
ISOCS	In-Situ Object Counting System
LTP	License Termination Plan
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
ORISE	Oak Ridge Institute for Science and Education
PDQ	Potential Deviation from Quality
RP	Radiation Protection
RSAP	Rancho Seco Administrative Procedure
RSQM	Rancho Seco Quality Manual
SAR	Safety Analysis Report

PARTIAL LIST OF DOCUMENTS REVIEWED

Correspondences and Memorandums

- MPC&D 07-005, CMRG Membership, from Plant Manager to CMRG Members and Alternates, dated January 31, 2007
- NQA 07-038, Qualified Reviewer List, from Supervising Quality Engineer to Qualified Reviewers, dated August 9, 2007
- MPC&D 07-067, List of Procedures that Require a Safety Evaluation, Revision 9, dated August 6, 2007

Data Sheets

- PDQ Log as of December 10, 2007
- 10 CFR 50.59/72.48/71.107(c) Screening and Evaluation, DSIP-0120, FSS Data Processing and Reporting, Revision 2, CMRG approved December 5, 2007
- 10 CFR 50.59/72.48/71.107(c) Screening and Evaluation, DSIP-0101, Final Status Survey Package Design and Preparation, Revision 3, CMRG approved December 5, 2007
- 10 CFR 50.59/72.48/71.107(c) Screening and Evaluation, DSIP-0310 Surface Soil, Subsurface Soil, and Other Bulk Media Sampling and Preparation Revision 2, CMRG approved December 5, 2007
- Computer report of procedures revised during the period of August 1, 2007 to December 10, 2007
- Training Information Management System report of individuals successfully completing course ST01N0100, 50.59 Training as of December 12, 2007
- Inaccessible Surfaces Contamination Evaluation 07-003, John Deere 120C Excavator # 634090, August 23, 2007
- Radiation Survey Records spreadsheet, "SurvLog" printout sorted for "Release" and "2007", December 13, 2007
- Radiation Survey Record S2007-01953, August 17, 2007
- Radiation Survey Record S2007-01988, August 21, 2007
- Radiation Survey Record S2007-02018, August 23, 2007
- Radiation Survey Record S2007-02044, August 22, 2007

- Gamma Spectroscopy Report Sample ID J.D. 120 oil, August 16, 2007

Meeting Minutes

- CMRG Meeting Held on August 20, 2007, NQA 07-039
- CMRG Meeting Held on October 24, 2007, NQA 07-046
- CMRG Meeting Held on December 5, 2007, NQA 07-049

Procedures

- Rancho Seco Administrative Procedure RSAP-0101, Nuclear Organization Responsibilities and Authorities, Revision 31, effective January 2, 2007
- Rancho Seco Administrative Procedure RSAP-1308, Potential Deviation from Quality, Revision 17, effective February 13, 2003
- Rancho Seco Quality Manual, RSQM-Section I, Organization, Revision 13, effective April 19, 2007
- Radiation Control Manual procedure RP.305.09A, Removal of Tools and Equipment from Controlled Areas
- Decommissioning Survey Implementing Procedure DSIP-0120, FSS Data Processing and Reporting, Revision 2, effective December 6, 2007
- Decommissioning Survey Implementing Procedure DSIP-0101, Final Status Survey Package Design and Preparation, Revision 3, effective December 6, 2007
- Decommissioning Survey Implementing Procedure DSIP-0310 Surface Soil, Subsurface Soil, and Other Bulk Media Sampling and Preparation, Revision 2, effective December 6, 2007

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 21, 2007

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: 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 (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 23 to 25 and Rooms 43 through 49) and Turbine Building embedded piping at the Rancho Seco Nuclear Generating Station in Herald, California on October 15 through 18, 2007. These survey activities were requested and approved by the U.S. Nuclear Regulatory Commission (NRC). Enclosed are the confirmatory survey results documenting these survey activities. The surveys included beta and gamma surface scans and direct measurements for total net beta activity within the Auxiliary Building; embedded piping beta-gamma or gamma scans and gross beta activity measurements within the Turbine Building; and limited gamma scans and the collection of a soil sample adjacent to the Lower Mixing Box in the southeastern corner of the facility. This revision incorporates changes to figures that indicated the wrong north direction (Figures 13 and 14), corrects some road and building information on the overview figures (Figures 1 and 2) and changes the statement concerning the status of the license termination plan (LTP) from in review to having been approved by the NRC.

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

Sincerely,

Wade C. Adams
ORISE Health Physicist/Project Leader
Survey Projects

WCA:km

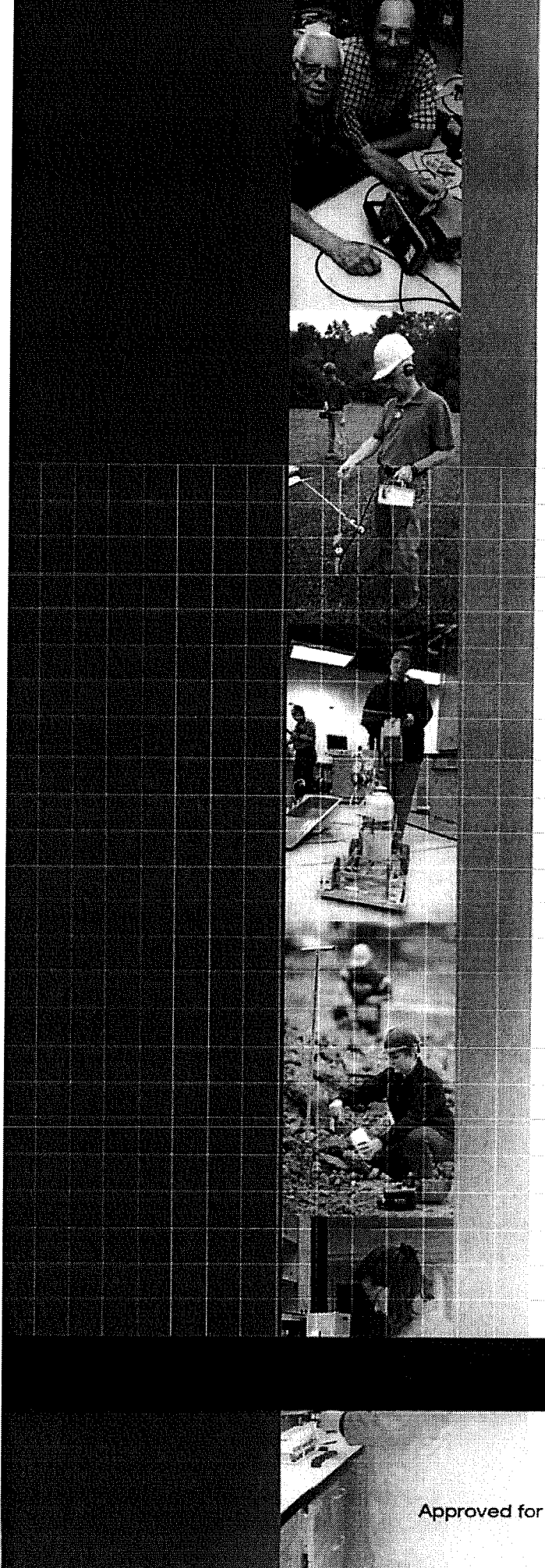
Enclosure

c: T. Carter, NRC/FSME/DWMEP/DD/SP T-8F5
E. Knox-Davin, NRC/FSME/TWFN 8A23
E. Garcia, NRC/Region IV
E. Bailey, ORISE
E. Abelquist, ORISE
S. Roberts, ORISE
W. Riley, ORISE
File 1695

P. O. Box 117
Oak Ridge, TN 37831

Voice: 865.576.0065 Fax: 865.241.3497 E-mail: Wade.Adams@orau.org

ENCLOSURE 2



REVISED—CONFIRMATORY SURVEY REPORT FOR PORTIONS OF THE AUXILIARY BUILDING STRUCTURAL SURFACES AND TURBINE BUILDING EMBEDDED PIPING

RANCHO SECO NUCLEAR GENERATING STATION, HERALD, CALIFORNIA

W. C. Adams

Prepared for the
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission

ORISE
Oak Ridge Institute for Science and Education

The Oak Ridge Institute for Science and Education (ORISE) is a U.S. Department of Energy facility focusing on scientific initiatives to research health risks from occupational hazards, assess environmental cleanup, respond to radiation medical emergencies, support national security and emergency preparedness, and educate the next generation of scientists. ORISE is managed by Oak Ridge Associated Universities. Established in 1946, ORAU is a consortium of 96 colleges and universities.

NOTICES

The opinions expressed herein do not necessarily reflect the opinions of the sponsoring institutions of Oak Ridge Associated Universities.

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Prepared by
W. C. Adams

Oak Ridge Institute for Science and Education
Oak Ridge, Tennessee 37831-0017

Prepared for the
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission

DECEMBER 2007

This report is based on work performed under an Interagency Agreement (NRC Fin. No. F-1008) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. The Oak Ridge Institute for Science and Education performs complementary work under a contract with the U.S. Department of Energy.

