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

December 6, 2006

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 050-00312/06-004

Dear Mr. Shetler:

An NRC inspection was conducted on November 13 through 16, 2006, at your Rancho Seco Nuclear Generating Station. At the conclusion of the site visit, an exit briefing was conducted with the acting Plant Manager and other members of your staff. The enclosed report presents the scope and results of the inspection.

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 maintenance and surveillance program; decommissioning performance, and solid radioactive waste management and transportation of radioactive materials.

Also enclosed is a copy of the Oak Ridge Institute for Science and Education (ORISE) report on the confirmatory survey results for the Reactor Building Dome upper structural surfaces. ORISE is the NRC contractor laboratory for radiological measurements. This confirmatory survey was conducted on June 7 and 8, 2006. The ORISE independent measurements confirmed that the radiological conditions of the upper structural surfaces of the Reactor Building Dome meet the site-specific release criteria as presented in your license termination plan.

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, if any, 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) 860-8191.

Sincerely,

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

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

Enclosures:
1. NRC Inspection Report
   050-00312/06-004
2. ORISE Report
   RFTA No. 06-003

cc w/enclosures:
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ENCLOSURE 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00312
License No.:	DPR-54
Report No.:	050-00312/06-004
Licensee:	Sacramento Municipal Utility District
Facility:	Rancho Seco Nuclear Generating Station
Location:	14440 Twin Cities Road Herald, California
Dates:	November 13-16, 2006
Inspector:	Emilio M. Garcia, Health Physicist
Accompanied and Approved By:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle and Decommissioning Branch
Attachments:	Supplemental Information Partial List of Documents Reviewed

EXECUTIVE SUMMARY

Rancho Seco Nuclear Generating Station
NRC Inspection Reports 050-00312/06-004

This inspection was a routine, announced inspection of decommissioning activities being conducted at the Rancho Seco Nuclear Generating Station. Areas inspected included the maintenance and surveillance program; decommissioning performance and solid radioactive waste management and transportation of radioactive materials.

Maintenance and Surveillance

- The licensee no longer had any safety-related structures, systems or components. The licensee continued to maintain their liquid effluent monitor. Checks and calibrations of the liquid effluent monitor had been conducted at the required intervals (Section 1).

Decommissioning Performance and Status Review

- The licensee continued the dismantlement and removal of contaminated components in a safe manner (Section 2).

Solid Radioactive Waste Management and Transportation of Radioactive Materials

- Audits and Surveillances of the solid radioactive waste management and transportation of radioactive material's program were performance-based, and their overall quality was good. The licensee had an effective program for identifying and correcting deficiencies or weaknesses related to the solid radioactive waste management and transportation of radioactive material's program (Section 3).

- Changes to the licensee's organization, personnel, equipment, and procedures had not negatively affected the solid radwaste management and transportation of radioactive material's program (Section 3).

- Individuals responsible for processing, testing, storage, and shipping (including certification) of low level radioactive waste and other radioactive materials had received the initial required training (Section 3).

- The licensee maintained copies of the applicable regulations and the licenses of recipients of radioactive materials, and had identified those individuals authorized to certify low level radioactive waste shipments (Section 3).

- The licensee had implemented a transportation program for radioactive materials and radioactive waste in accordance with NRC and U.S. Department of Transportation regulations (Section 3).

Inspection of Final Surveys

- The NRC contractor's independent measurements of the upper structural surfaces of the Reactor Building Dome confirmed that the radiological conditions meet the site-specific release criteria as presented in the license termination plan submitted by the licensee and currently under NRC review. The results of radiological measurements of soil samples made by the NRC contractor laboratory were in agreement with results obtained by the licensee laboratory on the same samples (Section 4).

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 activities at the site. Decommissioning was being performed 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 in the auxiliary building had been removed, packaged and/or shipped for disposal. In the reactor building, the major piping, the four reactor coolant pumps, the core flood tanks, reactor vessel head, pressurizer, pressurizer drain tank, and the two steam generators had been removed, packaged and shipped offsite for disposal. In the fuel handling building, the spent fuel pool (SFP) water had been processed and released. The pool liner plates had been cut, removed and shipped for disposal. Contaminated portions of concrete in the SFP were being removed. The reactor vessel internals had been segmented, packaged and either shipped for disposal or stored onsite. During this inspection the reactor vessel was undergoing segmentation.

1 Maintenance and Surveillance (IP 62801)

a. Inspection Scope

The inspector reviewed the status of required Surveillance and testing. The inspector discussed this area with the Maintenance Superintendent and reviewed selected records.

b. Observations and Findings

With the relocation of the spent fuel to the ISFSI, the licensee no longer had any safety-related structures, systems or components (SSC) as defined in 10 CFR 50.65(b)(1), nor any non-safety-related SSC as defined in 10 CFR 50.65(b)(2). The licensee had reviewed their Maintenance Rule procedure and concluded that it was no longer required with fuel in the ISFSI. With the processing of the water in the spent fuel pool, the potential for significant liquid effluent releases was greatly diminished; however, the licensee would still need to process water generated from the reactor vessel internals segmentation and the reactor vessel segmentation. The licensee had opted to maintain their liquid effluent radiation monitor.

The inspector reviewed the maintenance of a liquid effluent radiation monitor, R-15017A. The licensee performed quarterly tests and annual calibrations of this monitor. Records maintained indicated that the licensee had performed these Surveillances at the required intervals.

The inspector interviewed the Maintenance Superintendent and reviewed a printout of the Rancho Seco Computerized Surveillance Schedule dated November 13, 2006. This document listed the status of Surveillances and routine tests. Seven routine tests or Surveillances were beyond their due dates, but none exceeded their 25% extended schedule period permitted by the surveillance and routine test programs. None of these tests were related to safety-related structures, systems or components.

c. Conclusion

The licensee no longer had any safety-related structures, systems or components. The licensee continued to maintain their liquid effluent monitor. Checks and calibrations of the liquid effluent monitor had been conducted at the required intervals.

2 Decommissioning Performance and Status Review (IP 71801)

a. Inspection Scope

The inspector toured portions of the site to observe work activities including housekeeping, safety practices, fire loading and radiological controls.

b. Observations and Findings

The licensee had completed the segmentation of the reactor vessel internals and had separated and packaged the irradiated components into the various waste categories. These wastes included a canister containing the greater than Class C (GTCC) waste. The lid on this canister had been welded and the canister vacuum dried. The canister had been stored in the ISFSI. Class B and C containers had been stored on site. During this inspection the two canisters with Class A waste were shipped to a waste disposal site.

The reactor vessel segmentation was ongoing during this inspection. This process continued without any personnel or equipment contaminations.

Tours of the reactor, auxiliary, fuel handling, and turbine buildings were conducted to observe dismantling and decommissioning activities in progress. The work observed was being conducted in a safe and orderly manner. Radiological controls, including postings and barriers, were in place. Good housekeeping and fire protection practices were noted in areas observed.

c. Conclusion

The licensee continued the dismantlement and removal of contaminated components in a safe manner.

