ENVIRONMENTAL ASSESSMENT BY THE NUCLEAR REGULATORY COMMISSION

RELATED TO THE REQUEST TO AUTHORIZE FACILITY DECOMMISSIONING

RANCHO SECO NUCLEAR GENERATING STATION, UNIT 1

SACRAMENTO MUNICIPAL UTILITY DISTRICT

DOCKET NO. 50-312

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1.0 INTRODUCTION

1.1 Background

The Rancho Seco Nuclear Generating Station (RSNGS) received an operating license on August 16, 1974. The plant is described in the "Rancho Seco Nuclear Generating Station, Unit 1 Updated Safety Analysis Report" (USAR) [Ref. 1], and in the U.S. Nuclear Regulatory Commission (formerly the U.S. Atomic Energy Commission), "Safety Evaluation by the Directorate of Licensing, U.S. Atomic Energy Commission, in the Matter of Sacramento Municipal Utility District Rancho Seco Nuclear Generating Station, Unit 1," Docket No. 50-312 (SER) [Ref. 2].

RSNGS operated for 7 fuel cycles and was shut down on June 7, 1989, after approximately 15 years of operation. The plant operated approximately 2,149 effective full-power days over its operating life, as noted in "Rancho Seco Nuclear Generating Station Proposed Decommissioning Plan" (PDP) [Ref. 3]. The decision by the Sacramento Municipal Utility District (SMUD) to permanently shut down the plant was based on the results of a June 6, 1989, non-binding referendum that SMUD no longer operate RSNGS, and SMUD not being able to sell the plant. On August 29, 1989, the licensee formally informed the U.S. Nuclear Regulatory Commission (NRC) that the plant was permanently shut down.

Because the decision to shut the plant down before the expiration of its operating license was not anticipated, the licensee was unable to provide the NRC with a preliminary decommissioning plan in accordance with 10 CFR 50.75. The licensee submitted its "Plan for Ultimate Disposition of the Facility" (PUDF), in July 1990, in accordance with an NRC staff request [Ref. 4].

The licensee proposes to decommission RSNGS using the SAFSTOR alternative. The term "SAFSTOR," in this environmental assessment (EA), is intended to be inclusive of both the Custodial-SAFSTOR and Hardened-SAFSTOR subcategories of the SAFSTOR alternative, as generally defined in the "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586, August 1988, (GEIS) pages 2-9 and 2-10 [Ref. 5]. The licensee contemplates using these two subcategories of the SAFSTOR decommissioning alternative--Custodial-SAFSTOR and Hardened-SAFSTOR--followed by dismantlement.

SMUD submitted "Supplement to Rancho Seco Environmental Report-Post Operating License Stage," by letter (J. R. Shetler to T. E. Murley), dated October 21, 1991 [Ref. 6]. See 51 CFR §51.53(b). This document was supplemented by "The Response to the Request for Additional Information in Support of the Rancho Seco Decommissioning Plan and Associated Environmental Report," April 15, 1992 [Ref. 7].

The licensee, in its letters of April 7, and April 19, 1993 [Refs. 8 and 9], revised portions of its April 15, 1992, response to an NRC request for additional information related to the review of the RSNGS decommissioning plan. Most of the changes were adjustments to the activities schedule. The licensee now plans to complete certain actions prior to the NRC issuing an order authorizing the decommissioning of RSNGS. The staff has reviewed these schedular changes and finds that the activities the licensee plans to complete prior to the issuance of the decommissioning order are activities that are allowed under the terms of the current license and are consistent with NRC policy. See 51 CFR §51.95(b). That policy is consistent with January 14, 1993, Commission guidance [Ref. 10] which states that if a possession only license or shutdown order has been issued, a licensee may take certain actions prior to issuance of a decommissioning order if those actions do not:

(a) foreclose the release of the site for possible unrestricted use,
(b) significantly increase decommissioning costs,
(c) cause any significant environmental impact not previously reviewed, or
(d) violate the terms of the licensee's existing license ... or 10 CFR 50.59 as applied to the existing license.

The actions that SMUD proposed to perform before approval of the RSNGS decommissioning plan are allowed under the above criteria. Moreover, these proposed actions are of such minor significance that they are also allowed by the previous Commission policy prior to issuance of the January 14, 1993, guidance discussed above. The earlier policy was stated in CLI-90-08, on Shoreham, and required licensees to refrain from taking any actions that would materially and demonstrably affect the methods or options available for decommissioning or that would substantially increase the costs of decommissioning, prior to the submission and approval of a decommissioning plan.