REVISED—CONFIRMATORY SURVEY REPORT FOR PORTIONS OF THE AUXILIARY BUILDING STRUCTURAL SURFACES AND TURBINE BUILDING EMBEDDED PIPING RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

Prepared by: _____ Date: 12/21/2007
W. C. Adams, Project Leader
Independent Environmental Assessment and Verification

Reviewed by: _____ Date: 12/21/07
S. J. Roberts, Survey Projects Manager
Independent Environmental Assessment and Verification

Reviewed by: _____ Date: 12/21/07
R. D. Condra, Laboratory Manager
Independent Environmental Assessment and Verification

Reviewed by: _____ Date: 12/21/07
A. T. Payne, Quality Manager
Independent Environmental Assessment and Verification

REVISED—CONFIRMATORY SURVEY REPORT FOR PORTIONS OF THE AUXILIARY BUILDING STRUCTURAL SURFACES AND TURBINE BUILDING EMBEDDED PIPING RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

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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).

RSNGS was a 913-MWe pressurized water reactor (PWR) designed by Bechtel Power Corporation. The plant incorporated a pressurized water type nuclear steam supply system (NSSS) supplied by Babcock and Wilcox Company; a turbine generator and electrical systems; engineered safety features; radioactive waste systems; fuel handling systems; instrumentation and control systems; the necessary auxiliaries; and structures to house plant systems and other onsite facilities.

Due to a public vote the previous day, on June 7, 1989, RSNGS permanently shut down after approximately 14 years of operation. On August 29, 1989, SMUD formally notified the NRC of the permanent cessation of operations at the RSNGS. SMUD submitted the Post Shutdown Decommissioning Activities Report (PSDAR), in accordance with 10 CFR 50.82 (a) (4), in March 1997. 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 Oak Ridge Institute for Science and Education (ORISE) perform confirmatory surveys of structural surfaces in the Auxiliary Building and embedded piping in the Turbine 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 a soil sample adjacent to the Lower Mixing Box in the southeast corner of the site grounds. The confirmatory surveys were performed on October 15 through 18, 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 ORISE Survey Procedures and Quality Program Manuals (ORISE 2007b and ORAU 2007).

ORISE judgmentally selected ten Auxiliary Building rooms (Figures 3 through 12) and twelve Turbine Building embedded pipes (Figures 13 and 14) for confirmatory surveys based upon preliminary FSS results. At the request of the NRC site representative, ORISE performed limited

radiological surveys of the clay soils adjacent to the Lower Mixing Box in the southeastern portion of the site grounds.

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.

Turbine Building Embedded Piping

ORISE performed 100 percent beta-gamma radiation scans of approximately 44 horizontal linear feet of the 4" internal diameter (ID) of Turbine Building Drain (TBD) 3-1-27 embedded pipe using the ORISE-designed GM detector pipe monitor array.

Limited gamma scans were performed in eleven vertical (drop down) 4" inner diameter (ID) embedded pipes and conduits at various locations on the ground level as well as the +40 foot level elevations using a cesium iodide, thallium-activated [CsI(Tl)] gamma scintillation detector coupled to a ratemeter with an audible indicator. ORISE performed surveys in the conduits at the request of the NRC site representative and used the collected data as background gamma scan ranges for embedded piping.

Lower Mixing Box Soil

Gamma scans of the clay soils adjacent to the Lower Mixing Box were performed using a NaI(Tl) gamma scintillation detector coupled to a ratemeter with an audible indicator.

SURFACE ACTIVITY MEASUREMENTS

Auxiliary Building Structural Surfaces

Based on beta and gamma surface scan results, direct measurements for beta activity were performed at 57 judgmentally-selected locations on the evaluated structural surfaces which were available for confirmatory survey activities. Direct measurements locations are indicated on Figures 3 through 12.

Surface Activity Data Comparison

ORISE performed direct beta measurements at five SMUD direct measurement locations in Room 25 for direct measurement data comparison (Figure 5).

Turbine Building Embedded Piping

Direct measurements for beta-gamma activity were performed at 14 locations at approximately 1 meter (3.3 feet) intervals within TBD 3-1-27. The ORISE-designed pipe monitor array was equipped with three GM detectors spaced at 120° intervals and coupled individually to portable ratemeter-scalers. Measurement data were collected for each individual detector as well as totaled for the array. The location of TBD 3-1-27 is indicated on Figure 13.

ORISE performed gamma scans and recorded the gamma scan range for the remaining embedded piping surveys

SOIL SAMPLING

Lower Mixing Box

At the request of the NRC site representative, ORISE collected a clay soil sample adjacent to the Lower Mixing Box in the southeastern portion of the site grounds.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Radiological data and sample media were returned to the ORISE laboratory in Oak Ridge, TN for analysis and interpretation. Radioassays were performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2007c). The soil sample was 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). Direct measurements for total surface activity were converted to units of disintegrations per minute per 100 square centimeters (dpm/100 cm^2). Embedded piping scan data were reported in units of counts per minute (cpm).

FINDINGS AND RESULTS

SURFACE SCANS

Auxiliary Building Structural Surfaces

The scan percent coverage and room area classification are provided in Table 1. Beta surface scans determined that localized areas of residual elevated beta-gamma radiation were present on floor, lower wall and upper surfaces within the evaluated survey units. In general, the contamination was limited to small areas that were interspersed throughout the rooms.

Turbine Building Embedded Piping

Beta-gamma scans of TBD 3-1-27 did not detect beta-gamma radiation levels in excess of the embedded piping derived concentration guideline levels (DCGLs).

Gamma scans of the drop down 4" embedded pipes on the ground level and +40 level elevations did not detect gamma radiation levels in excess of the detector background as determined in the Turbine Building +40 level elevation east side conduits and Exciter conduits.

Lower Mixing Box

Gamma scans of the clay soils adjacent to the Lower Mixing Box did not detect any elevated gamma radiation levels.

SURFACE ACTIVITY LEVELS

Auxiliary Building Structural Surfaces

Beta surface activity measurements were performed at locations of residual elevated beta-gamma radiation determined during surface scans. Total net beta activity measurements ranged from 5,900 to 240,000 dpm/100 cm^2. Surface activity level results are presented in Table 2.

Surface Activity Data Comparison

ORISE surface activity levels for the comparison data set ranged from 2,000 to 5,000 dpm/100 cm^2; and the SMUD surface activity levels ranged from 2,500 to 4,300 dpm/100 cm^2. The data indicate that ORISE and SMUD surface activity levels collected from approximately the same locations are within 25% of the respective FSS and confirmatory survey values. The surface activity data comparison results are presented in Table 3.

Turbine Building Embedded Piping

Gross surface activity levels for TBD 3-1-27 are summarized in Table 4. The gross surface activity levels for each measurement location over the assessed area (168 cm^2) for the pipe monitor array ranged from 4,500 to 6,700 dpm/100 cm^2. ORISE did not subtract background activity from the gross surface activity due in part to the total activity levels within the pipe being well below the guideline levels.

Gamma scans of the drop down 4" embedded pipes did not detect significant gamma radiation levels in excess of the detector background as determined in Turbine Building conduits. For comparison, the CsI(Tl) detector background range for the conduits along the east side of the +40 level elevation was 200 to 800 cpm and the gamma radiation levels observed within the Turbine Building drains ranged from 200 to 1,600 cpm. The confirmatory gamma scan ranges are provided in Table 5.

SOIL SAMPLE

The radionuclide concentrations for the soil sample collected near the mixing box were 0.00 pCi/g for Co-60 and 0.03 pCi/g for Cs-137.

COMPARISON OF SURVEY RESULTS WITH GUIDELINES

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 survey units (SU) that were being evaluated.

STRUCTURAL SURFACE ACTIVITY LEVELS

SMUD used site-specific supplemental DCGLs for Co-60 and Cs-137 for determining surface release criteria. The applicable surface activity guidelines for the structural surfaces within specific rooms/survey units within the Auxiliary Building are provided in Table 6. These DCGLs were provided in the preliminary FSS data packages for each survey unit that was evaluated and were derived from the LTP and decommissioning technical basis documents (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 survey units. Twelve of the 57 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 survey unit, SMUD calculated Design and Actual DCGL elevated measurement comparison ($DCGL_{EMC}$) values which are also provided in Table 6. All confirmatory direct surface activity measurements on the Auxiliary Building structural surfaces in the evaluated SUs were within the site-specific survey unit $DCGL_{EMC}$ as provided by SMUD in the preliminary FSS data packages for each SU.

EMBEDDED PIPING

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).

Confirmatory survey data for the TBD 3-1-27 were compared with the site-specific DCGL for embedded piping. The results indicated that gross surface activity levels (i.e., assuming all detected activity attributed to ROCs) within the pipe were well below the DCGL. Gamma scans of the other evaluated Turbine Building drains did not detect gamma radiation levels in excess of the detector background.

SOIL SAMPLE

Table 6-5 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 Lower Mixing Box soil sample concentrations were well below the respective single radionuclide DCGLs.

SUMMARY

During the period of October 15 and 18, 2007, ORISE performed confirmatory radiological survey activities which included beta and gamma structural surface scans and beta activity direct measurements within the Auxiliary Building, beta or gamma scans within Turbine Building embedded piping, beta activity determinations within Turbine Building Drain 3-1-27, and gamma

scans and the collection of a soil sample from the clay soils adjacent to the Lower Mixing Box.