3 Solid Radioactive Waste Management and Transportation of Radioactive Materials (IP 86750)

3.1 Audits and Surveillances

a. Inspection Scope

The inspector reviewed reports of recently conducted Audits and Surveillances to determine implementation of the commitments made in the Section XVIII, Audits, of the Rancho Seco Quality Manual (RSQM), as it relates to the solid radioactive waste management and transportation of radioactive material's program. The inspector also reviewed the qualification records for the individual involved in the audit and surveillance.

b. Observations and Findings

The inspector reviewed audit report 06-A007, dated July 11, 2006. This audit focused on wet and dry waste processing and the packaging and transportation of radioactive waste. This audit had been conducted from May 24 through June 21, 2006. The inspector confirmed that the audit was conducted according to the commitments in the RSQM. The individual that conducted the audit was independent of the function being audited. The audit included the use of an approved checklist. The auditor was qualified and authorized to perform the audit in the area audited. The audit did not identify any findings, but it included a recommendation for which the licensee had initiated actions to address. The audit was conducted in a timely manner and was overall of good quality. No other audit of this area had been performed since the last inspection.

The inspector reviewed the licensee's surveillance log and noted that in calender year 2005 of the 28 Surveillances that had been conducted, 15 related to radioactive waste and/or shipments. In calender year 2006, as of November 13, of the 25 Surveillances that had been conducted, 18 related to radioactive waste and/or shipments. The inspector selected three Surveillances for review: Surveillance Reports 05-S-028, approved on March 23, 2006; 06-S-017, approved on August 3, 2006; and 06-S-018, approved on August 3, 2006. The individual assigned to perform the Surveillances was trained and qualified and was independent of the areas being audited. The Surveillances included performance-based elements. No quality related problems were identified during the Surveillance related to solid radwaste management and transportation of radioactive materials.

c. Conclusion

Audits and Surveillances of the solid radioactive waste management and transportation of radioactive material's program were performance-based, and their overall quality was good. The licensee had an effective program for identifying and correcting deficiencies or weaknesses related to the solid radioactive waste management and transportation of radioactive material's program.

3.2 Changes

a. Inspection Scope

The inspector interviewed cognizant personnel and reviewed selected documents to determine if any major changes had taken place since the last inspection in the organization, personnel, facilities, equipment, programs or procedures that may have effected the solid radwaste management and transportation of radioactive material's program.

b. Observations and Findings

The Principal Decommissioning Radiological Engineer was focusing most of his time on the solid radwaste management and transportation of radioactive materials program. The position of Radwaste Supervisor was currently being held by a contractor. The Interim Onsite Storage Building (IOS) had under gone some upgrades including refurbishing of some doors, painting of walls and the addition of air conditioning. Four procedures related to the solid radwaste management and transportation of radioactive material's program had been revised and are listed in Attachment 2.

c. Conclusions

Changes to the licensee's organization, personnel, equipment, and procedures had not negatively effected the solid radwaste management and transportation of radioactive material's program.

3.3 Training and Qualifications of Personnel

a. Inspection Scope

The inspector interviewed cognizant personnel and reviewed selected documents to determine if individuals that were responsible for processing, testing, storage, and shipping (including certification) of low level radioactive waste and other radioactive materials had received training and periodic retraining in the Department of Transportation (DOT) and NRC regulatory requirements, the waste burial license requirements, and in the instructions and operating procedures.

b. Observations and Findings

Procedure RPO.309, Radioactive Waste Control Program, last revised in March 2006, included a description of the training required for each type of worker involved in the processing, testing, storage, and shipping of radioactive materials. This description was consistent with requirements of DOT regulations. The description specified general awareness, safety, security, and function specific training. The procedure designated a training module RW0 for general awareness, safety and security and function specific into three training modules RW1, RW2, and RW3 for the different worker classifications.

The inspector noted that these module codes were not reflected on the course descriptions that were used in the licensees' training information management system (TIME). The inspector also noted that although all workers involved in the processing, testing, storage, and shipping of radioactive materials had received the initial training required by this procedure and DOT regulations, two were overdue for refresher security training. Although the recurrent training had not occurred, the individuals were familiar with their security responsibilities.

The licensee opened problem report P.Q. 06-0030 to address these matters of minor significance.

c. Conclusions

Individuals responsible for processing, testing, storage, and shipping (including certification) of low level radioactive waste and other radioactive materials had received the initial required training.

3.4 Implementation of the Solid Radioactive Waste Program

a. Inspection Scope

The inspector interviewed cognizant personnel and reviewed selected documents to determine if the licensee maintained copies of the applicable regulations and licenses of recipients of radioactive materials shipped from the site, and had identified those individuals authorized to certify low level radioactive waste shipments in accordance with Section II of Appendix F to 10 CAR 20.1001-20.2402.

b. Observations and Findings

The licensee maintained paper copies and had access to electronic copies of the NRC, DOT and States of Utah and Tennessee regulations, and had copies of the licenses for the low level radioactive waste disposal site and the materials recovery site to which licensed material were shipped. The licensee issued an annual memorandum to file that identified the individuals, their signatures and their initials that were authorized to certify radioactive shipments. This memorandum also included the names, signature and initials of the individuals authorized to perform quality assurance functions associated with radioactive shipments generated at the site. The inspector reviewed this memorandum dated November 8, 2006.

c. Conclusions

The licensee maintained copies of the applicable regulations and the licenses of recipients of radioactive materials, and had identified those individuals authorized to certify low level radioactive waste shipments.

3.5 Shipping of low level radioactive waste for Disposal, and Transportation of other Radioactive Material

a. Inspection Scope

The inspector observed the loading of a Class A waste container into a transportation cask for shipment to a waste disposal site. The inspector reviewed records of radioactive materials' shipments.

b. Observations and Findings

On November 15, 2006, the licensee loaded waste liner LAU-806-0149 into a transport cask for shipment to a waste disposal site. This cask contained shipping package RS-RVI-036 which was classified as Class A waste. The inspector noted that the licensee's personnel had followed a written check list while conducting the receipt inspection, loading, blocking and bracing, marking and labeling the package and placarding the transport trailer. Direct radiation and contamination surveys were performed by the licensee personnel through this evolution. The licensee took appropriate precautions to maintain radiological exposure ALARUMS.

As of November 15, 2006, 54 shipments of radioactive material had been made in 2006. The inspector reviewed three records of these shipments. These were for Shipments 06-027, 06-051, and 06-053. The emergency response telephone number listed on the waste manifests was confirmed as the telephone number for the Rancho SCO secondary alarm station. The shipping records included copies of the radiological surveys conducted, Form 540 Uniform Low-Level Radioactive Waste Manifest as applicable, emergency response information, instructions to the carrier for maintenance of exclusive use shipment controls and the vehicle inspection report. Documents requiring shipper certification were signed by a licensee representative. Records of the training of individuals who signed or otherwise performed functions related to the transport of hazardous material were reviewed. The individuals involved with these shipments had received appropriate training as required by 49 CAR 172, Subpart H.

The Dismantlement Superintendent - Radiological stated that the licensee had not received any notices of noncompliance from DOT or other competent state authorities.

c. Conclusion

The licensee had implemented a transportation program for radioactive materials and radioactive waste in accordance with NRC and U.S. Department of Transportation regulations.

4 Inspection of Final Surveys (IP 83801)

On June 7 and 8, 2006, representatives from the Oak Ridge Institute for Science Education (ORISE) working for the NRC reviewed records of final status surveys of the dome of the containment building and conducted independent confirmatory radiological measurements of the dome. In addition seven soil samples previously collected and

analyzed by the licensee were sent to ORISE for independent evaluation. The results of these surveys were reported to the NRC on October 25, 2006.

The ORISE report notes that their survey for the upper structural surfaces of the Reactor Building Dome confirmed that the radiological conditions meet the site-specific release criteria as presented in the license termination plan submitted by the licensee and currently under NRC review. The report also notes that the results of the licensee's laboratory analysis on seven soil samples were consistent and in agreement with ORISE analytical results.