The effect of the licensee undertaking these actions prior to the approval of the RSNGS decommissioning plan is to reduce the environmental impact of the activities authorized by the issuance of the Decommissioning Order. The licensee estimates that the net effect of completing these activities prior to decommissioning will be to change the overall radiation exposure expected during SAFSTOR from 154 man-rem to 134 man-rem. The reduction in radiation exposure during decommissioning is accompanied by some increased exposure prior to the issuance of the Decommissioning Order. These changes do not cause an increase in cumulative radiation exposure. There is no significant environmental impact regarding whether these activities are performed before or after decommissioning is authorized. In addition, since the activities to be undertaken by the licensee are allowed under the existing facility license, their environmental impacts need not be considered when evaluating the environmental impacts of activities authorized by the Decommissioning Order.

1.2 Need for Proposed Action

The proposed action (decommissioning) is necessary because of the SMUD decision to abide by the June 6, 1989, non-binding referendum and the inability to sell RSNGS. 10 CFR 50.82(a) requires that any licensee may apply to the Commission for authority to surrender a license voluntarily and to decommission the facility. Each application must be accompanied or preceded by a proposed decommissioning plan. Further, 10 CFR 50.82(e) provides that, if the decommissioning plan demonstrates that the decommissioning will be performed in accordance with the regulations and will not be inimical to the common defense and security or to the health and safety of the public, and after notice to interested persons, the Commission will approve the plan subject to such conditions and limitations as it deems appropriate and necessary and issue an order authorizing the decommissioning.

1.3 Proposed Action

The licensee proposed to decommission RSNGS by employing two subcategories of the SAFSTOR alternative: Custodial-SAFSTOR and Hardened-SAFSTOR, followed by dismantlement at the end of the Hardened-SAFSTOR period (approximately 20 years after final shutdown). The licensee described its decommissioning plan in its PDP [Ref. 3], transmitted by letter (D. R. Keuter to S. Weiss) to NRC on May 20, 1991 [Ref. 11].

The licensee will initially place the plant into a Custodial-SAFSTOR condition. The Custodial-SAFSTOR phase will last until all spent fuel is removed from the spent fuel pool (SFP) and transferred to an onsite independent spent fuel storage installation (ISFSI). Then SMUD will begin the process of placing the plant into a Hardened-SAFSTOR condition. The spent fuel will be stored in the ISFSI until the Department of Energy takes title to the spent fuel and the fuel is subsequently transported to another location.

During the Hardened-SAFSTOR period, the licensee has committed to continue to operate the plant ventilation, high-efficiency particulate air (HEPA) filters, and radiation monitoring system ("Response to Request for Additional Information in Support of the Rancho Seco Decommissioning Plan," August 31, 1992) [Ref. 12]. Dismantlement will begin approximately 20 years after the shutdown of the plant in the year 2008. During this phase of decommissioning, the licensee will decontaminate and dismantle the plant. Specific details associated with potential environmental impacts, during the dismantlement phase of decommissioning, will be addressed in an updated supplement to the RSNGS Environmental Report (ER). See 10 CFR §50.82(d).

1.4 Decommissioning Alternatives

The purpose of decommissioning a nuclear facility is to take the facility safely from service, and to reduce residual radioactivity to levels that permit release of the property for unrestricted use and license termination. Alternative methods to accomplish decommissioning were evaluated in the Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, NUREG-0586, pages 2-9 through 2-11 [Ref. 5] and are as follows: DECON, ENTOMB, or SAFSTOR. These alternatives and the No Action alternative are addressed below as a supplement to the evaluation in NUREG-0586.

1.4.1 DECON

The DECON decommissioning alternative consists of either removing contaminated equipment, components, systems, and structures for disposal at a site authorized to receive such contamination or reducing the radioactive contamination to a level that permits unrestricted use shortly after the cessation of facility operation. The licensee did not propose the immediate DECON alternative. SMUD proposes to dismantle RSNGS (implementing what SMUD terms a Deferred-DECON phase) approximately 20 years after final reactor shutdown. [Ref. 3].

1.4.2 ENTOMB

The ENTOMB alternative involves encasing radioactive contaminants in a structurally long-lived material, such as concrete. The entombed structure would be appropriately maintained, and there would be continued surveillance until the radioactivity is removed from the site or decays to a level that permits unrestricted use of the property. Operation of power reactors typically produces long-lived radionuclides which have half-lives in excess of 100 years and will not decay to levels permitting release of the facility for unrestricted use within the foreseeable lifetime of any man-made structure. Thus, the basic requirement of continued structural integrity of the entombment cannot be ensured for this facility, and ENTOMB would not be a viable alternative in this circumstance. See NUREG-0586, §2.4.4, §4.3.3, and §15.1.1.

1.4.3 SAFSTOR

The SAFSTOR alternative involves placing the facility in a safe condition and maintaining it in that state until it is dismantled. While in SAFSTOR, the facility would be left intact, fuel would be removed from the reactor, and radioactive fluids would be drained from systems and processed. Some radioactive decay will occur during the SAFSTOR period and thus reduce the amount of radioactive material. Also, the SAFSTOR period will allow time for SMUD to accumulate additional funds to complete decommissioning and reduce residual radioactivity to a level that will permit release of the site for unrestricted use. Waste generated during the SAFSTOR period would be processed and either shipped off site for disposal, or provisions would be made for onsite storage if the disposal option is not immediately available.

