UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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December 7, 2001

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 50-312/2001-06; 72-11/2001-03

Dear Mr. Shetler:

An NRC inspection was conducted November 13-15, 2001, at your Rancho Seco nuclear reactor facility. The enclosed report presents the scope and results of that inspection.

The purpose of the inspection was to review compliance with federal regulations, your license and your technical specifications concerning safe storage of spent fuel, preparations for cold weather, corrective actions program, and the site radiation protection program. No violations of NRC regulations were identified during the inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket Nos.: 50-312; 72-11
License Nos.: DPR-54; SNM-2510

Enclosure:
NRC Inspection Report
50-312/2001-05;72-11/2001-03

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-312; 72-11
License Nos.:	DPR-54; SNM-2510
Report No.:	50-312/2001-06; 72-11/2001-03
Licensee:	Sacramento Municipal Utility District
Facility:	Rancho Seco Nuclear Generating Station
Location:	14440 Twin Cities Road Herald, California
Dates:	November 13-15, 2001
Inspector:	J. Vincent Everett, Sr. Health Physicist, Fuel Cycle and Decommissioning Branch
Approved By:	D. Blair Spitzberg, Ph. D., Chief Fuel Cycle and Decommissioning Branch
ADAMS Entry :	IR 05000312-01-06/072000011-01-03; on 11/13/01-11/15/01; Sacramento Municipal Utility District; Rancho Seco Nuclear Generating Station. Decommissioning Report; No Violations.

EXECUTIVE SUMMARY

Rancho Seco Nuclear Generating Station
NRC Inspection Report 50-312/2001-06;72-11/2001-03

The Rancho Seco facility was undergoing active dismantlement during this inspection. Work observed was being performed safely and in compliance with NRC regulations. Good radiological controls were observed during tours of the facility, particularly in containment. Discussions with health physics personnel indicated a good knowledge of work activities underway, the potential for radiological problems and the radiation work permit requirements in the area.

The current staff at the Rancho Seco facility still has a large number of personnel that were involved with the facility during operations. These individuals continue to demonstrate the value of having personnel involved with decommissioning that are intimately familiar with the facility. Problems that have been encountered during dismantlement have been relatively minor when considering the potential for health and safety consequences that exist during a large dismantlement effort involving highly radioactive material and extensively contaminated systems. This success reflects the controlled approach that was being used at the site to systematically remove systems starting with the low radiation areas and working toward the high radiation areas. Focus on hot spot removal to reduce personnel exposures in the high radiation areas prior to initiating extensive dismantlement was a very successful program and is reflected in the low annual doses that are currently being experienced during decommissioning.

Movement of spent fuel to dry cask storage at the Independent Spent Fuel Storage Installation (ISFSI) was continuing successfully. Six casks have been loaded with five delivered to the ISFSI. Critical path to completing the project continues to be delivery of canisters.

Spent Fuel Pool Safety

- The licensee was maintaining the spent fuel pool water level, temperature and chemistry within technical specification limits (Section 1).

Organization/Management and Cost Controls

- The licensee initiated several table top drills to identify changes that would improve the site's emergency response capability to a security threat. The drills were timely and very beneficial, covering a wide range of issues that would be unique to this type of event (Section 2).

Cold Weather Preparation

- No important systems related to the spent fuel pool or the storage of large quantities of contaminated water onsite were identified as susceptible to cold weather problems (Section 3).

Self Assessments, Audits and Corrective Actions

- The licensee was actively documenting and resolving issues and problems encountered during decommissioning and dry cask storage operations. The licensee's threshold for documenting problems was very low which provided for recognizing adverse trends at an early stage (Section 4).

Operations of an Independent Spent Fuel Storage Installation

- The licensee had successfully loaded six casks with spent fuel. No significant problems had been encountered. Twenty-one casks will be loaded (Section 5).