Beta and gamma surface scans identified several areas of elevated beta activity on the structural surfaces of the evaluated survey units with the Auxiliary Building. Additional investigation of these locations indicated that the majority of the elevated radiation levels were attributable to localized areas of residual beta-gamma radiation. In general, the contamination was limited to small areas that were interspersed throughout the rooms. Direct measurements were performed at 62 locations of which five locations were for direct measurement data comparison with the licensee's data. Several direct measurements exceeded the site-specific gross beta DCGL but all were within the $DCGL_{EMC}$ criteria. A review of the preliminary FSS data packaged indicated that SMUD personnel had also found the elevated residual radiation levels and had based their FSS data package release for those locations using the determined $DCGL_{EMC}$ values for those SUs. Therefore, the results of the confirmatory survey activities for the evaluated structural surfaces of the Auxiliary Building confirmed the radiological status of the evaluated areas as presented in the licensee's preliminary FSS data packages.

ORISE performed survey data comparisons on five RSNGS direct measurement locations within Auxiliary Building Room 25; the results indicated that SMUD's radiological survey data were consistent and in agreement with ORISE's direct measurement results.

Beta and gamma surface scans of the evaluated Turbine Building drains did not indicate any areas of elevated radiation levels; all scan results and direct measurement results within the embedded piping were less that the applicable DCGL of 100,000 dpm/100 cm^2.

The clay soil sample results from the Lower Mixing Box were below the individual radionuclide DCGLs and meet the soil release criteria.

FIGURES

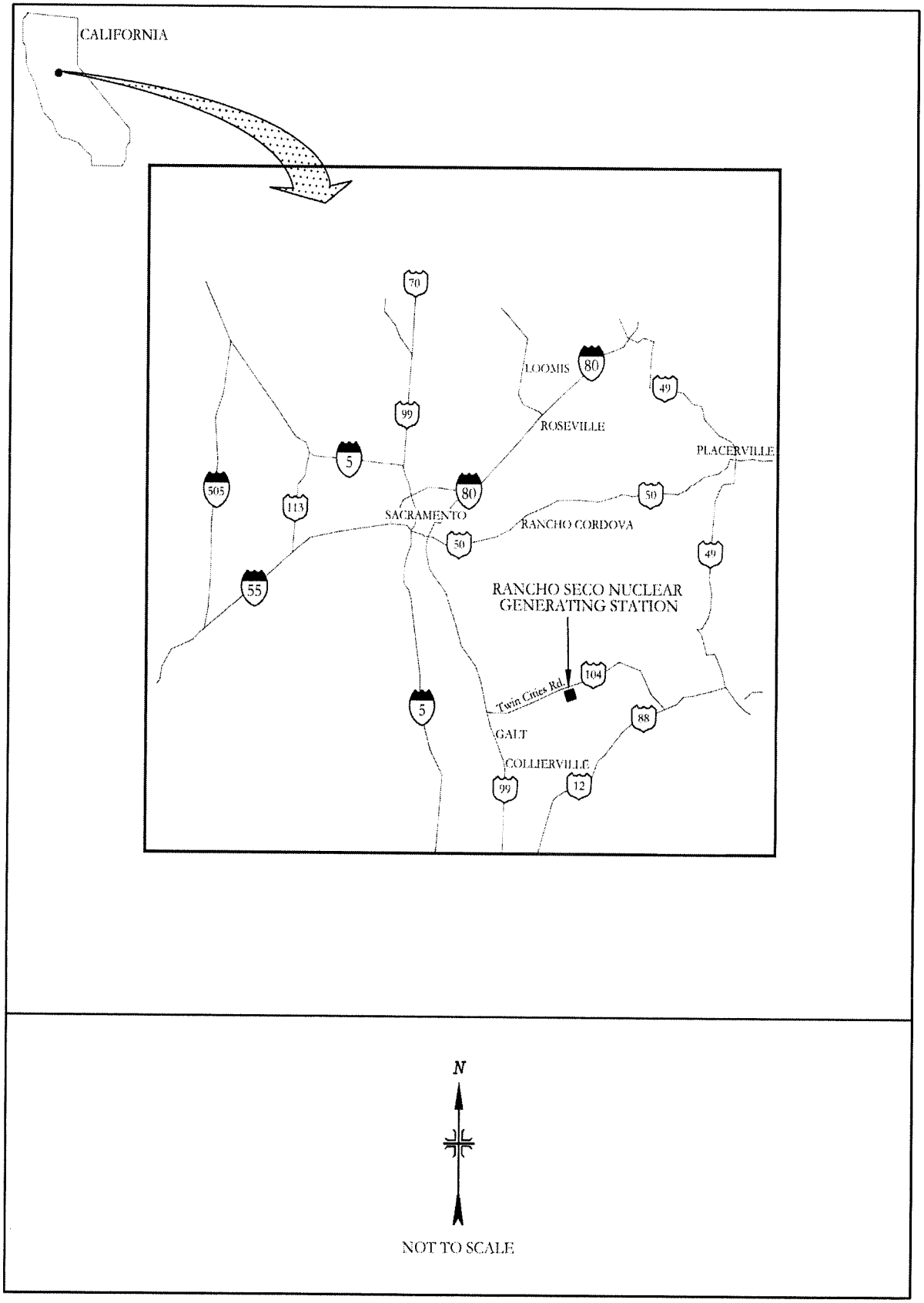


FIGURE 1: Location of Rancho Seco Nuclear Generating Station, Herald, California

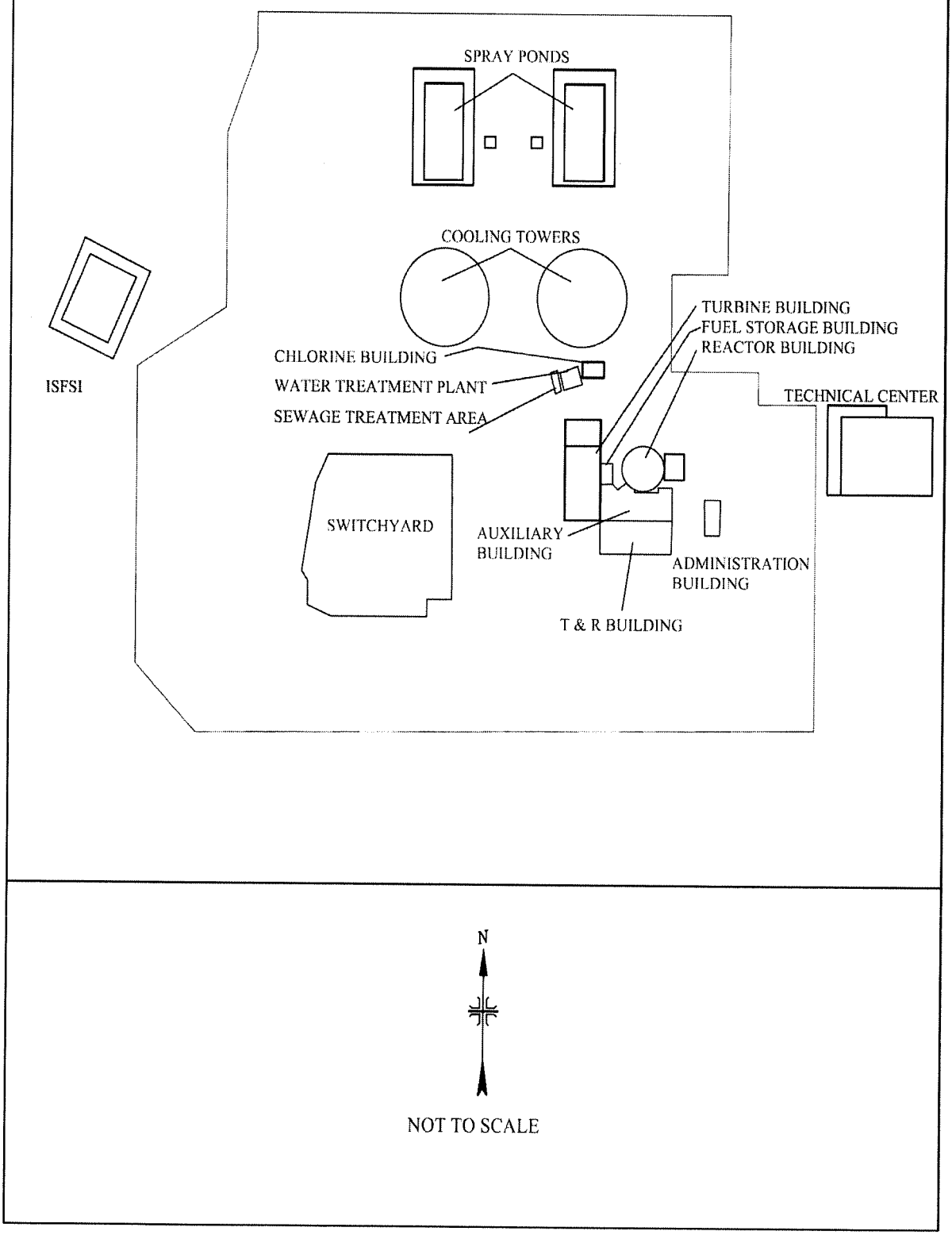
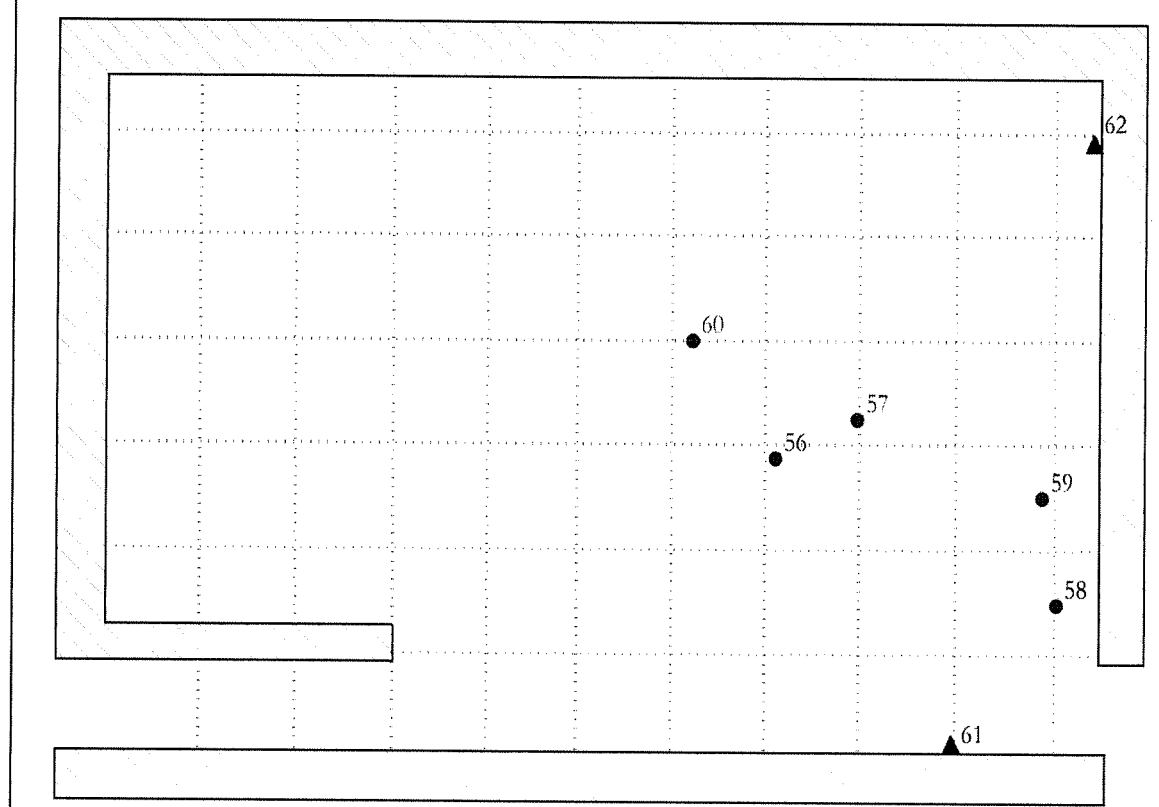