The SAFSTOR alternative satisfies the requirement to protect the public while reducing commitments of occupational radiation exposure. The SAFSTOR alternative provides that buildings are secure against intruders, and that radioactive or toxic materials are maintained within the facility. See NUREG-0586 §2.4.3, §4.3.2 and §15.1.1.

1.4.4 No Action

The objective of decommissioning RSNGS is to restore a radioactive facility to a condition such that there is no unreasonable radiological impact from the decommissioned facility on the public, and on worker health and safety. To ensure that the impacts on the public health and safety are within acceptable bounds, some action is required, even if it is as minimal as making a termination radiation survey to verify acceptably low radioactivity levels. "No Action" implies that a licensee would simply abandon or leave a facility, after ceasing operations; therefore, as concluded in Section 2.4.1 of NUREG-0586 [Ref. 5], the "No Action" alternative is not a viable decommissioning alternative. NRC regulations do not allow a licensee to simply abandon or leave a facility, after it ceases operation.

1.4.5 Decommissioning Alternative Finding

The DECON and SAFSTOR decommissioning alternatives are viable methods to decommission this facility. The licensee proposed the SAFSTOR alternative for decommissioning RSNGS. Because the SAFSTOR alternative does not significantly impact the environment, the alternative proposed by the licensee is acceptable.

2.0 DESCRIPTION OF PLANT AND PROPOSED DECOMMISSIONING PLAN

2.1 RSNGS Description

RSNGS is described in detail in the USAR [Ref. 1]. The plant is a pressurized-water reactor (PWR) design. The nuclear steam supply system (NSSS) is a 935-MWe, 2770-MWt, Babcock and Wilcox design. Condenser cooling water was supplied by the Folson South Canal. The canal was constructed by the Bureau of Reclamation, and the pipeline and pumping station are located between the plant and canal [Ref. 6].

At the time of the plant final shutdown, a significant quantity of radioactive material remained at RSNGS. The irradiated fuel stored on site in the SFP contains very large quantities of radioactive material. Large immobile quantities of radioactive material are contained in the neutron-activated structural materials in and around the reactor pressure vessel (RPV). A significant quantity of radioactive material is contained in the corrosion film on the inside of system piping.

During plant operation, there were fuel failures and primary-to-secondary leaks (steam generator tube failures) that spread radioactive material beyond the primary system. The licensee has identified radioactive contamination in areas outside the containment and auxiliary buildings, and in the immediate environs of the plant [Ref. 6].

2.2 Plant Radioactive Inventory

Except for inaccessible areas, the major plant radioactive inventories remaining at RSNGS are summarized in Table 1. Radioactive inventories in the RPV, nonfuel assemblies, plant systems, primary shield wall, SFP walls, and other equipment, plus the inventory in inaccessible areas, will be significant at RSNGS, even after spent fuel is removed from the SFP.

Table 1

Plant Radioactivity Inventory

Location	Curies
Spent fuel in SFP (493 spent fuel assemblies)	140,800,000
Reactor pressure vessel (RPV)[1]	2,582,714
Non-fuel assemblies, SFP[2]	97,000
Plant systems[3]	4,490
Primary shield wall[4]	524
SFP walls, racks, & related equipment	47[5]

1 Includes the RPV and internals. Neutron activation calculations were performed using the following computer codes ANISN-W CCC-255C MICRO, "ANISN-W - Multi-Group One-Dimensional Discrete Ordinates Transport Code with Anisotropic Scattering," Oak Ridge National Laboratory Radiation Shielding Information Center, February 1986 [Ref. 13], and ORGEN2 CCC-371 MICRO "ORIGEN2 - A Revised and Updated Version of the Oak Ridge Isotopic Generation and Depletion Code," Oak Ridge National Laboratory Radiation Shielding Information Center, October 1987 [Ref. 14].

2 Includes 181 orifice rod assemblies, burnable poison assemblies, in-core instruments, and retainer assemblies.

3 Based on "Residual Radionuclide Distribution and Inventory at Rancho Seco Nuclear Generating Station," PNL 5146 [Ref. 15], and Phase I characterization.

4 Includes reinforced steel and corrugated steel liner.

5 These data were calculated using an analysis of samples from the underwater vacuum filter and estimated crud volume.

2.3 Plant Radiation Levels

General area radiation exposure rates due to radioactivity induced during operation and contamination in the reactor and auxiliary buildings are given in Tables 2, and 3, respectively.