A copy of the ORISE report is included as an enclosure.

5 Exit Meeting Summary

The inspector presented the inspection results to the acting plant manager and other members of licensee staff at the exit meeting on November 16, 2006. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Sacramento Municipal Utility District

M. But, Radiation Protection/Chemistry Superintendent
R. Decker, Final Status Survey Lead Engineer
D. Gonzales, Acting Radwaste Supervisor
J. Field, Engineering Superintendent
W. Hawley, Dismantlement Superintendent - Operations, Acting Plant Manager
K. Johnson, Rad Waste Technical Analyst
R. Jones, Supervising Quality Engineer
D. Koontz, ISFSI Supervisor
L. Langley, Asset Protection Specialist
S. Redeker, Plant Manager
G. Roberts, Maintenance Superintendent
E. Ronningen, Dismantlement Superintendent - Radiological
M. Steinbacher, Radiation Protection Supervisor

INSPECTION PROCEDURES USED

IP 62801	Maintenance and Surveillance
IP 71801	Decommissioning Performance and Status Review
IP 83801	Inspection of Final Surveys
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

CAR	Code of Federal Regulations
DOT	Department of Transportation
GTCC	Greater than Class C
IP	Inspection Procedure
IOS	Interim Onsite Storage Building
ISFSI	Independent Spent Fuel Storage Installation
RISE	Oak Ridge Institute for Science Education
RPO	Radiation Protection
RSQM	Rancho SCO Quality Manual
SSC	Structures, Systems or Components
SFP	Spent Fuel Pool
TIME	Training Information Management System

ATTACHMENT 2

PARTIAL LIST OF DOCUMENTS REVIEWED

Audits and Surveillances

- Rancho SCO Audit Report No. 06-A-007, Process Control Program (PCP) + Packaging & Transportation of Radioactive Waste, Report date July 11, 2006, Audit dates May 24 - June 21, 2006.

Data Sheets

- Printout of the Rancho SCO Computerized Surveillance Schedule dated November 13, 2006.
- Memorandum to File DPT 06-040, dated November 8, 2006, subject: Signature Authority for Radioactive Shipments.
- Printouts for selected individuals training records maintained in TIME, the training information management system.
- Records file for shipments 06-027, 06-051, and 06-053.

Procedures

- Rancho SCO Administrative Procedure RSAP-1601, Rancho SCO Surveillance Program, Revision 10, effective July 22, 2004.
- Rancho SCO Administrative Procedure RSAP-1605, Routine Test Program, Revision 5, effective August 26, 2002.
- Radiation Control Manual RPO.305.16, Radioactive Material Receipts, Revision 5, effective October 17, 2006.
- Radwaste Control Manual RPO.309, Radioactive Waste Control Program, Revision 2, effective March 7, 2006.
- Radwaste Control Manual RPO.309.I.12, Reactor Vessel Internals Packaging Plan, Revision 2, effective April 18, 2006.
- Radwaste Control Manual RPO.309.III.02, Compactor Operation, Revision 5, effective February 8, 2006.

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

October 25, 2006

Mr. John Hickman
Mail Stop: T-E18
Division of Waste Management
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

SUBJECT: CONFIRMATORY SURVEY RESULTS FOR THE REACTOR BUILDING DOME UPPER STRUCTURAL SURFACES, RANCHO SECO NUCLEAR GENERATING STATION, HERALD, CALIFORNIA (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 Reactor Building Dome Upper Structural Surfaces at the Rancho Seco Nuclear Generating Station in Herald, California on June 7 and 8, 2006. 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 survey activities included beta surface scans, direct measurements for total net beta activity, and limited gross alpha and gross beta removable activity measurements.

If you have any questions or comments, please direct them to me at 865.576.0065 or J. Scott Kirk at 865.574.0685.

Sincerely,

Wade C. Adams
Health Physicist/Project Leader
Survey Projects

WCA:ar

Enclosure

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E. Knox-Davin, NRC/NMSS/TWFN 8A23
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CONFIRMATORY SURVEY RESULTS FOR THE REACTOR BUILDING DOME UPPER STRUCTURAL SURFACES 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.

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 has yet to be approved by the NRC (SMUD 2006a). SMUD currently is conducting decontamination efforts and performing final status surveys (FSS) in the remaining structural surfaces and open land areas.

The NRC requested that the Oak Ridge Institute for Science and Education (ORISE) perform a confirmatory survey of the upper structural surfaces of the Reactor Building Dome at the RSNGS (Figures 1 and 2). While on site, the NRC site representative also requested that ORISE perform interlaboratory comparison analyses on several archived soil samples that would be provided by RSNGS personnel. The confirmatory surveys were performed on June 7 and 8, 2006.

PROCEDURES

Confirmatory surveys were performed in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2006a). The site-specific survey plan follows the guidance provided in the ORISE Survey Procedures and Quality Assurance Manuals (ORISE 2004 and 2005).

Reactor Dome Upper Structural Surfaces

Due to the difficulty and hazards associated with performing hand-held detector surveys of the Reactor Building Dome, SMUD opted to use the Containment Building Surface Single Nuclide Renovation/Demolition Scenario derived concentration guideline levels (DCGLs) for surfaces above the polar crane rail as described in Table 6-12 of the LTP (SMUD 2006a). In lieu of direct

surface activity measurement with hand-held radiological instrumentation, SMUD chose to perform *in situ* gamma spectroscopy measurements of the dome surfaces (SMUD 2006b). The detector geometry for the dome survey was defined as a 28 square meters (m^2) circular plane with a source to detector distance of 3 meters (m). Each individual circular plane, also designated as the field-of-view (FOV), was designated at a grid or measurement location.

SMUD used site-specific supplemental DCGLs for Co-60 and Cs-137 for determining surface release criteria (SMUD 2006a and b). ORISE judgmentally selected five grid blocks for confirmatory surveys based upon final status survey (FSS) results which approached unity.

Beta surface scans were performed using hand-held gas proportional detectors coupled to ratemeter-scalers with audible indicators. Surface scans were performed on up to 80% of the judgmentally selected grid block surfaces. Particular attention was given to cracks, joints, and horizontal surfaces in the evaluated structural surfaces where material may have accumulated.

Direct measurements for beta activity were performed at 31 (a minimum of five locations within each grid) locations on the evaluated structural surfaces which were available for confirmatory survey activities. Smear samples were collected at three direct measurement locations of elevated surface activity within Grid CRC052 to determine removable activity levels at these locations. Direct measurements locations are indicated on Figures 3 through 7.

Interlaboratory Comparison Soil Samples

At the request of the NRC site representative, ORISE was tasked with conducting an interlaboratory comparison to evaluate the quality of the licensee's radioanalytical procedures. Therefore, ORISE reviewed RSNGS characterization soil sample data and selected seven soil samples, collected and analyzed by SMUD, for interlaboratory comparison analyses. These samples were shipped by SMUD personnel and received by ORISE laboratory personnel on July 10, 2006.

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 2006b). Soil samples were analyzed by gamma spectroscopy for the primary radionuclides-of-concern [ROC (i.e., 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. Soil sample results were reported in units of picocuries per gram (pCi/g). Dry 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).