FIGURE 2: Plot Plan of the Industrial Area at Rancho Seco Nuclear Generating Station



MEASUREMENT/SAMPLING LOCATIONS

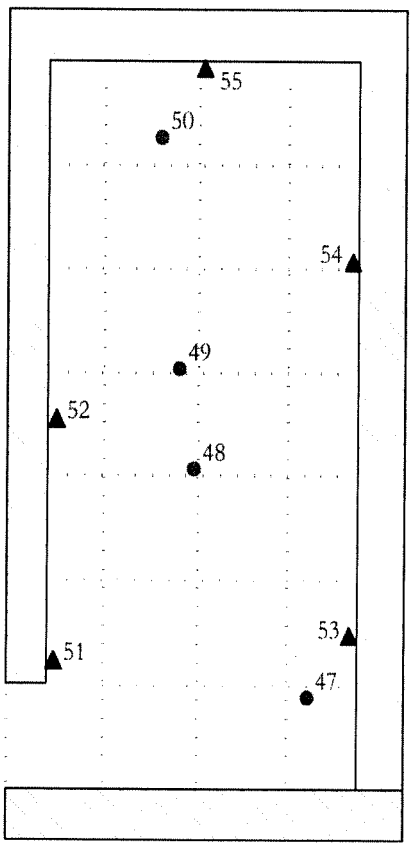
● # Single-Point, Floor

▲ # Single-Point, Lower Wall

N

NOT TO SCALE

FIGURE 3: Auxiliary Building, Room 23 - Direct Measurement Locations



MEASUREMENT/SAMPLING LOCATIONS

● # Single-Point, Floor

▲ # Single-Point, Lower Wall

N

NOT TO SCALE

FIGURE 4: Auxiliary Building, Room 24 - Direct Measurement Locations