Table 2

Reactor Building Contamination Levels

Location (Room and/or Component)	Contamination Level dpm/cm^2	Exposure Rate mR/hr
+60-ft level	1K-60K	1-12
+40-ft level		
Operating floor	<1K-6K	0.2-45
Components	30K	-
+20-ft level		
Floor & walls	<1K-1K	0.2-5
Pipe components	1K-8K	-

Table 2 (CONT'D)

Reactor Building Contamination Levels

Location (Room and/or Component)	Contamination Level dpm/cm^2	Exposure Rate mR/hr
Grade level		
Floor	<1K-4K	0.2-2
Cable trays	4K-26K	-
-27-ft level	2K-180K	2.0-500
"A" D-ring		
"A" reactor coolant pump	25K-90K	1.5-40
-27-ft level area	2K	5.0-40
-14-ft level (OTSG[1] area)	40K	5.0-150
+40-foot level (OTSG[1] area)	15K-300K	2.5-150
"B" D-ring		
"C" reactor coolant pump motor	60K	-
"D" reactor coolant pump seal area	20K	-
"B" OTSG[1]	20K-90K	-
Pressurizer	40K-60K	-
Floors & walls	8K-110K	-
RCS piping	10K-40K	-
+15-ft level	10K-40K	-

1 Once-through steam generator.

Table 3

Auxiliary Building Contamination Levels and Exposure Rates

Location (Room and/or Component)	Contamination Level, dpm/cm^2	Exposure Rate, mR/hr
+40-ft level		
Radiochemistry lab	<1K	0.01-0.08
Access control point	<1K	0.01
Change room	<1K	0.01
Instrument repair room	<1K	0.01-0.04
Radioactive source room	<1K	0.01-0.04
+20-ft level		
Ventilation equipment room	<1K-6K	0.4
Radiation monitor room	<1K-2K	0.4

Table 3 (CONT'D)

Auxiliary Building Contamination Levels and Exposure Rates

Grade level		
Compactor room	<1K-6K	1.0-5.0
Solidification room	<1K-3K	-
Hot machine shop	<1K-2K	0.06-0.1
-20-ft level		
Miscellaneous waste filter room	2K-500K	2.0-50.0
Deborating ion exchange room	<1K	0.01-0.4
West decay heat cooler room	<1K-10K	0.5-12.0
"A" high-pressure injection pump room	<1K-20K	-
Spent resin tank/crud tank room	1K-100K	5.0-100.0
Underground tank farm	1K-60K	1.0-500.0
Miscellaneous waste tank room	<1K	0.5-7000.
Miscellaneous waste concentrates tank room	<1K-80K	10.0-1000.
Pump alley (-27-ft level)	<1K	<1.0-10.
East decay heat cooler room	<1K-300K	4.0-60.
Waste gas decay tank room	<1K	0.04-0.2
"B" high-pressure injection pump room	<1K-22K	<1.0-22.0
Hallways	<1K	<1.0-6.0
Miscellaneous waste concentrator	2K-60K	2.0-18.0
Primary/secondary ion exchanger valve gallery	<1K-12K	2.0-140.0
Makeup pump room	2K-14K	1.0-10.0
-47-ft level		
East decay heat pump room		
Main level	5K-20K	6.0-100.0
Mezzanine	<1K-2K	2.0-40.0
West decay heat pump room		
Main level	<1K-40K	<1.0-12.0
Mezzanine	<1K-40K	0.2-5.0

In the fuel storage building the walkway around the SFP is on the +40-ft elevation. The exposure rate in this area is 0.5 mR/hr. Contamination levels ranging up to 80,000 dpm/100 cm^2 were found [Ref. 3]. Exposure measurements ranging from 6 mR/hr to 200 mR/hr were found in the upender pit. Underwater contact measurements of corrosion products ranged from 200 mR/hr to 5 R/hr [Ref. 3].

On the +40-ft elevation of the turbine building, exposure rates were found to be less than 0.1 mR/hr. The highest measured exposure rate found was 0.16 mR/hr. Removable contamination levels were found in general areas to be less than 1000 dpm/100 cm^2 [Ref. 3]. General area exposure rates of 0.1 mR/hr, and a contact measurement of 12 mR/hr on one of the feedwater heaters were found on the +20-ft elevation of the turbine. Removable contamination was found to be less than 1000 dpm/100 cm^2 [Ref. 3]. The polisher sump, condensate pit sump, feedwater pumps, and hotwells are on the grade level of the turbine building. Surveys of the sumps found them to be at background levels. Contamination levels were found to be less than 1000 dpm/100 cm^2 [Ref. 3].

The tank farm is located on the northwest side of the reactor building. In the area of the borated water storage tank (BWST), exposure rates were found that range from 0.5 mR/hr to 10 mR/hr. Contact exposures as high as 200 mR/hr were measured on BWST valves and pipes. Removable contamination levels (excluding the tritium evaporator day tank sample sink enclosure which ranged up to 50,000 dpm/100 cm^2) were, in general, less than 1000 dpm/100 cm^2. One high radiation area in excess of 100 mR/hr and another area averaging 8 mR/hr were measured in the interim onsite storage building. In this building, contamination levels were, in general, less than 1000 dpm/100 cm^2 [Ref. 3]. In addition, there are a number of structures and systems that are inaccessible, because of high radiation levels. The best estimated exposure rates in these areas are given in Table 4.