FINDINGS AND RESULTS

Reactor Dome Surface Activity Measurements

Beta surface scans identified several areas of elevated beta activity on the horizontally positioned metal bracket. The brackets previously connected air conditioning ductwork to the inside surface of the reactor building walls. Beta surface scans did not identify elevated beta activity on the vertical

concrete surfaces of the Reactor Building Dome walls. Total net beta activity measurements ranged from -13,000 to 410,000 dpm/100 cm^2. Removable activity measurements ranged from 9 to 26 dpm/100 cm^2 for alpha and 230 to 890 dpm/100 cm^2 for beta. Surface activity level results are presented in Table 1.

Interlaboratory Sample Analyses

Prior to shipping, SMUD re-analyzed the seven soil samples selected by ORISE. The analytical results for the comparative evaluation of the RSNGS characterization samples are provided in Table 2. The results indicate that the quality of the SMUD laboratory data, within the parameters of sample preparation and analytical procedures, were comparable with ORISE's analytical results.

Comparison of Confirmatory Survey Results Against the Release Criteria

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 DCGLs (which have yet to be approved by the NRC) based on dose modeling not to exceed 25 mrem/year total effective dose equivalent (TEDE) as presented in Section 6 of the LTP (SMUD 2006a). The DCGLs for surfaces were modified by SMUD to reflect the ratio of radionuclide concentrations in the specific survey units (SU) that were being evaluated.

The applicable surface activity guidelines from the LTP and decommissioning technical basis document (DTBD)-05-015 for the structural surfaces above the polar crane in the Reactor Building Dome are as follows (SMUD 2006a and c):

Derived Concentration Guideline Levels (dpm/100 cm^2)				
Radionuclides	**Co-60[a]**	**Cs-137[a]**	**Gross Beta[b]**	**EMC[c]**
DCGL	40,200	182,000	43,000	593,400

[a]Containment Building Surface Single Nuclide DCGL for the Renovation/Demolition Scenario as provided in Table 6-12 of the LTP.
[b]Gross beta DCGL accounts for radionuclide fractions and hard to detects as specified in the DTBD-05-015.
[c]$DCGL_{EMC}$ is the conservative value for the more restrictive Co-60 area factor of 13.8 as provided by SMUD.

All of the direct beta activity measurement results on the concrete structural surface walls (vertical surfaces) were well within the DCGLs for Co-60 and Cs-137 as provided in the LTP (SMUD 2006a). The 25 direct measurement results (on the vertical concrete walls) were also within the gross beta activity DCGL as determined by SMUD personnel using the LTP and technical basis documents (SMUD 2006a, b and c). However, the six direct beta activity measurement locations on the metal brackets that exceeded the gross beta activity DCGL were typically less than 500 cm^2. SMUD determined two area factors that were not independently verified by ORISE, one for Cs-137 which was 14.9 and one for Co-60 which was 13.8; ORISE used the lowest area factor in determining the elevated measurement comparison (EMC) criteria for a 1 m^2 area to be conservative. This corresponds to a $DCGL_{EMC}$ of 593,400 dpm/100 cm^2. All of the direct beta

surface activity measurements on the metal brackets were less than the SMUD derived $DCGL_{EMC}$ for Co-60.

SUMMARY

Beta surface scans identified several areas of elevated beta activity on the horizontal surfaces of the remaining metal brackets within the Reactor Building Dome. Direct measurements were performed at 31 locations of which six locations were on the metal brackets; the remaining locations were on the vertical concrete walls. The 25 direct measurement results on the concrete walls (vertical surfaces) were well within the individual DCGLs for Co-60 and Cs-137 and the gross beta activity DCGL for structural surfaces. As the survey results indicated, horizontal surfaces, such as on the metal brackets, exhibited elevated beta activity levels that exceeded the gross beta activity DCGL; however, these measurement locations were typically less than 500 cm^2 and were within the $DCGL_{EMC}$ release criteria. Therefore, the results of the survey activities for the upper structural surfaces of the Reactor Building Dome confirmed that the radiological conditions meet the site-specific release criteria as presented in the licensee's LTP.

ORISE performed interlaboratory comparison analyses on seven RSNGS characterization soil samples; the results indicated that the quality of the SMUD laboratory data were consistent and in agreement with ORISE's analytical results.