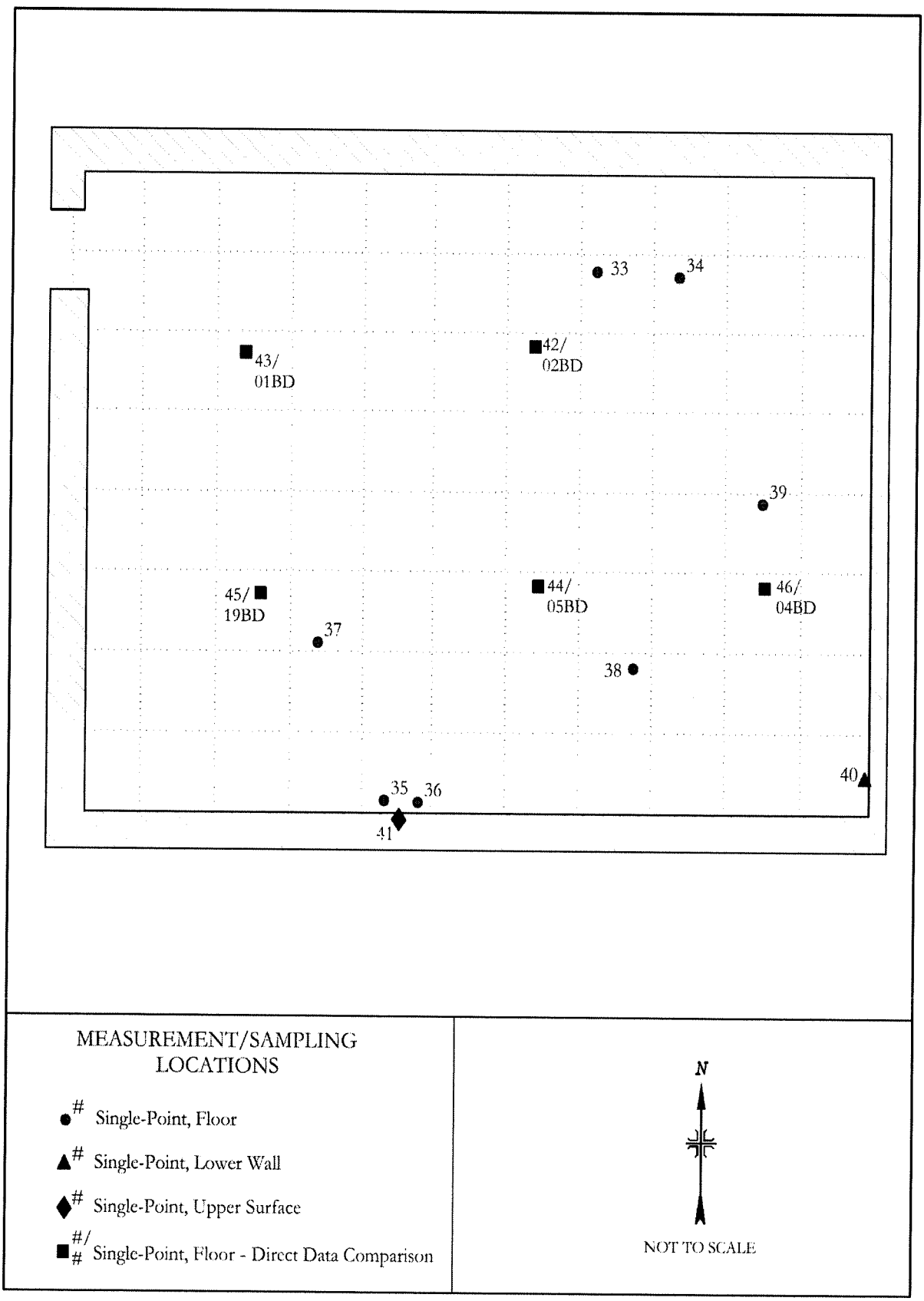


FIGURE 5: Auxiliary Building, Room 25 - Direct Measurement Locations

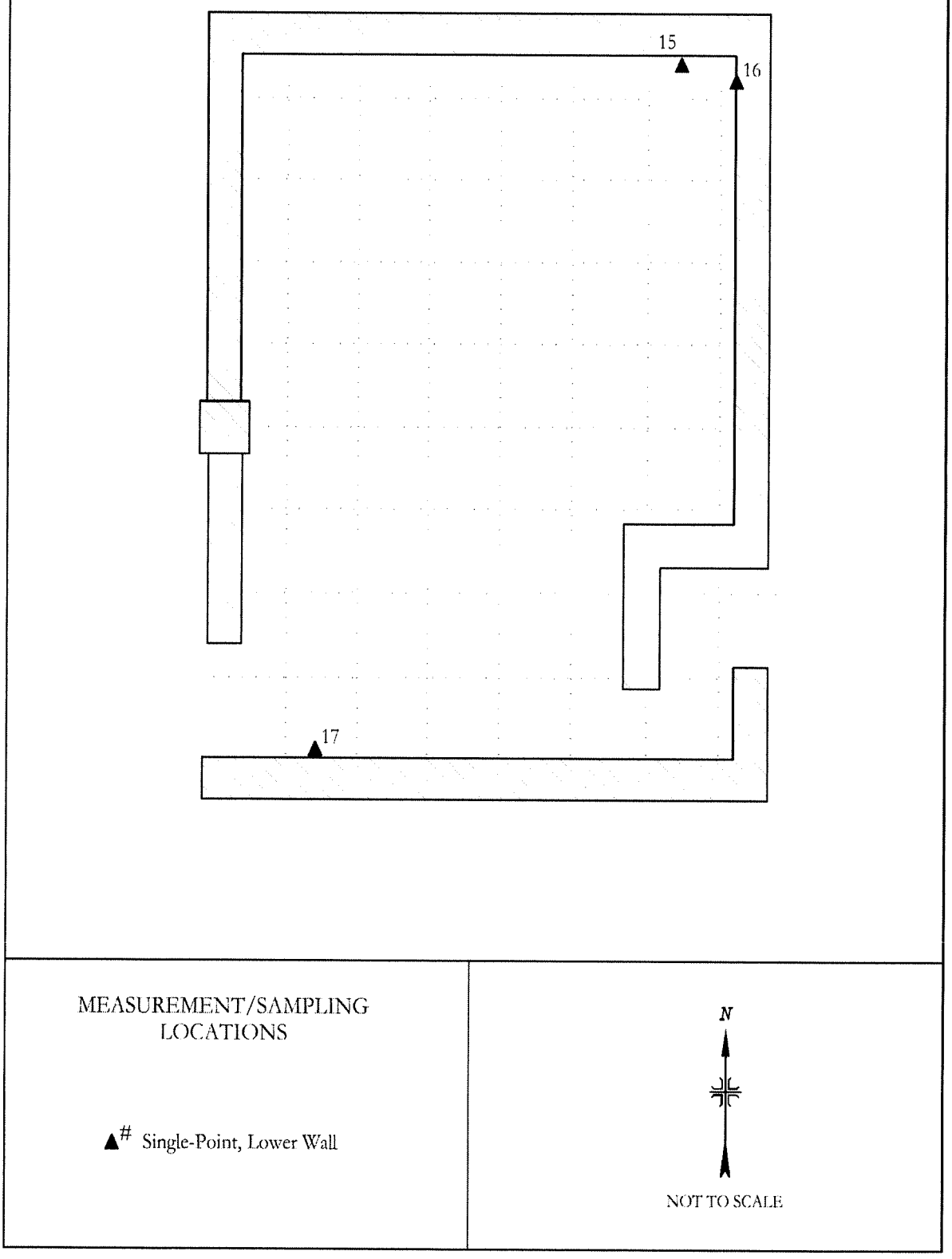


FIGURE 6: Auxiliary Building, Room 43 - Direct Measurement Locations

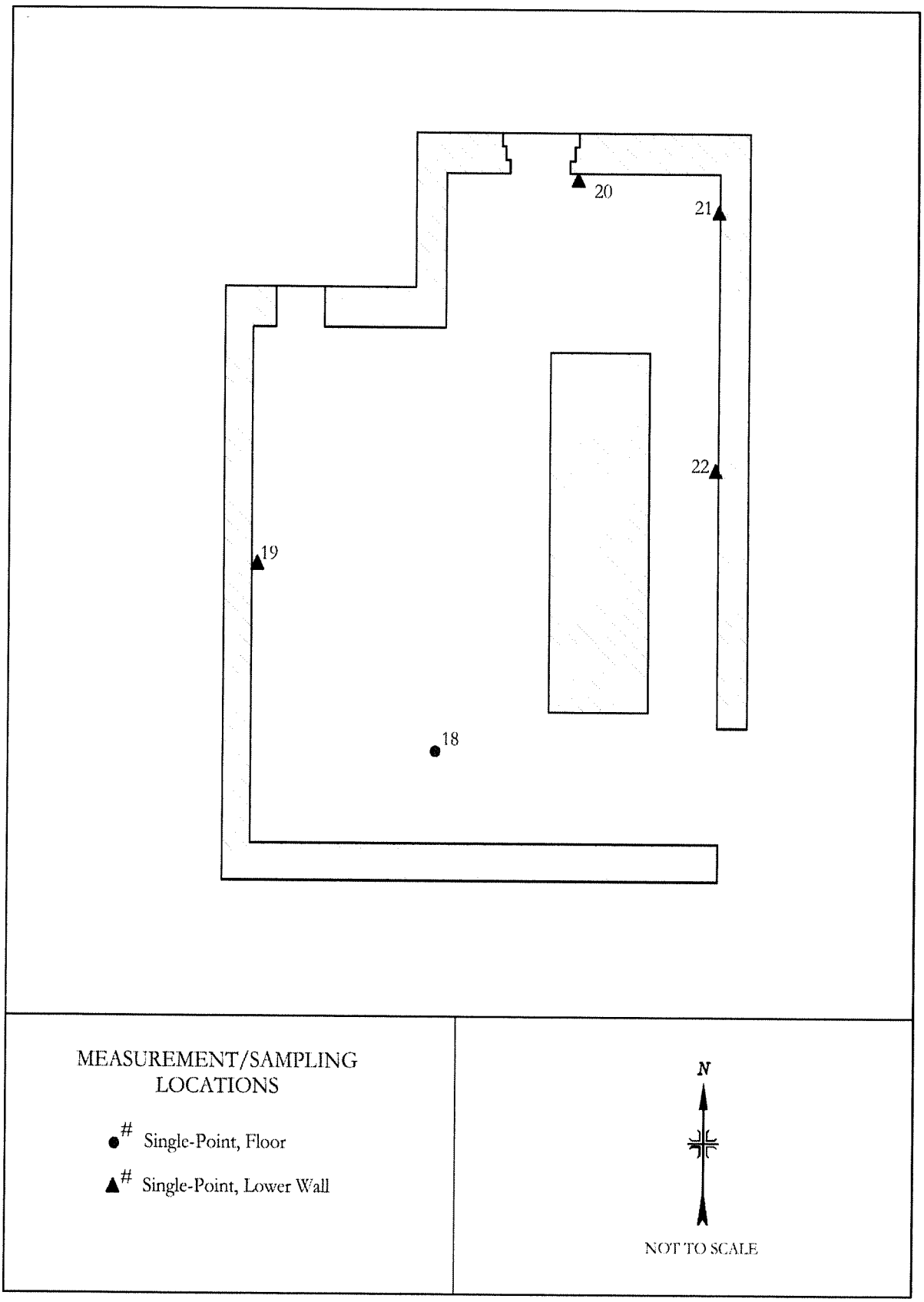


FIGURE 7: Auxiliary Building, Room 44 - Direct Measurement Locations

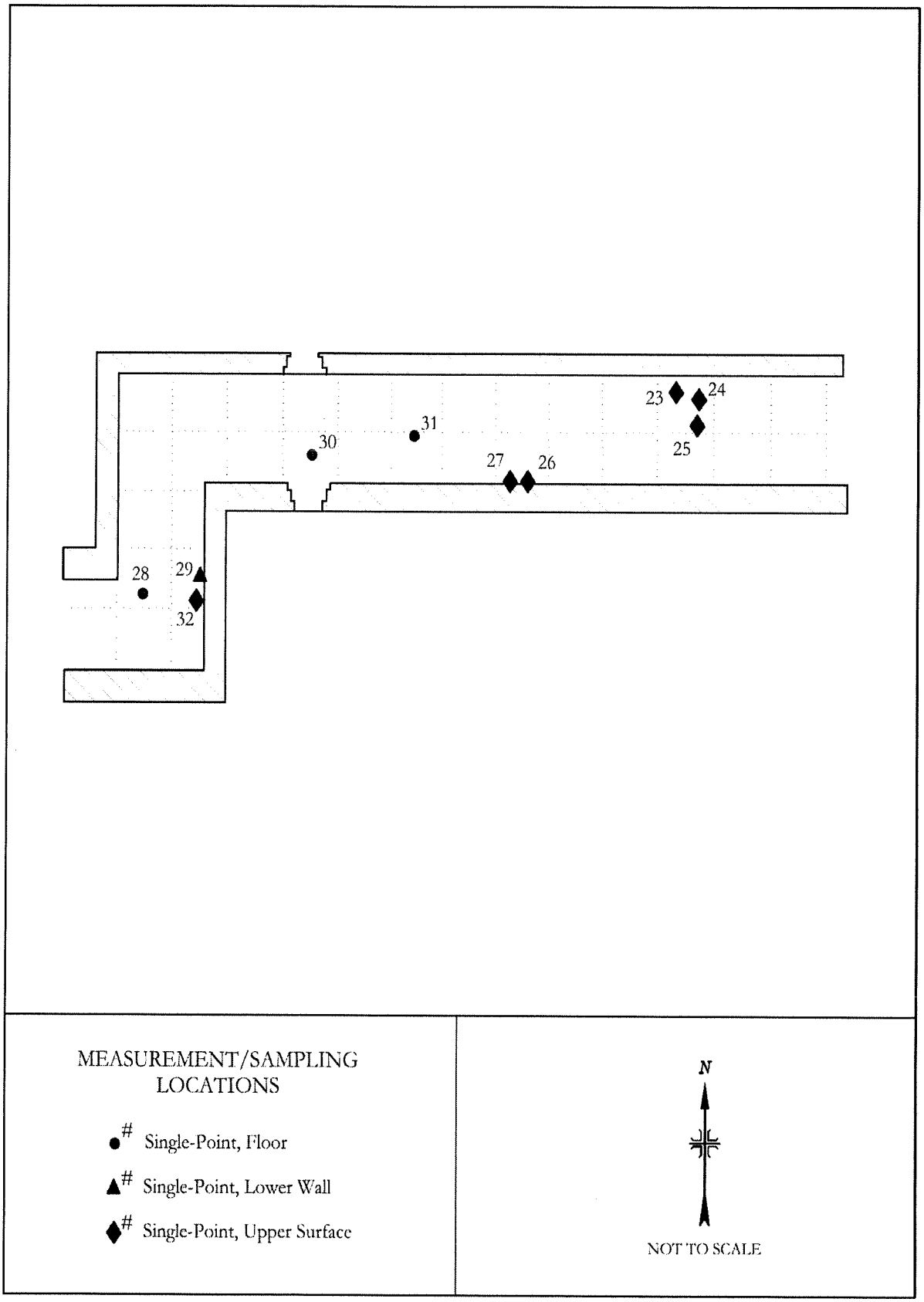
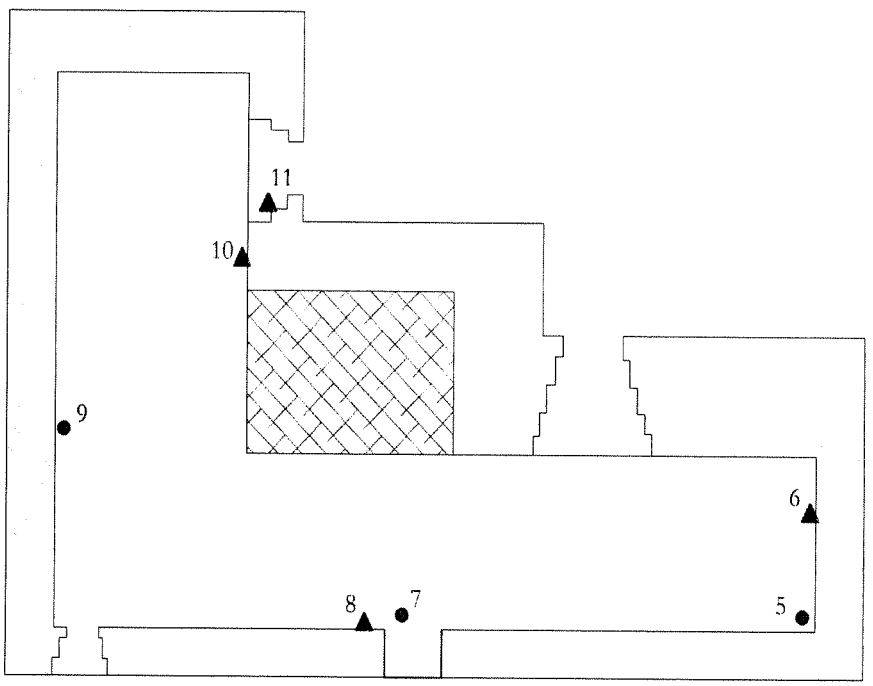