Table 4

Exposure Rates for Inaccessible Structures/Systems [Ref. 3]

Location	Last Access to Area	Exposure Range mR/hr.
Reactor cavity	2/89	100-1500[1]
RC drain tank	1987	5000-10000
Demineralizer[2]	1974	-[3]
Spent resin tank	2/90	-[4]
Radwaste crud tank	1974	20-30 [5]
Flash tank	1987	100-200
Letdown filters	1985	300-1000[6]
Backflush tank	1974	-[7]
Reactor building Emerg. sump	1988	2000[8]

Table 4 (CONT'D)

Exposure Rates for Inaccessible Structures/Systems [Ref. 3]

Location	Last Access to Area	Exposure Range mR/hr.
Reactor building		
Normal sumps	-	200-500[9]
Decay heat pump room & radioactive waste sumps	1987	3-20[10]

1 Surveys from 1986 indicate a level of 1800 mR/hr on the vessel exterior at the -10-ft level.

2 Spent fuel, primary, and secondary system cubicles. The licensee compared the radiological status with isotopic concentrations of the resins.

3 Radioactivity of the resin concentration in the range of 3 to 4 µCi/ml.

4 The resins were transferred into a high-integrity container in June 1990; the licensee anticipates transferring approximately 100 ft^3 of resin per year from the SFP and radwaste waste system.

5 The licensee measured 1 R/hr to 10 R/hr through an opening in the filter shield wall.

6 Last survey when shielding was removed from filters for modifications.

7 Estimated that exposure rates are in the several R/hr range.

8 Sump surveyed with 4 in. of water in the sump; removable contamination in excess of 500,000 dpm/cm^2.

9 Estimate with 0.25 in. of water in sumps "A" and "B."

10 Debris cleanout of the sump had exposure rates of up to 1 R/hr.

2.4 Contamination Outside of the Major Structures

Onsite contamination outside of the major structures (e.g., reactor, auxiliary, and fuel-handling buildings) was identified in the retention basins, tank farm, storm drains, regenerant holdup tanks (RHUTs), and radioactive waste storage area. Soil samples around the two retention basins show contamination levels that range from background up to 4.9 pCi/g. Basin sludge and concrete samples are analyzed in Table 5. Table 6 lists the specific activity of soil in the area of the tank farm.

Table 5

Radionuclide Inventory in Concrete and Sludge In the Retention Basins[1]

Nuclide	Curies
Co-60	1.5×10^{-4}
Cs-134	2.1×10^{-4}
Cs-137	3.1×10^{-3}
Total	3.4×10^{-3}

1 As of July 1, 1990. Estimated volumes of contaminated sludge and concrete are 15 ft^3 and 236 ft^3, respectively. These data were calculated on the basis of analysis of samples collected by plant personnel.

Table 6

Radionuclide Concentrations in Soil Remaining in the Tank Farm Area[1]

Nuclide	(pCi/g)
Co-60	6.0×10^{-1}
Cs-134	1.0×10^{-1}
Cs-137	2.00

1 An estimated 110.25 $ft.^3$ of contaminated soil was removed from the tank farm area.

The licensee reported finding fixed contamination in the area of the RHUT. The contamination ranged from 100 to 400 counts per minute (cpm) above background radiation. The activity level in the storm drains was above background. The concentrations for Cs-134, Cs-137, and Co-60 in the storm drains are 0.1 pCi/gm, 0.9 pCi/gm, and 0.2 pCi/gm, respectively.

The radioactive waste storage area was used for storing packaged low-level waste for shipment off site between 1975 and 1989. The area was cleaned because of being a potential ISFSI location.

The cooling towers were sampled in May 1990, to determine if the sludge at the bottom of the towers was contaminated. Sampling results have shown that the activity levels were less than the measured environmental levels elsewhere on the site of 0.3 pCi/g of Cs-137 and 0.04 pCi/g of Cs-134 [Ref. 3].

The licensee detected radioactivity levels above background along Clay Creek. Table 7 lists the most recent maximum radionuclide concentrations in the Clay Creek sediment.

Table 7

Radionuclide Concentrations in Clay Creek Sediment[1]

Nuclide	(pCi/gm)
Co-60	1.47
Cs-134	1.20
Cs-137	11.00

1 Within 0.5 kilometers of the RSNGS release point.

The most recent detailed analysis of Clay Creek sediment was conducted by the Lawrence Livermore National Laboratories in 1989, "Environmental Radiological Studies in 1989 Near the Rancho Seco Nuclear Power Generating Station," November 1990 [Ref. 29], and shows that the maximum radionuclide contaminations in the creek sediment were found within 0.5 kilometers of the plant release point [Ref. 3]. The licensee used the radionuclide concentrations in Table 7 to calculate the hypothetical doses to a person off site (dose calculated for a person standing on the sediment). The licensee calculated the 1.38 mrem/yr dose using the methodology in "Calculation of Annual Dose to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluation Compliance with 10 CFR Part 50, Appendix I" [Ref. 30]. The 1.38 mrem/yr [Ref. 7] is significantly smaller than the direct radiation from the uranium fuel cycle limit of 25 mrem (total body or any organ) in a calendar year. The 25 mrem limit meets the requirements of 40 CFR Part 190 that has been incorporated into 10 CFR Part 20.