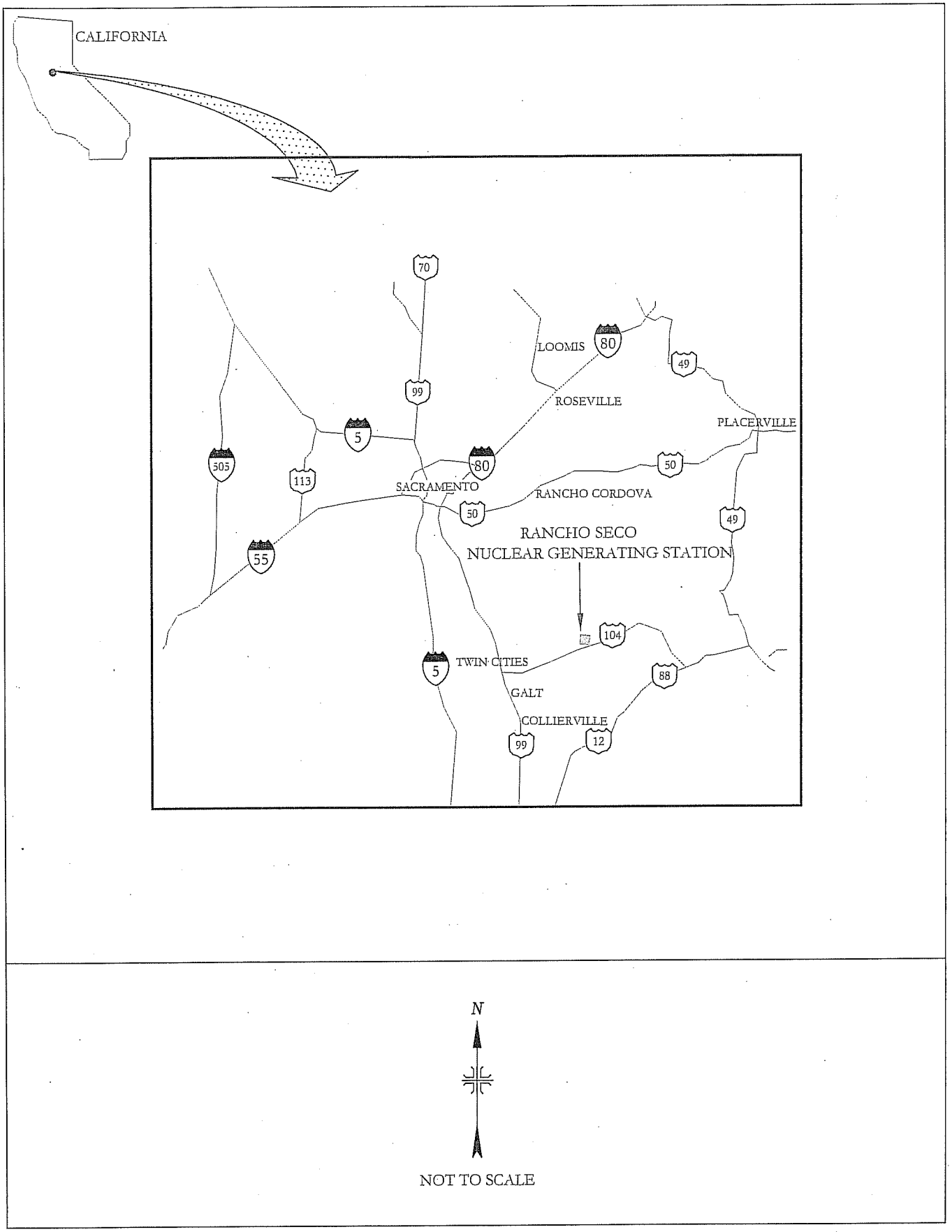


FIGURE 1: Location of Rancho Seco Nuclear Generating Station, Herald, California

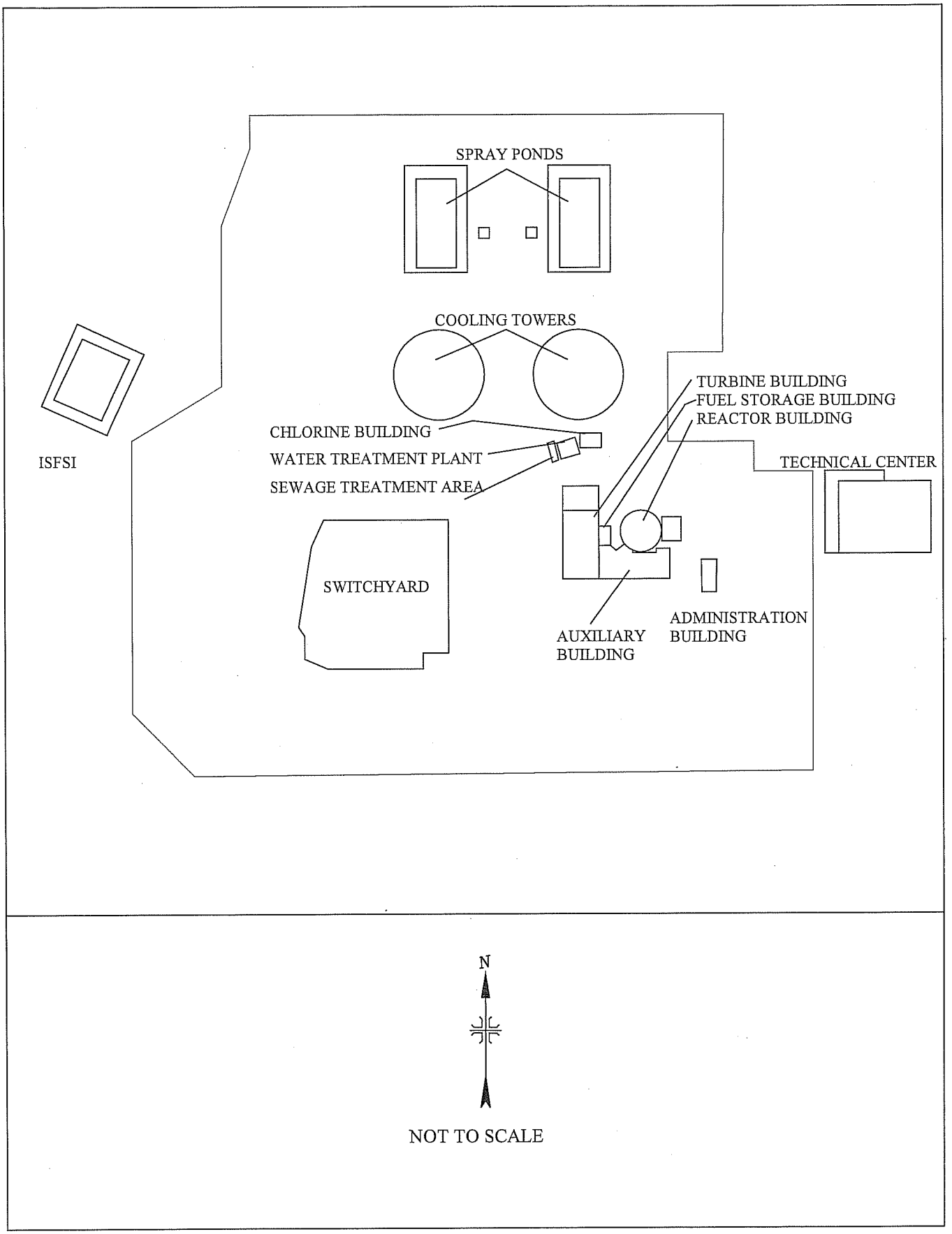


FIGURE 2: Plot Plan of the Industrial Area at Rancho Seco Nuclear Generating Station