FIGURE 8: Auxiliary Building, Room 45 - Direct Measurement Locations



MEASUREMENT/SAMPLING LOCATIONS

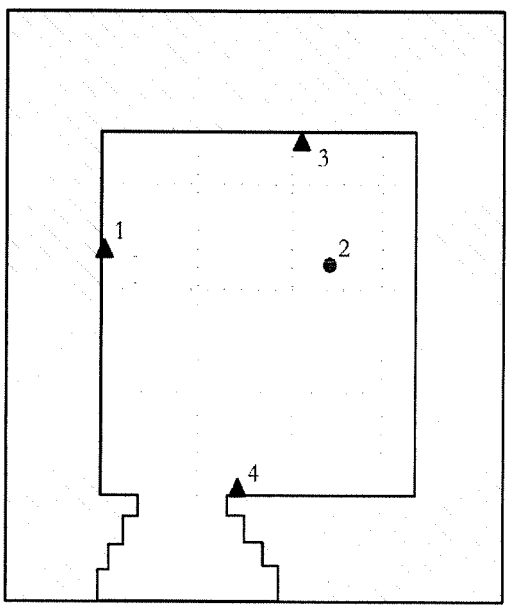
● # Single-Point, Floor

▲ # Single-Point, Lower Wall

N

NOT TO SCALE

FIGURE 9: Auxiliary Building, Room 46 - Direct Measurement Locations



MEASUREMENT/SAMPLING LOCATIONS