Occupational Radiation Exposure

- Review of the radiation exposure records for the first three quarters of 2001 indicated that personnel exposures were reasonable for the work being performed. No one was projected to exceed the site administrative limit of 1 rem for the year, which is well below the NRC annual limit of 5 rem (Section 6).

Onsite Follow-up of Written Reports of Nonroutine Events

- The licensee took adequate and timely corrective actions to return effluent coliform levels to below the State of California permit levels for effluents released from the site after discovering a problem with tunnels dug in the terrace area by rodents. The tunnels had allowed run-off of the effluents instead of absorption and evaporation (Section 7).

Report Details

Summary of Facility Status

The Rancho Seco facility was undergoing active decommissioning with dismantlement work in the auxiliary building and the reactor building. In addition, the sixth cask had been loaded with spent fuel and was in the fuel building waiting transfer to the Independent Spent Fuel Storage Installation (ISFSI). Work in the reactor building included completion of the removal of all four reactor coolant pump motors, work on removal of the large air handler and the incore instrumentation, and removal of the fuel handling equipment from the refueling cavity. In the auxiliary building, dismantlement work included the segmentation of a number of tanks, including the reactor coolant drain tank and spent resin tank, and the removal of various pumps and motors. Core drilling had begun to remove small-bore piping that penetrated the concrete walls between rooms. Removal of the piping eliminates the problem of surveying the inside of the piping to verify that contamination levels remaining in the piping meets the NRC release criteria for license termination.

Overall, site decommissioning work was progressing safely with significant work completed since the last NRC inspection. Good radiological controls by the health physics personnel in containment were observed during the tour of work activities. The amount of material awaiting removal from the work areas was adequately controlled with no backlog of scrap observed that would present a safety concern to workers in the area.

1 Spent Fuel Pool Safety (60801)

1.1 Inspection Scope

Compliance with technical specification limits for the spent fuel pool water level, temperature and chemistry were reviewed.

1.2 Observations and Findings

Technical specification D 3.1.2 required the spent fuel pool water level to be maintained at 23 feet 3 inches or greater. Technical specification D 3.1.1 required the water level to be maintained at 37 feet or greater when fuel handling operations were occurring. The water level for the spent fuel pool was observed on November 14, 2001, to be 38 feet 3 inches. Technical specification D 3.2 required the temperature of the spent fuel pool to be maintained below 140°F. The spent fuel pool temperature was 62.7°F on November 14, 2001.

Technical Specification D 3.5 and D 4.5 required the licensee to conduct monthly sampling of the spent fuel pool and maintain chlorides and fluorides below 0.15 parts per million (ppm). Records were reviewed for the current calendar year. Both chlorides and fluorides were maintained at 0.01 ppm. The licensee also monitored tritium, Cs-137, Cs-134 and Co-60 concentrations in the pool. These concentrations had remained constant throughout the year with tritium levels around 0.02 microcuries/ml, Cs-137 around 2×10^{-5} microcuries/ml, and Cs-134 and Co-60 levels below

1×10^{-6} microcuries/ml.

Leakage of water from the spent fuel pool was measured on a daily basis. The water was collected, processed and returned to the spent fuel pool. For 2001, the leakage ranged from 3 to 7 gallons/day with an average of 5 gallons/day. The leak rate was consistent with levels recorded during the past years.

1.3 Conclusion

The licensee was maintaining the spent fuel pool water level, temperature and chemistry within technical specification limits.

2 Organization, Management and Cost Controls (36801)

2.1 Inspection Scope

The inspector reviewed recent table top drills conducted by the licensee to evaluate the adequacy of the emergency training and preparedness for security threat events.

2.2 Observations and Findings

As a result of the recent increase in security threats within the United States and the need for heightened awareness at the nation's nuclear plants to this threat, the licensee had initiated several table top drills with scenarios related to terrorist attacks. This effort was initiated to evaluate the emergency response capability of the staff to these types of threats and determine if implementation of the current emergency planning program, procedures and capability would be effective in responding. The NRC inspector observed one of these table top drills. The scenario presented the plant's management team with several unique decisions that would be required during these types of threats. Very good discussions were held and response actions that could be implemented were identified. The licensee discussed issues including receiving notification of a threat, determining the credibility of the threat, classifying the emergency, prioritizing issues, activating resources, making notifications, protecting site workers, and initiating recovery efforts that would be needed immediately after the event. The table top drill was well conducted and very beneficial.