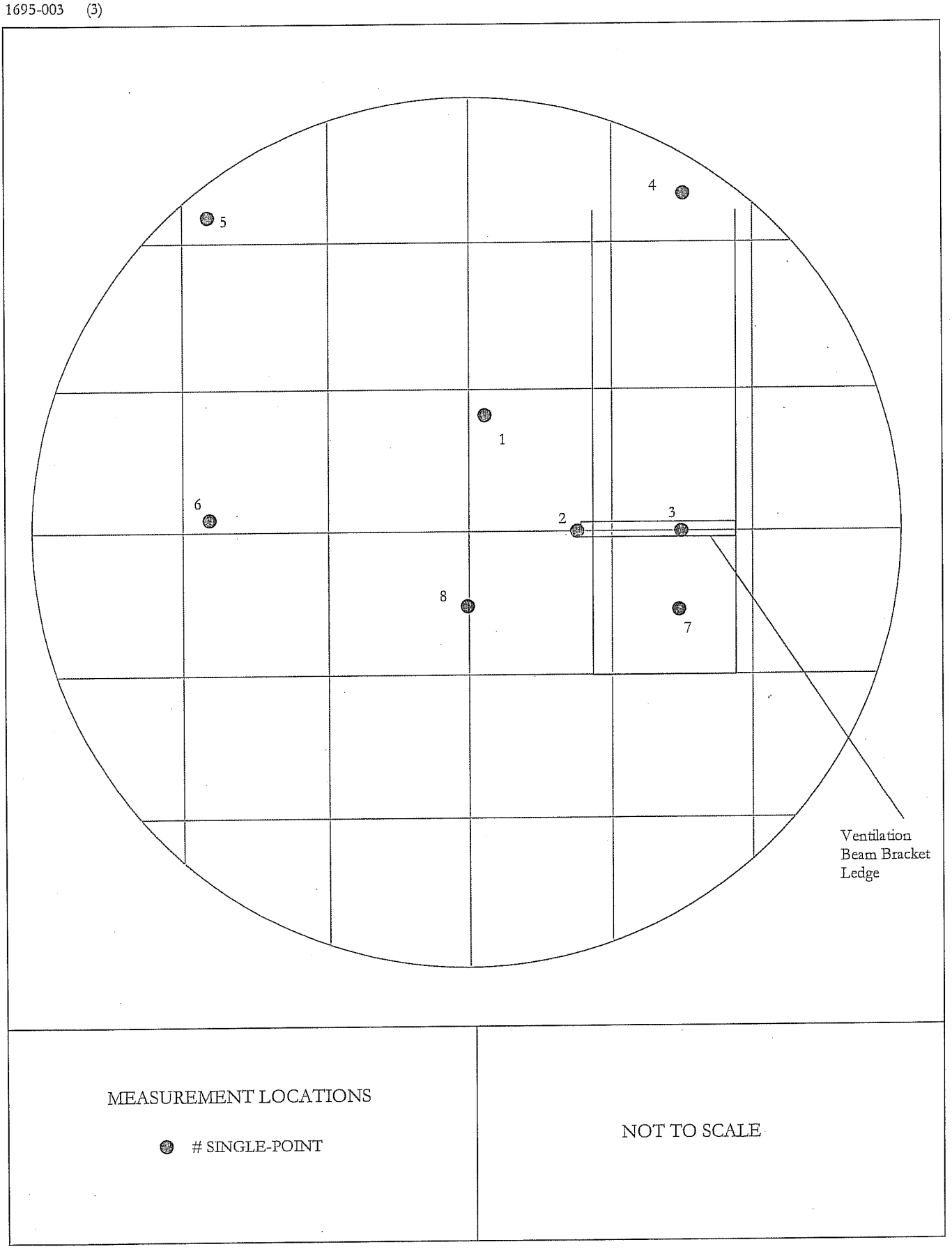
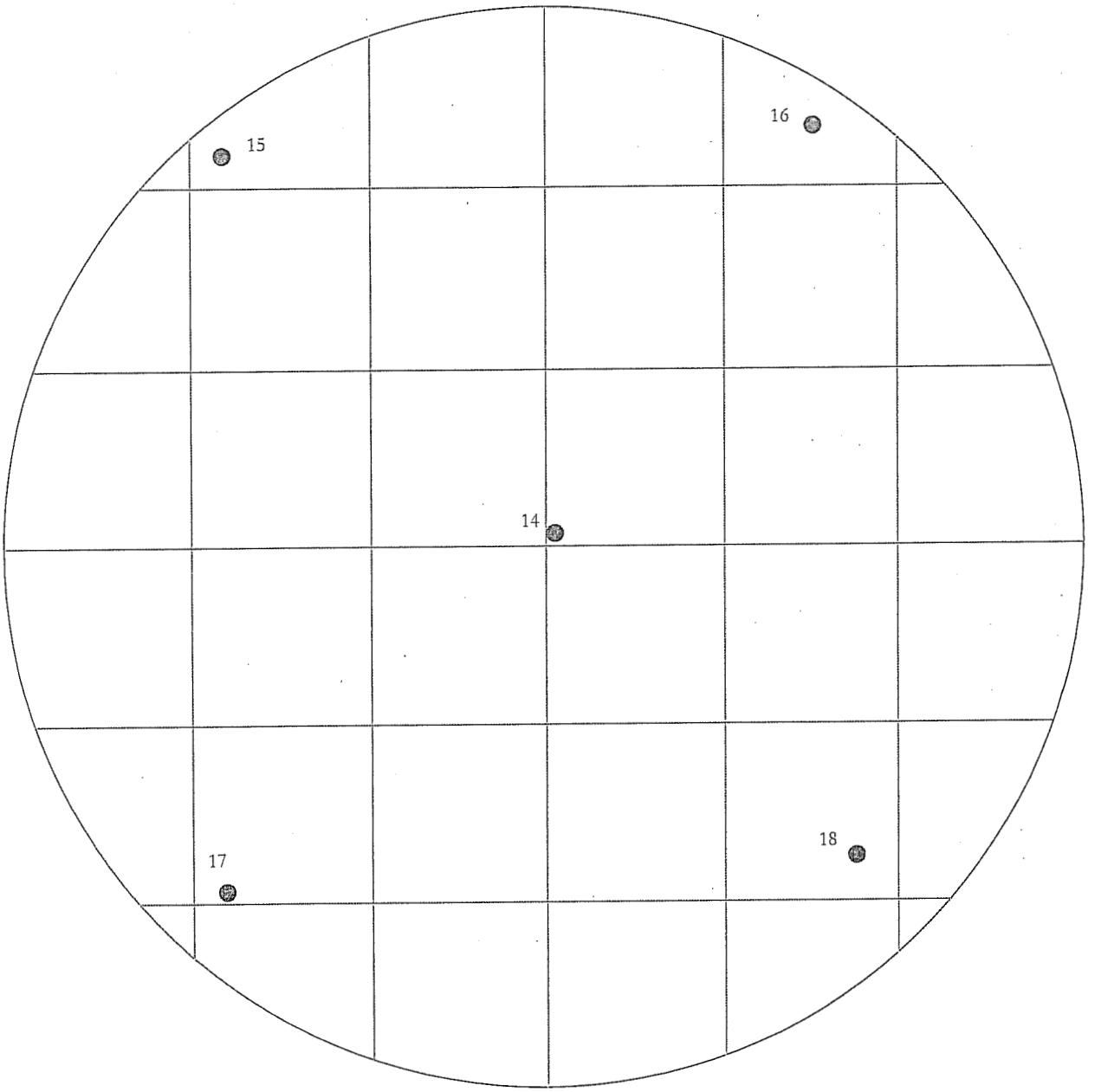