●# Single-Point, Floor

▲# Single-Point, Lower Wall

N

NOT TO SCALE

FIGURE 10: Auxiliary Building, Room 47 - Direct Measurement Locations

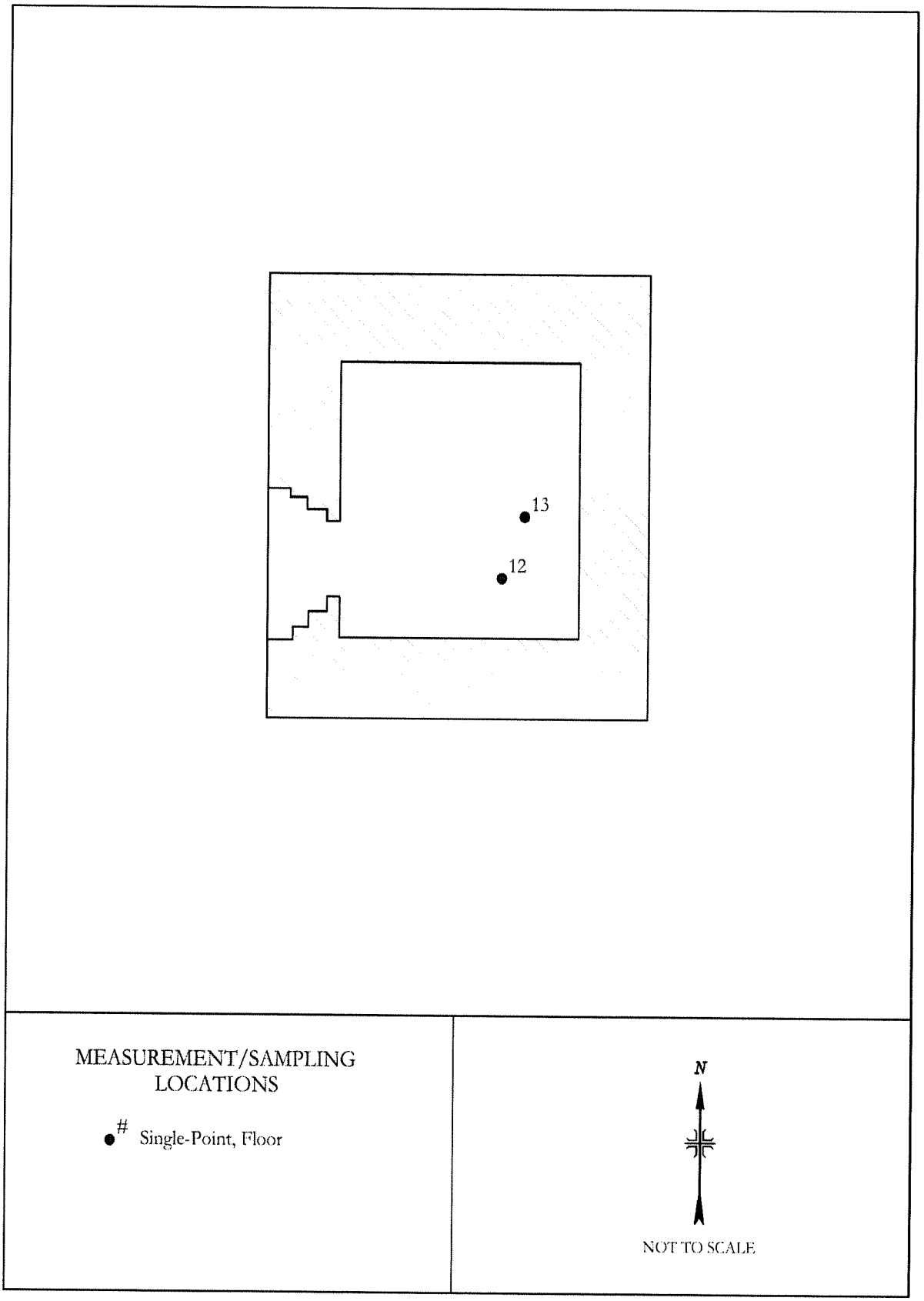


FIGURE 11: Auxiliary Building, Room 48 - Direct Measurement Locations

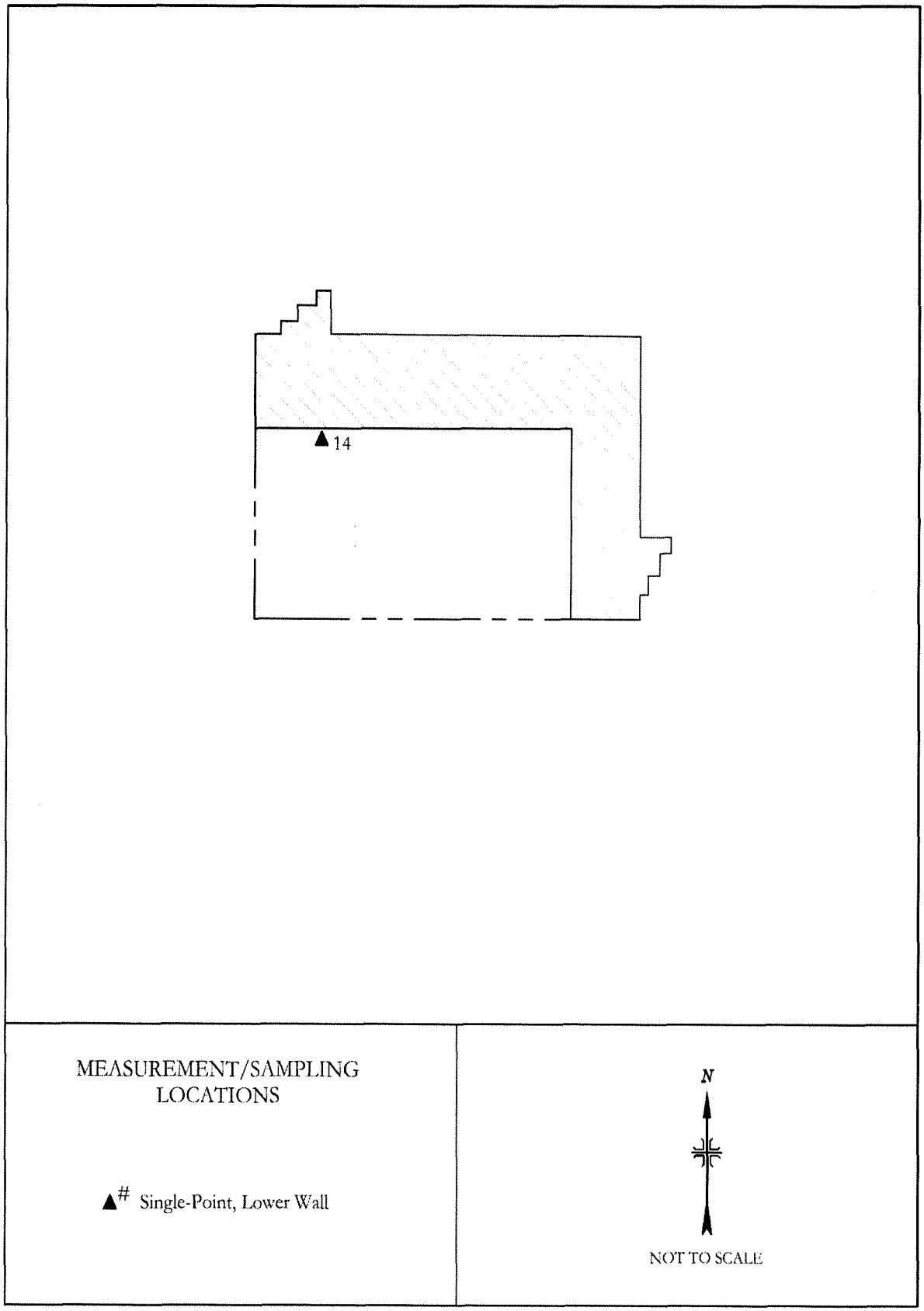
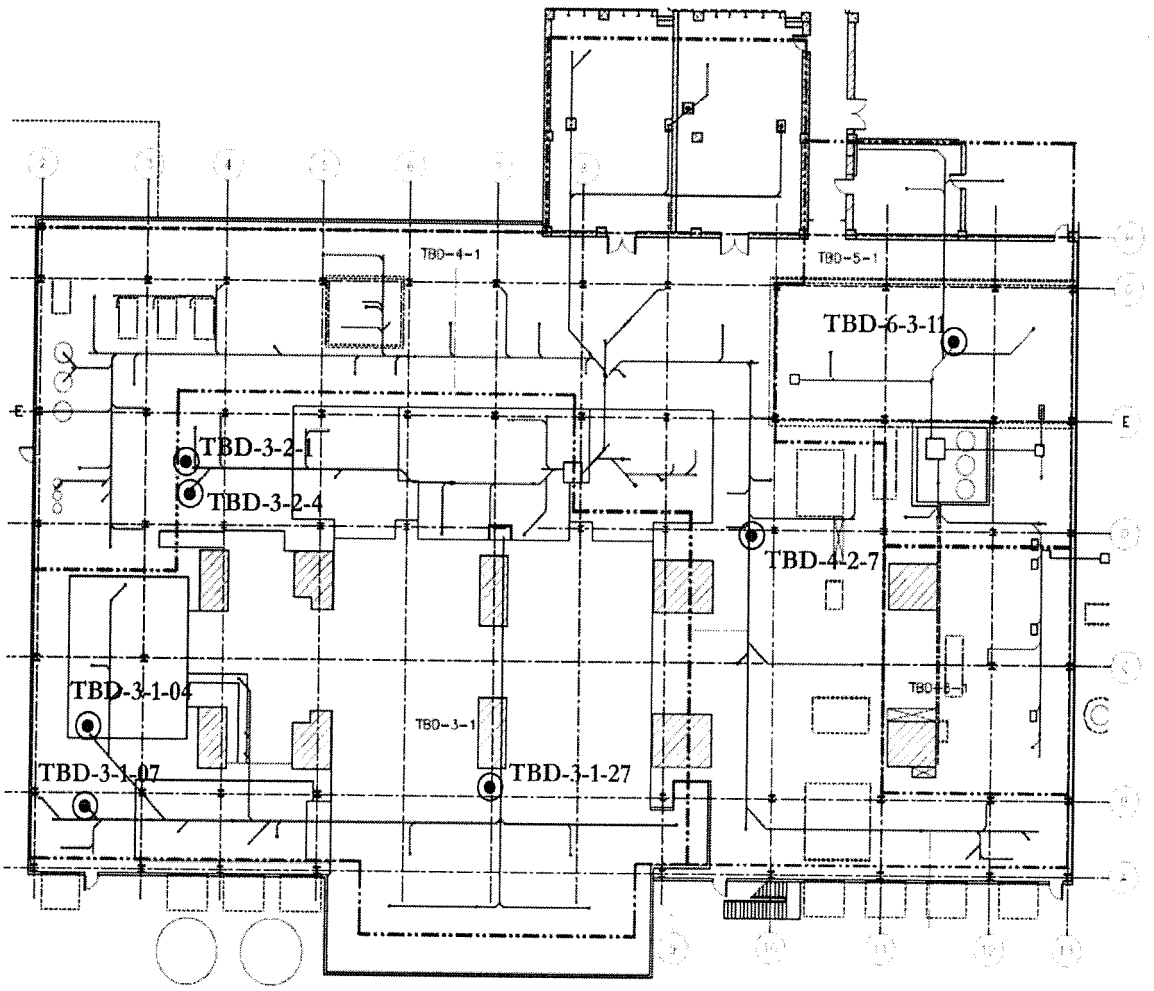