2.3 Conclusion

The licensee initiated several table top drills to identify changes that would improve the site's emergency response capability to a security threat. The drills were timely and very beneficial, covering a wide range of issues that would be unique to this type of event.

3 Cold Weather Preparation (71714)

3.1 Inspection Scope

Cold weather preparations for systems vulnerable to freezing were reviewed.

3.2 Observations and Findings

The licensee had few systems that were susceptible to cold weather problems. Extensive dismantlement of plant systems and tanks had been completed. The spent fuel pool cooling system was a self-contained skid mounted system inside the fuel building. The spent fuel pool clean-up system was located inside the auxiliary building. Neither of these systems were exposed to areas outside the building such that they were susceptible to freezing. No modifications had been made to these systems since the last inspection which would increase their susceptibility to freezing.

Very few tanks containing water remained onsite. The exception was the demineralizer (demin) reactor coolant storage tank. This tank contained 200,000 gallons of slightly contaminated water. Because of the mild temperatures that occur at the site during winter, the risk of a freezing problem with this tank was minimal. The licensee's freeze protection procedure, entitled OP-C33, "Freeze Protection," Revision 14, had not been changed since a review was completed during the site inspection conducted in January 2000. The procedure was still applicable to the systems remaining onsite.

3.3 Conclusion

No important systems related to the spent fuel pool or the storage of large quantities of contaminated water onsite were identified as susceptible to cold weather problems.

4 Self-Assessments, Audits and Corrective Actions (40801)

4.1 Inspection Scope

The licensee's tracking system for documenting problems was reviewed to determine if issues were being logged, tracked and resolved related to problems encountered during decommissioning activities and dry cask storage operations. Selected documents were reviewed to determine if adequate resolution of the issues was being identified.

4.2 Observations and Findings

The licensee tracked issues that need review by management to determine if the event was significant or if it represented a trend that could be a problem. The issues were initially assigned a number in the Potential Deviation of Quality (PDQ) system and were logged in a book. The PDQ book was reviewed for issues identified in 2001. There had been 135 PDQs issued as of November 15, 2001. Of these, approximately 70 were related to dry cask storage activities. A review of the issues did not identify any significant problems or adverse trends. The licensee demonstrated a very low threshold

for initiating a PDQ. This resulted in a large number of PDQs, but also provided for the ability to observe an adverse trend at an early stage. Several PDQs were reviewed in detail and determined to be properly dispositioned.

4.3 Conclusion

The licensee was actively documenting and resolving issues and problems encountered during decommissioning and dry cask storage operations. The licensee's threshold for documenting problems was very low which provided for recognizing adverse trends at an early stage.

5 Operation of an Independent Spent Fuel Storage Installation (60855)

5.1 Inspection Scope

The status of dry cask storage activities was reviewed.

5.2 Observations and Findings

The licensee had loaded five casks containing spent fuel into the ISFSI. A sixth loaded cask was in storage in the fuel building waiting transport to the ISFSI. Table 2.1 of Special Nuclear Material License SNM-2510, issued to Sacramento Municipal Utility District for the dry cask storage of spent fuel, established limits for the spent fuel approved for storage. These included a limit of 13.5 Kw total decay heat per cask, a maximum burn-up of any assembly of 38,268 megawatt-days (MWd)/Metric Ton Uranium (MTU), and a maximum enrichment of 3.43 percent. A summary of the spent fuel characteristics for the casks currently loaded at Rancho Seco is provided as Attachment 2 to this report. All six casks have been loaded with spent fuel that met the requirements in the license.