FIGURE 3: Reactor Dome CRC052 - Measurement Locations

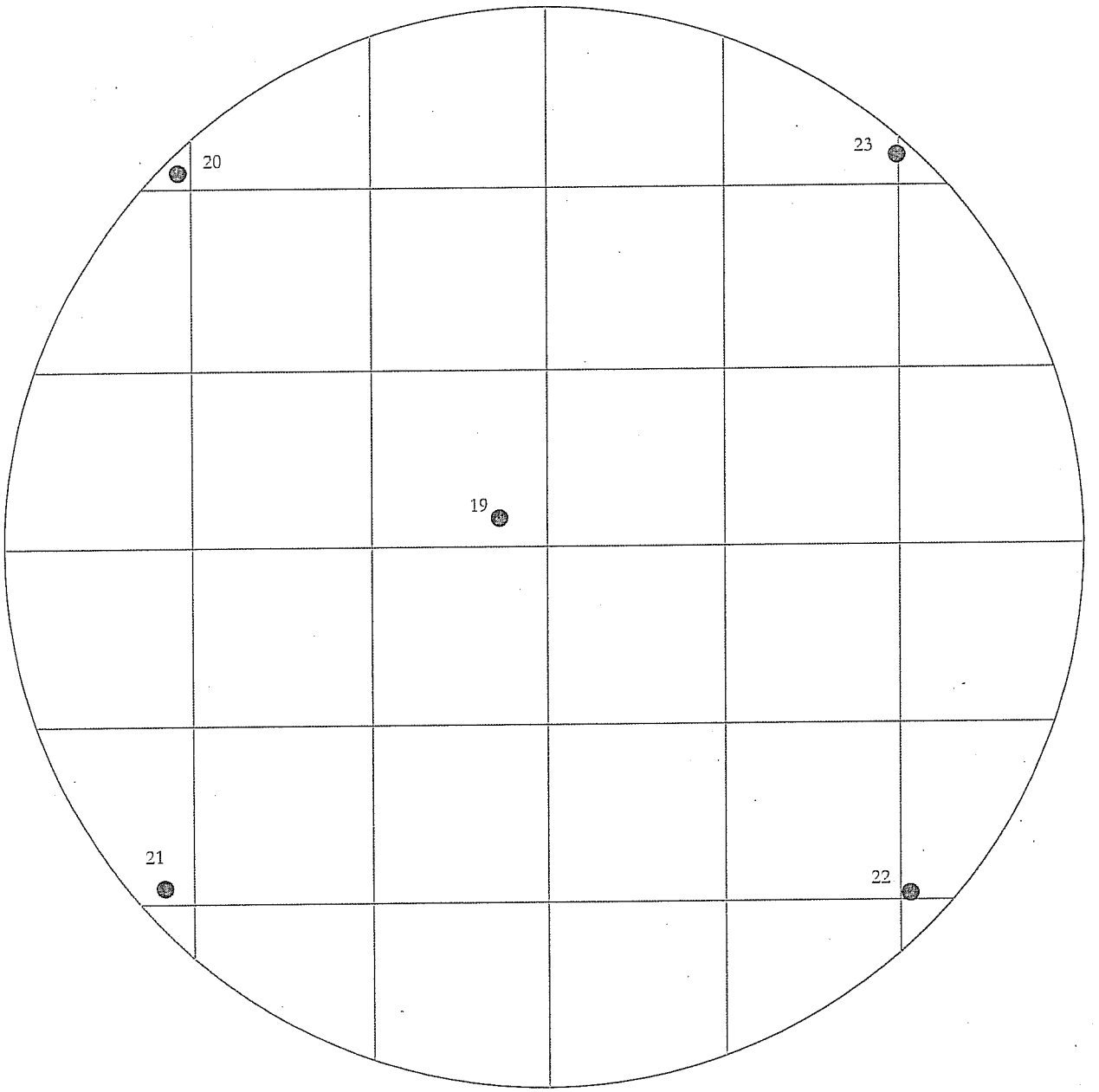


MEASUREMENT LOCATIONS

SINGLE-POINT

NOT TO SCALE

FIGURE 4: Reactor Dome CRC076 - Measurement Locations

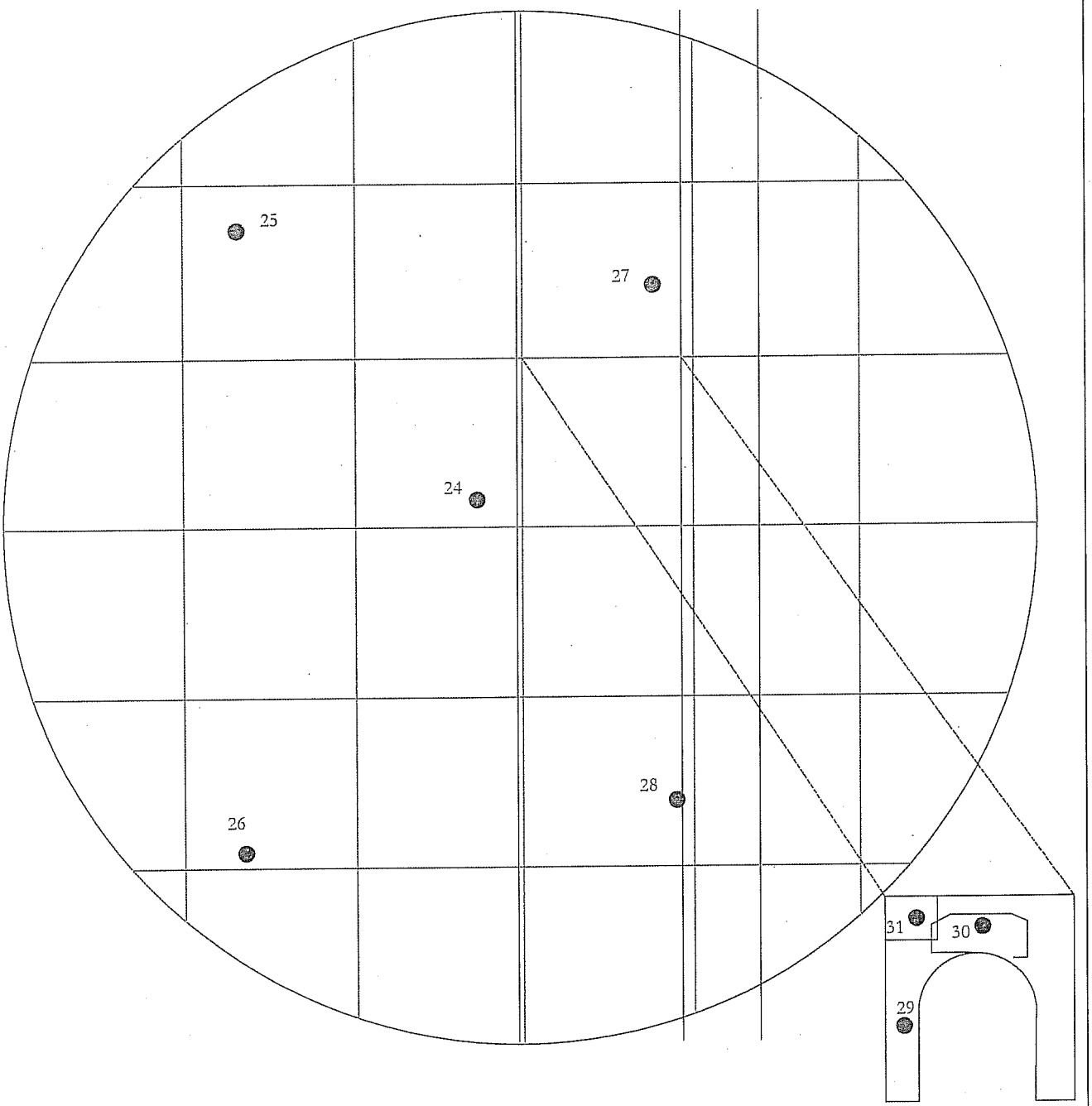


MEASUREMENT LOCATIONS

● # SINGLE-POINT

NOT TO SCALE

FIGURE 5: Reactor Dome CRC089- Measurement Locations



MEASUREMENT LOCATIONS

● # SINGLE-POINT

NOT TO SCALE

FIGURE 6: Reactor Dome CRC114 - Measurement Locations

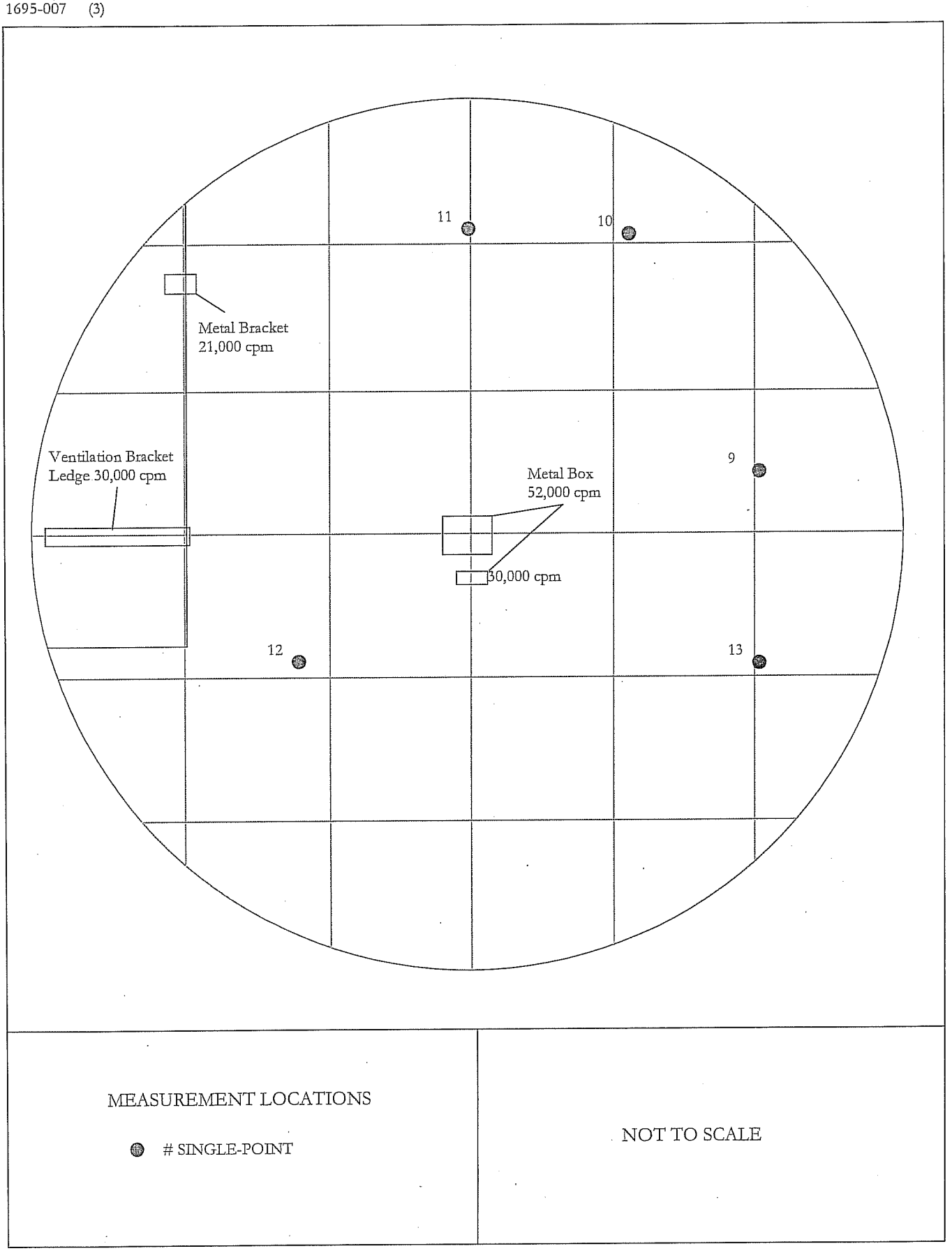


FIGURE 7: Reactor Dome CRC168 - Measurement Locations

TABLE 1

SURFACE ACTIVITY LEVELS
REACTOR DOME UPPER STRUCTURAL SURFACES
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Location/Grid Block[a]	Total Beta Activity[b] (dpm/100 cm^2)	Removable Activity (dpm/100 cm^2)	
		Alpha	Beta
Grid CRC052			
1	79,000	9	230
2	150,000	16	330
3	410,000	26	890
4	-6,800	--	--
5	-5,900	--	--
6	-13,000	--	--
7	-2,800	--	--
8	-370	--	--
Grid CRC168			
9	7,500	--	--
10	360	--	--
11	890	--	--
12	2,700	--	--
13	27,000	--	--
Grid CRC076			
14	13,000	--	--
15	12,000	--	--
16	12,000	--	--
17	-590	--	--
18	12,000	--	--
Grid CRC089			
19	4,500	--	--
20	2,700	--	--
21	12,000	--	--
22	-1,800	--	--
23	-820	--	--

TABLE 1 (continued)

SURFACE ACTIVITY LEVELS
REACTOR DOME UPPER STRUCTURAL SURFACES
RANCHO SECO NUCLEAR GENERATING STATION
HERALD, CALIFORNIA

Location/Grid Block[a]	Total Beta Activity[b] (dpm/100 cm^2)	Removable Activity (dpm/100 cm^2)	
		Alpha	Beta
Grid CRC114			
24	4,000	--	--
25	9,900	--	--
26	6,400	--	--
27	2,500	--	--
28	2,500	--	--
Metal Overhang in CRC114			
29	75,000	--	--
30	210,000	--	--
31	280,000	--	--

[a]Refer to Figures 3 through 7.
[b]The LTP Surface Single Nuclide DCGL values are 182,000 dpm/100 cm^2 for Cs-137 and 40,200 dpm/100 cm^2 for Co-60 and the Gross Beta DCGL is 43,000 dpm/100 cm^2. With a SMUD area factor of 13.8 for Co-60, the $DCGL_{EMC}$ is 593,400 dpm/100 cm^2; all of the elevated beta activity measurement locations from 1 through 28 were less than 500 cm^2. Measurement locations 29 though 31 were on a metal overhang with approximately 1 m^2 area; the average for the 1 m^2 area would be less than the $DCGL_{EMC}$.