2.5 SAFSTOR Decommissioning Plan

The licensee selected the SAFSTOR decommissioning alternative. SMUD proposes use of two subcategories of the SAFSTOR decommissioning alternative--Custodial-SAFSTOR and Hardened-SAFSTOR. The Custodial-SAFSTOR period will last until spent fuel is removed from the SFP and stored in an onsite ISFSI.

Upon transfer of the spent fuel to an ISFSI, the licensee will proceed to place the plant into Hardened-SAFSTOR. In accordance with 10 CFR 51.23(a), the Commission has made a generic determination that, for at least 30 years beyond the expiration of the reactor operating license, no significant environmental impacts will result from the storage of spent fuel in the reactor SFP or ISFSI. The methods proposed by SMUD for spent fuel storage are consistent with the Commission generic determination in 10 CFR 51.23(a).

2.5.1 Custodial-SAFSTOR

The licensee will maintain sufficient onsite staff, during the Custodial-SAFSTOR period, to perform radiological surveillance and any decontamination necessary to maintain plant radiological conditions. During the Custodial-SAFSTOR period, external surfaces that contribute significantly to radiation exposure to surveillance and maintenance personnel will be decontaminated as necessary [Ref. 3]. The licensee will maintain all systems and components required to support spent fuel storage in the SFP, in accordance with Amendment No. 119 to Facility Operating License No. DPR-54, for Rancho Seco Nuclear Generating Station, "Permanently Defueled Technical Specifications" [Ref. 16].

The licensee will keep the reactor and auxiliary buildings HEPA filters functional, and will continue to perform testing and periodic maintenance during Custodial-SAFSTOR. The turbine building exhaust fans, supply fans, and air handlers for the emergency pump room cooler will be deenergized [Ref. 3].

The licensee will maintain the cranes in the fuel storage building as long as there is fuel in the SFP. After the spent fuel is removed from the SFP, the SFP will be drained, the water will be processed, and the fuel-handling systems and cranes will be abandoned in place during the SAFSTOR period [Ref. 3].

2.5.2 Hardened-SAFSTOR

The licensee plans to maintain areas, structures, and systems within the industrial area as a restricted-use area during Hardened-SAFSTOR. These areas, structures, and systems will be decontaminated as necessary, to reduce or stabilize significant radioactive contamination, to ensure the safety of the public and workers [Ref. 3].

The major activities necessary to place RSNGS into Hardened-SAFSTOR can be summarized as follows:

- Transfer spent fuel from the SFP to dry-cask onsite storage.
- Drain and process the water from the SFP.
- Drain, deenergize, and secure all systems not needed to support the security and surveillance program.
- Perform a radiation survey of the plant.
- Lock buildings containing radioactive materials (e.g., reactor, auxiliary, and fuel storage buildings), to avoid accidental intrusion.

As evaluated in the GEIS Section 2.4.3, page 2-10 [Ref. 5], Hardened-SAFSTOR included extensive decontamination and cleanup in areas containing significant quantities of radioactive material. SMUD has committed to perform some decontamination, erect barriers, and seal contamination during Hardened-SAFSTOR. To compensate for the limited decontamination at RSNGS during Hardened-SAFSTOR, SMUD has committed to:

(a) Continue to operate the ventilation system including HEPA filters and monitor the ventilation exhaust from significantly contaminated buildings.

(b) Perform preventive and corrective maintenance on required security systems, area lighting, and general use buildings.

(c) Maintain a 24-hour staff.

(d) Continue routine radiological inspections of contaminated buildings.

(e) Maintain the structural integrity of buildings.

"Significant contamination," as used here is contamination that exceeds the levels specified in NRC Regulatory Guide 1.86, "Termination of Operating License for Nuclear Reactors," Sections C.2.b and C.3.a [Ref. 17]. SMUD has also committed to maintaining radiation monitors associated with the ventilation exhaust from the plant. In addition, licensee personnel will continue surveillance of inactive systems and structures to ensure system and structural integrity, thus providing assurance that radioactivity does not migrate from these contaminated systems and structures during the Hardened-SAFSTOR period [Ref. 3]. The licensee has also committed to maintain the Radiological Environmental Monitoring Program (REMP) in effect during the Hardened-SAFSTOR period.