No significant problems have been identified during the loading of spent fuel into the ISFSI. A cautious approach to the work activities was still evident by discussions with the licensee's staff and a review of the issues identified in the corrective action program. The licensee's schedule projects completion of the loading of all 21 casks by the fall of 2002.

5.3 Conclusion

The licensee had successfully loaded six casks with spent fuel. No significant problems had been encountered. Twenty-one casks will be loaded.

6 Occupational Radiation Exposure (83750)

6.1 Inspection Scope

Radiation exposure records and personnel contamination records for the first three quarters of 2001 were reviewed to determine if exposures were being controlled below NRC limits.

6.2 Observations and Findings

Radiation exposure records for the first three quarters of 2001 were reviewed. Of the 245 personnel who had been badged as of the third quarter of 2001, approximately half had exposures of less than 10 mrem. Thirteen had exposures of 300 mrem or greater. The highest exposure was 568 mrem. This individual was an operator who had been performing work with the drum dryer system. Based on work remaining for the fourth quarter of the year, no workers were expected to exceed the licensee's 1 rem administrative limit for the year.

The radiation exposures for personnel assigned to the dry cask storage project were reviewed. Five casks had been loaded and moved to the ISFSI. The sixth cask was loaded and in the fuel building waiting transport to the ISFSI. The work group involved with the dry cask storage project that received the highest exposures were the welders. They were averaging 0.165 person-rem/cask. The radiation protection personnel were averaging 0.070 person-rem/cask. Quality control personnel and the fuel team maintenance group were both also around 0.070 person-rem doses. The total dose to all workers during the loading of the casks ranged from 0.601 person-rem for the first cask to 0.361 person-rem for the fifth cask with an average of 0.477 person-rem/cask for the five casks that had completed loading into the ISFSI. As Low As Reasonably Achievable (ALARA) estimates developed in 2000 for the dry cask storage project had estimated doses for the cask loading activities of 1.2 person-rem/cask with a goal of 0.960 person-rem/cask.

Personnel contamination incidents were reviewed for the period of January 1 through October 31, 2001. Fifty-seven contamination incidents were documented. The highest personnel contamination level involved a small amount of contaminated water that had dripped on an individual's shirt. Contamination levels were 200,000 dpm. All other contamination incidents were below 40,000 dpm with most below 10,000 dpm. For contamination incidents involving the face, the individual would be sent for a whole body count. Records were reviewed for several individuals who had been whole body counted. Most counts resulted in minimal or no internal contamination detected. One individual was determined to have 0.158 microcuries of internal Cs-137 contamination. Whole body counts of the individual over the next several months showed a steady decrease as the material was excreted from the body. The value of 0.158 microcuries represented less than 1 percent of the annual limit of intake for Cs-137.

6.3 Conclusion

Review of the radiation exposure records for the first three quarters of 2001 indicated that personnel exposures were reasonable for the work being performed. No one was projected to exceed the site administrative limit of 1 rem for the year, which is well below the NRC annual limit of 5 rem.

7 Onsite Follow-up of Written Reports of Nonroutine Events (92700)

7.1 Inspection Scope

Follow-up concerning notification by the licensee of exceeding their State of California permit for coliform levels in effluents was completed.

7.2 Observations and Findings

On July 3, 2001, the licensee notified the NRC by letter that they had exceeded their total coliform daily maximum limit in the domestic sewage effluent on June 25, 2001. The coliform maximum limit was specified in their National Pollutant Discharge Elimination System (NPDES) Permit with the State of California. Compliance with the NPDES permit was achieved the following day. Notification to the NRC was made in accordance with 10CFR50.72(b)(2)(xi) which requires notification of the NRC whenever notification is made to another governmental agency due to exceeding a permit limit.

The problem with the high coliform levels was the result of the sewage water flowing through tunnels in the terrace area created by small rodents and an inadequate concentration of sodium hypochlorite added to the effluent. The terrace area was a large settling area intended to hold the sewage effluent water to allow for evaporation and absorption into the soil. By flowing quickly through the terrace area, the effluent did not have time to evaporate. Corrective action was to increase the level of sodium hypochlorite to the effluent and till the soil in the terrace area to eliminate the tunnels and return the terrace area to it's normal condition. Annual tilling of the terrace may be performed by the licensee.