TABLE 2

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

Sample Identification		Radionuclide	Radionuclide Concentration (pCi/g)		
			ORISE	SMUD[a]	
ORISE	SMUD			Previous	Current
1695S0001	XB8100030DS01A	Mn-54	-0.15 ± 0.15[b]	--[c]	--
		Co-60	1.45 ± 0.14	1.69	2.52
		Cs-134	0.05 ± 0.07	--	--
		Cs-137	46.6 ± 1.6	61.2	86.4
		Eu-152	0.03 ± 0.20	--	--
		Eu-154	0.06 ± 0.16	--	--
1695S0002	SA8100000DS01A	Mn-54	1.2 ± 2.5	--	--
		Co-60	2.86 ± 0.16	2.9	3.19
		Cs-134	0.13 ± 0.08	--	--
		Cs-137	113.1 ± 3.7	115	122
		Eu-152	0.15 ± 0.24	--	--
		Eu-154	0.08 ± 0.16	--	--
1695S0003	SA837001DS01	Mn-54	-0.02 ± 0.05	--	--
		Co-60	2.75 ± 0.12	5.63	2.83
		Cs-134	0.01 ± 0.02	--	--
		Cs-137	24.30 ± 0.76	20.2	20.4
		Eu-152	0.04 ± 0.09	--	--
		Eu-154	0.04 ± 0.08	--	--
1695S0004	SB837001DS12	Mn-54	0.13 ± 0.16	--	--
		Co-60	0.06 ± 0.07	0.05	0.06
		Cs-134	0.12 ± 0.09	--	--
		Cs-137	48.1 ± 1.6	31.1	33.5
		Eu-152	-0.15 ± 0.18	--	--
		Eu-154	-0.03 ± 0.12	--	--
1695S0005	CC8430020S001SS	Mn-54	0.00 ± 0.01	--	--
		Co-60	0.37 ± 0.05	0.34	0.34
		Cs-134	0.01 ± 0.02	--	--
		Cs-137	4.46 ± 0.18	4.25	4.11
		Eu-152	0.02 ± 0.06	--	--
		Eu-154	-0.03 ± 0.09	--	--

TABLE 2 (continued)

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

Sample Identification		Radionuclide	Radionuclide Concentration (pCi/g)				
			ORISE			SMUD[a]	
ORISE	SMUD					Previous	Current
1695S0006	CC8430020S005SS	Mn-54	-0.11	±	0.19	--	--
		Co-60	0.04	±	0.03	0.09	0.06
		Cs-134	0.04	±	0.03	--	--
		Cs-137	1.95	±	0.10	2.01	2.03
		Eu-152	0.00	±	0.06	--	--
		Eu-154	0.02	±	0.09	--	--
1695S0007	8100010SFPCP	Mn-54	0.05	±	0.07	--	--
		Co-60	0.07	±	0.02	0.12	0.05
		Cs-134	0.02	±	0.03	--	--
		Cs-137	2.09	±	0.09	1.42	1.6
		Eu-152	0.01	±	0.03	--	--
		Eu-154	-0.03	±	0.05	--	--

[a]Co-60 and Cs-137 concentrations provided by SMUD personnel. Previous concentrations were performed during characterization surveys. Current concentration are when the site re-analyzes the samples prior to submitting them to ORISE.
[b]Uncertainties represent the 95% confidence level based on total propagated uncertainties.
[c]Radionuclide concentrations were not provided.

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