3.0 ENVIRONMENTAL IMPACTS

3.1 Non-radiological Impacts of Decommissioning

3.1.1 RSNGS Site and Location

The Rancho Seco site is located in southern Sacramento County, California, approximately 26 miles north-northeast of Stockton and 25 miles southeast of Sacramento. The site is on approximately 2480 acres, owned entirely by SMUD. The site is located between the Sierra Nevadas, to the east, and the Coast Range, to the west, along the Pacific Ocean. The area is almost exclusively agricultural and is currently used as grazing land. The nearest population center of 25,000 or more is at Lodi, about 17 miles southwest of the site. Within a 5-mile radius of the site, there are few tourist attractions and little seasonal variation in the population. Beyond the 5-mile radius of the site, the nearest population concentration is approximately 6.5 miles from the site. There are public roads that traverse the exclusion area. The Twin Cities Access Road is the main access road to the plant and to nearby recreation facilities [Ref. 6].

3.1.2 Climate

The climate conditions at RSNGS are summarized in "Supplement to the Applicant's Environmental Report--Post Operating License Stage." [Ref. 6]. As described in that document, the climate of the Rancho Seco site is representative of the Great Central Valley of California.

3.1.3 Demography and Socioeconomics

The land area surrounding the site is currently undeveloped, and is being used for grazing beef cattle and other agricultural activities. Currently, there are 15,550 permanent residences within a 13-mile radius of the RSNGS. No new development is projected for the north, east, or south sides of the site. These areas will continue to be used for grazing beef cattle and other agricultural purposes. Although some new residential development is expected in the area to the west of the plant, decommissioning will not have an adverse effect on this development [Ref. 6].

The most significant socioeconomic impact occurred when RSNGS was permanently shut down. The income generated by the plant was eliminated. The impact of decommissioning is not expected to be significant because of the following: (a) employment at the plant has already been reduced, and subsequent staffing reductions caused by decommissioning will be small; and (b) during dismantlement, the staff size will increase, providing additional jobs and local business opportunities. The socioeconomic impact of RSNGS decommissioning is consistent with and within the bounds of NUREG-0586 [Ref. 5].

3.1.4 Land Use

Current land use is summarized in Reference 6, which updates the information provided in the USAR [Ref. 1]. Three large commercial dairies, with more than 200 cows each, are within a 10-mile radius of the plant. The closest is approximately 8 miles northwest of the site. Activities in the area immediately surrounding the site are not expected to change. Proposed land use for the southeast section of Sacramento County, as adopted by the Sacramento Planning Department, is predominantly agricultural.

3.1.5 Water Use

Stream, lake, and reservoir characteristics in the vicinity of RSNGS are summarized in Table 2.4-1 of the USAR [Ref. 1]. Water used for RSNGS operations is obtained from the Folson South Canal. A pipeline and pumping station are located between the plant and Folson South Canal. During all phases of SAFSTOR, water use will be less than during operation. As concluded in the Final Environmental Statement (FES) related to operation [Ref. 18], the diversion of water to RSNGS is not expected to deny water to prospective users. The water use requirements will be significantly reduced from the requirements during operations. Also, during all phases of SAFSTOR, SMUD plans no significant decontamination activities. Thus, the total amount of water use would be bounded by the amount evaluated in Section 4.4 of NUREG-0586 [Ref. 5] and the plant-specific FES.

3.1.6 Groundwater

Groundwater in the area occurs under semi-confined conditions, as part of the Sacramento Valley groundwater basin water table. The storage in the basin is very large, but in the vicinity of the RSNGS site, water levels are steadily dropping (see USAR Figure 2.4-13 [Ref. 1]). To the south and west, Gault and Lodi are the closest communities with public groundwater supplies. Section 2.4.6.1 of the RSNGS USAR [Ref. 1] indicates that the estimated groundwater moves from the RSNGS site to the Gault area. The plant technical specification, "Administrative Controls," D6.8.3b [Ref. 13], requires that the RSNGS Radiological Environmental Monitoring Program (REMP) [Ref. 3] monitor the radiation and radionuclides in the environment of RSNGS.

3.1.7 Transportation and Noise Impacts

During the SAFSTOR phase of decommissioning, the impact on the transportation system is expected to be small. The licensee anticipated approximately 15 shipments of low-level radioactive waste during the SAFSTOR period. Heavy truck traffic could have a small impact on the existing transportation system in the vicinity of the site, when the bulk of the low-level radioactive waste and spent fuel is shipped off site during the Deferred-DECON phase of decommissioning. However, attention to truck scheduling can reduce the impact on the transportation system. The staff will review the impact of heavy truck traffic during the Deferred-DECON decommissioning when SMUD submits its updated Deferred-DECON decommissioning plan. During the SAFSTOR period, the staff concludes that the transportation impacts will be consistent with those considered in NUREG-0586 [Ref. 5]. For additional information on transportation, see Section 3.1.8 below.