7.3 Conclusion

The licensee took adequate timely corrective actions to return their coliform levels to below the State of California permit levels for effluents released from the site after discovering a problem with tunnels dug in the terrace area by rodents. The tunnels had allowed run-off of the effluents instead of absorption and evaporation.

8 Open Items (92701)

8.1 (Closed) IFI 50-312/0001-02: Difference Between Dose Estimates and Dose Records: The dose records for the first three quarters of 2001 were reviewed. The results reflected that optically stimulated luminescent (OSL) dosimeter badges were being stored at the entrance to the radiologically controlled area, which was determined to be

a lower background area than the previous storage area in the security building. The total for the three quarters of 2001 was 15.397 person-rem from the electronic dosimeters and 13.433 person-rem from the OSL dosimeters. A review of individual dosimeter results did not indicate a consistent pattern of one type of dosimeter giving higher readings than the other. The electronic dosimeter results also reflected neutron doses that had been estimated based on time keeping, which was used through September 2001, until a correction factor was determined for the electronic dosimeters as part of open Item 72-11/0101-01 discussed below. This resulted in the electronic dosimeter values being higher due to the conservative nature of using time keeping for calculating dose estimates. Overall, the data for the past three quarters demonstrated adequate consistency between the dose estimates from the electronic dosimeters and the dose values from the OSL dosimeters used for the dose records.

8.2 (Closed) IFI 72-11/0101-01: Neutron Dosimetry Program: The licensee conducted a number of tests and evaluations to determine the correction factor for the Siemens direct reading electronic dosimeters that were used during the loading of the spent fuel into dry cask storage. This was necessary because dosimeter results are effected by the neutron energies that the workers are exposed to. Neutron energy levels are different with water in the cask versus the cask drained. When the cask is filled with water, the neutron energy levels are closer to the thermal range and the neutron flux levels are low, resulting in minimal contribution to the overall worker dose rate. When the water in the cask is drained during the fuel drying process prior to movement to the ISFSI, the neutron fluxes and the energy levels are higher. This is because the water, acting as a moderator and as shielding, has been removed. The neutron dose rates can exceed the gamma dose rates. The Siemens dosimeter allowed for an electronic setting to account for the neutron energy levels. The licensee documented a number of tests conducted to determine the relationship between the Remball survey meter, the Siemens dosimeters and the Neutrak personnel dosimeters in an office memo dated March 19, 2001. On August 21, 2001, the licensee issued an office memo establishing a calibration factor of 25 for the Siemens dosimeters and provided the basis for the determination. The licensee had coordinated activities with the vendor concerning the tests being performed and the determination of the calibration factor. A review of the licensee's tests was completed during this inspection. The test that best reflected the case where water was removed from the cask and the neutron dose rate was highest was the third test conducted on July 19, 2001. This test lasted 2.12 hrs with a neutron dose rate averaging 56 mrem/hr as measured by the Remball. This would be an integrated dose of 119 mrem. The Siemens dosimeters, with a calibration factor of 25, measured a dose of 102 mrem. The Neutrak dosimeters, which are the official dose record, measured 60 mrem. The Neutrak dosimeters are the most accurate dose results, calibrated to a moderated Californium-252 under a National Voluntary Laboratory Accreditation Program in compliance with ANSI HPS N13.11-1993. However, these dosimeters must be sent offsite for analysis and do not provide the immediate dose information that is available through the Remball and Siemens dosimeters. The Siemens dosimeters and the Remball provided comparable results which can be used for controlling access and were demonstrated to be conservative when compared to the Neutrak results.