FIGURE 12: Auxiliary Building, Room 49 - Direct Measurement Locations



Drawing provided by SMUD

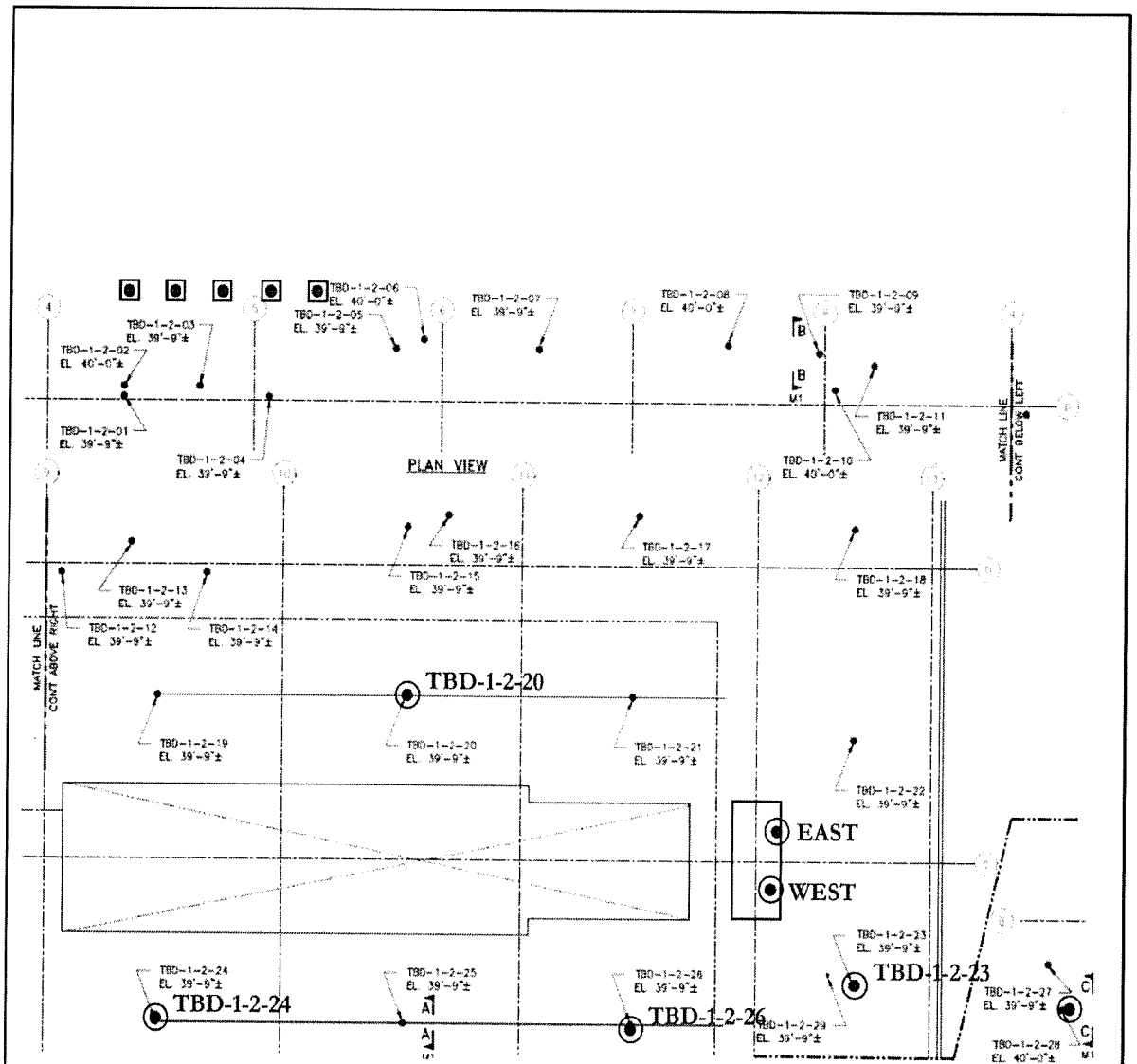
MEASUREMENT LOCATIONS

⊙# Single-Point, Embedded Piping

N

NOT TO SCALE

FIGURE 13: Turbine Building; Ground Level Elevation - Embedded Piping Measurement Locations



Drawing provided by SMUD

MEASUREMENT LOCATIONS

⊙# Single-Point, Embedded Piping

▣ Single-Point, Conduit Piping

N

NOT TO SCALE

FIGURE 14: Turbine Building; 40 Foot Elevation - Embedded Piping Measurement 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	Beta Floor	Beta Lower Wall	Beta Upper Wall
23 FL and LW	1	50	50	25	---[b]
24	1	100	50	50	---
25 FL and LW	1	100	75	50	---
25 US	1	---	---	---	2
43 FL and LW	1	100	50	50	---
44	1	100	50	50	---
45	1	100	50	50	5
46	1	100	50	50	10
47	1	100	75	50	---
48	1	100	50	50	---
49	1	100	100	100	20

[a]Refer to Figures 3 through 12. 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]	Activity Meets Gross Beta DCGL[d]	Activity Meets Design $DCGL_{EMC}$[d]	Activity Meets Actual $DCGL_{EMC}$[d]
Room 23					
56	FL	240,000	NO	NO	YES
57	FL	25,000	YES	YES	YES
58	FL	51,000	NO	YES	YES
59	FL	26,000	YES	YES	YES
60	FL	110,000	NO	YES	YES
61	LW	190,000	NO	NO	YES
62	LW	25,000	YES	YES	YES
Room 24					
47	FL	44,000	NO	YES	YES
48	FL	30,000	YES	YES	YES
49	FL	30,000	YES	YES	YES
50	FL	28,000	YES	YES	YES
51	LW	20,000	YES	YES	YES
52	LW	30,000	YES	YES	YES
53	LW	37,000	YES	YES	YES
54	LW	30,000	YES	YES	YES
55	LW	35,000	YES	YES	YES
Room 25					
33	FL	74,000	NO	YES	YES
34	FL	94,000	NO	YES	YES
35	FL	18,000	YES	YES	YES
36	FL	57,000	NO	YES	YES
37	FL	18,000	YES	YES	YES
38	FL	32,000	YES	YES	YES
39	FL	100,000	NO	YES	YES
40	LW	12,000	YES	YES	YES
41	US	100,000	NO	YES	YES
Room 43					
15	LW	12,000	YES	YES	YES
16	LW	12,000	YES	YES	YES
17	LW	17,000	YES	YES	YES
Room 44					
18	FL	12,000	YES	YES	YES
19	LW	20,000	YES	YES	YES
20	LW	22,000	YES	YES	YES
21	LW	8,000	YES	YES	YES
22	LW	11,000	YES	YES	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]	Activity Meets Gross Beta DCGL[d]	Activity Meets Design $DCGL_{EMC}$[d]	Activity Meets Actual $DCGL_{EMC}$[d]
Room 45					
23	US	39,000	YES	YES	YES
24	US	23,000	YES	YES	YES
25	US	30,000	YES	YES	YES
26	US	5,900	YES	YES	YES
27	US	14,000	YES	YES	YES
28	FL	36,000	YES	YES	YES
29	LW	33,000	YES	YES	YES
30	FL	46,000	NO	YES	YES
31	FL	22,000	YES	YES	YES
32	US	13,000	YES	YES	YES
Room 46					
5	FL	24,000	YES	YES	YES
6	LW	38,000	YES	YES	YES
7	FL	36,000	YES	YES	YES
8	LW	12,000	YES	YES	YES
9	FL	47,000	NO	YES	YES
10	LW	31,000	YES	YES	YES
11	LW	34,000	YES	YES	YES
Room 47					
1	LW	37,000	YES	YES	YES
2	FL	26,000	YES	YES	YES
3	LW	16,000	YES	YES	YES
4	LW	21,000	YES	YES	YES
Room 48					
12	FL	9,900	YES	YES	YES
28	FL	8,700	YES	YES	YES
Room 49, Co-60					
14	LW	12,000	YES	YES	YES

[a]Refer to Figures 3 through 12.
[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 6.

TABLE 3

SURFACE ACTIVITY DATA COMPARISON
AUXILIARY BUILDING ROOM 25
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Location[a]		Surface[b]	Total Beta Activity (dpm/100 cm^2)	
ORISE	SMUD		ORISE	SMUD[c]
42	02BD	FL	4,200	4,000
43	01BD	FL	3,500	3,700
44	05BD	FL	2,000	2,500
45	19BD	FL	4,400	4,300
46	04BD	FL	5,000	4,200

[a]Refer to Figure 5. SMUD measurement locations were provided in the preliminary FSS data by SMUD.
[b]FL = floor.
[c]SMUD Total Beta Activity results were provided by SMUD. ORISE and SMUD Total Beta Activity results were rounded to two significant digits.

TABLE 4

TURBINE BUILDING EMBEDDED PIPING CONFIRMATORY SURVEY RESULTS FOR TBD-3-1-27 RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

TBD 3-1-27[a] Pipe Position (feet)	Gross Total Beta/Gamma Activity (dpm/100 cm^2)[b, c]
3.3	6,700
6.6	5,900
9.8	6,600
13.1	6,100
16.4	5,200
19.7	6,300
23.0	5,500
26.2	5,000
29.5	5,200
32.8	5,200
36.1	5,700
39.4	4,500
42.7	5,400
44.3	6,300

[a]Refer to Figure 13.
[b]Background was not subtracted. ORISE Total Activity results were rounded to two significant digits.
[c]The embedded piping DCGL is 100,000 dpm/100 cm^2 with a grouting action level of 21,000 dpm/100 cm^2. ORISE pipe detector was calibrated with a Tc-99 flexible source. Although the pipes had both Co-60 and Cs-137, ORISE took a conservative approach and considered that all the contamination within the pipe was from Co-60 and used a source efficiency of 0.25.

TABLE 5

TURBINE BUILDING EMBEDDED PIPING CONFIRMATORY GAMMA SCAN RANGES FOR REMAINING EMBEDDED PIPING RANCHO SECO NUCLEAR GENERATING STATION HERALD, CALIFORNIA

Turbine Building Drain Line[a]	Diameter (inches)	Scan Depth (feet)	ORISE Gamma Scan Range (cpm)
Turbine Building Backgrounds[b]			
Conduit, East Side 1	4	1	300 to 600
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
Turbine Building Ground Level Drains			
TBD 6-3-11	4	8	300 to 1600
TBD 4-2-7	4	13	200 to 600
TBD 3-2-01	4	13	500 to 1600
TBD 3-2-4	4	10	200 to 800
TBD 3-1-7	4	10	200 to 600
TBD 3-1-4	4	13	200 to 800
Turbine Building +40 Level Drains			
TBD 1-2-28	4	1	250 to 450
TBD 1-2-23	4	1	220 to 450
TBD 1-2-26	4	11	200 to 1000
TBD 1-2-24	4	13	400 to 900
TBD 1-2-20	4	13	200 to 1000

[a]Refer to Figures 13 and 14.
[b]Turbine Building embedded piping backgrounds were determined within Turbine Building conduits.

TABLE 6

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)	Actual $DCGL_{EMC}$[c] (dpm/100 cm^2)
23 FL and LW	1	43,000	150,500	6.4E7
24	1	43,000	150,500	N/A[d]
25 FL and LW	1	43,000	146,200	N/A
25 US	1	43,000	141,900	N/A
43 FL and LW	1	43,000	137,600	N/A
44	1	43,000	141,900	N/A
45	1	43,000	141,900	1.11E6
46	1	43,000	141,900	N/A
47	1	43,000	141,900	N/A
48	1	43,000	193,500	N/A
49[e]	1	16,000[e]	142,400	N/A

[a]Refer to Figures 3 through 12. 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]Due to SMUD FSS findings, Actual $DCGL_{EMC}$ was not applicable for these survey units since all results were less than the gross beta DCGL.
[e]The major contaminant for Room 49 was determined to be Co-60; SMUD accounted for ROCs by calculating an appropriate gross beta DCGL (based on ROC fractions in relation to Co-60) for this room.

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