8.3 (Discussed) URI 50-312/0103-01: Adequacy of the Licensee's Safety Evaluation of Fuel Storage Building Walls: The licensee was continuing their evaluation of the fuel storage building walls to determine if the movement of the walls indicated that unusual stresses were occurring on the walls. The licensee hired an outside consultant to evaluate the movement observed on the walls which had caused the crane rails to become misaligned. The consultant, a Ph.D. in structural analysis, conducted an onsite evaluation of the condition of the walls and the structural design of the walls. His evaluation concluded that there were no structural forces being applied to the walls that would cause the walls to deform or fail. The most likely cause of the movement of the walls was from ground settling and the incident of a higher solar affect on one side of the building than the other. To continue to assess the structural integrity of the walls, the licensee initiated a monitoring program to inspect the walls on a monthly basis and to track any cracks found. This included monitoring existing cracks to determine if additional growth of the cracks were occurring and whether new cracks were forming. Also, on a quarterly basis, the licensee plans to inspect the rails where the original misalignment had occurred to determine if any additional misalignment was occurring. Further consultation with the independent structural engineer was planned if any unusual indications were found. The results of the monitoring program will be used by the licensee to support their position during future discussions with the NRC concerning the adequacy of the original safety evaluation that evaluated the misalignment problem.

9 Exit Meeting

The inspector presented the inspection results to members of licensee management at the exit meeting on November 15, 2001. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

J. Delezenski, Nuclear Quality Assurance/Licensing/Administrative Superintendent
J. Fields, Technical Services Superintendent
D. Gardiner, Decommissioning Project Manager
L. Langley, Security
S. Porterfield, Health Physics
B. Rogers, Supervising Radiation Specialist
S. Redeker, Plant Manager
T. Shaw, Chemistry Specialist
J. Whitte, Technical Services Engineer

INSPECTION PROCEDURES USED

36801	Organization, Management and Cost Controls
40801	Self Assessment, Auditing and Corrective Actions
60801	Spent Fuel Pool Safety at Permanently Shutdown Reactors
60855	Operations of an Independent Spent Fuel Storage Installation
71714	Cold Weather Preparations
71801	Decommissioning Performance and Status Review
83750	Occupational Radiation Exposure

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-312/0001-02	IFI	Difference Between Dose Estimates and Dose Records
72-11/0101-01	IFI	Neutron Dosimetry Program

Discussed

50-312/0103-01	URI	Adequacy of the Licensee's Safety Evaluation of Fuel Storage Building Walls

LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
Ci	Curie
dpm	disintegrations/minute
HPS	Health Physics Society
ISFSI	Independent Spent Fuel Storage Installation
ml	milliliter
MWd/MTU	Megawatt-days/metric ton Uranium
mR	milliRoentgen
NRC	Nuclear Regulatory Commission
NPDES	National Pollutant Discharge Elimination System
OSL	Optically Stimulated Luminescence
PDQ	Potential Deviation from Quality
ppm	Parts per million
SNM	Special Nuclear Material

ATTACHMENT 2

LOADED NUHOMS CASKS AT THE RANCHO SECO ISFSI

LOADING ORDER	CASK #	HSM #	DATE PLACED ON PAD	HEAT LOAD (Kw)	BURNUP MWd/MTU	FUEL ENRICHMENT	PERSON-REM DOSE
1	#1	#20	4/01	9.005	35,200	3.43	0.601
2	#3	#18	7/01	8.145	37,911	3.43	0.418
3	#4	#16	8/01	8.268	36,290	3.43	0.552
4	#5	#14	9/01	8.149	37,911	3.43	0.456
5	#2	#12	10/01	8.774	37,550	3.43	0.361
6	#6	#10	in fuel bldg	8.152	36,707	3.43	not complete

Notes:
- Heat Load (kw) is the sum of the heat load values for all spent fuel assemblies in the cask based on 1999 decay
- Burnup is the value for the spent fuel assembly with the highest individual discharge burnup
- Fuel Enrichment is the spent fuel assembly with the highest individual enrichment per cent of U-235
- HSM is the concrete horizontal storage module located at the ISFSI that holds the cask