During the SAFSTOR period, heavy trucks will make noise and stir up nonradioactive dust during the construction of the onsite ISFSI, the transfer of spent fuel to the ISFSI, and the removal of cooling-tower fill ("Transite" material). Although under current NRC regulations, these activities are not considered to be "decommissioning" and these need not be addressed in this environmental assessment, the NRC staff also evaluated these activities for completeness. Because of the plant location and the relatively short duration of these activities, the overall environmental impact around the plant will be small. Noise-producing activities can be limited to normal working hours.

3.1.8 Asbestos

Sheets of "Transite," a material that contains a non-friable asbestos, were used in the cooling towers, to disburse heat during operations. The licensee anticipates early disposal of this material, commonly referred to as "fill." The non-friable asbestos fill will be remediated by a certified contractor, registered by the State of California. Removal of the material is not expected to have an impact on water quality. The wetting water used will be diluted and released from the site in accordance with local regulatory constraints [see Section 3.1.9 (1) below].

The licensee anticipates that, to completely remove the material, it will require between three and six truck loads per day, for a period of 3 months. This volume of traffic is not expected to have an impact on the transportation system in the area ("Response to NRC RAI-2") [Ref. 19].

3.1.9 Status of Federal, State, Regional, and Local Environmental Permits

RSNGS submitted information required by 10 CFR 51.45(d) in response to staff questions [Ref. 7]. A list of environmental quality standards applicable to RSNGS follows:

(1) RSNGS discharges liquid effluents to the environment in its plant effluent waste water stream in accordance with NPDES Permit No. 0004758 and the Rancho Seco Radioactive Liquid Effluent Control Program.

(2) RSNGS emits gaseous effluents in accordance with its Sacramento Metropolitan Air Quality Management District air quality permit for Rancho Seco and the Rancho Seco Gaseous Effluent Control Program.

(3) RSNGS supplies drinking water for plant personnel from a well, in accordance with Sacramento County Water Supply Permit No. 232.

(4) RSNGS generates and disposes of hazardous waste in accordance with its Notification of Regulated Waste Activity (EPA Form 8700-12) and its Part A, Hazardous Waste Permit Application [Environmental Protection Agency (EPA) Form 8700-23], under EPA ID No. CAD000626010.

(5) RSNGS generates and stores mixed waste under EPA ID No. CA00062010 and in accordance with the Federal Register notice of August 29, 1991, 56 FR 42730 through 42734, [Ref. 20] 10 CFR Part 30 requirements, and 10 CFR Part 20 requirements.

(6) RSNGS is currently pursuing a facility permit, for its operating underground storage tanks (USTs), with the County of Sacramento. Rancho Seco operates its USTs in accordance with applicable State and EPA UST regulations.

3.1.10 Non-Radiological Impact Findings

Based on the activities anticipated to be performed by SMUD during SAFSTOR, the staff determined that all non-radiological impacts are bounded by either the FES [Ref. 18] or NUREG-0586 [Ref. 5].

3.2 Radiological Impacts of Decommissioning

The largest potential radiological impact on the public during decommissioning is the failure to contain or control radioactive materials that would result in exposure to the public. The estimated levels of radiation during decommissioning are lower than those for an operating PWR. The principal sources of radioactive effluents from routine decommissioning operations are the release of contaminated liquid aerosols during chemical decontamination, the release of contaminated vaporized metal during equipment removal, and the release of contaminated dust during decontamination or removal of concrete structures. At RSNGS, equipment and concrete removal operations will be minimal during the preparation for, and during, the SAFSTOR periods. In addition to impacts from routine decommissioning operations, accidents could expose the public to radioactivity. Decommissioning workers could be affected primarily by being directly exposed to radiation sources at or near work areas.

3.2.1 Occupational Radiation Exposure

The licensee has estimated that a total of 134 man-rem will be incurred during SAFSTOR decommissioning activities, i.e., preparation for Custodial-SAFSTOR, during the Custodial-SAFSTOR period, preparation for Hardened-SAFSTOR, and during the Hardened-SAFSTOR period [Refs. 8 and 9]. The licensee based its occupational exposures on the following activities:

- preliminary decontamination
- operation of radwaste processing equipment
- maintenance, security, health physics, and environmental and safety monitoring
- preserving plant systems

NUREG-0586, Table 4.3-2, page 4-8, [Ref. 5] estimates a total dose of 664 man-rem for a 10-year SAFSTOR period, and 333 man-rem for a 30-year SAFSTOR period, for the reference 1175 MWe PWR. The SAFSTOR period for RSNGS is based on a shutdown safe storage period of approximately 20 years. The RSNGS man-rem estimate does not include a significant contribution from decontamination, because the licensee has committed only to decontaminate as necessary to support surveillance during the SAFSTOR period. The 134 man-rem estimate is reasonable, and bounded by the values given (excluding the contribution from a rigorous decontamination) in NUREG-0586.

3.2.2 Radiological Impacts on the Public

At RSNGS, various tanks, the SFP, and the RPV contain approximately 1.2 million gallons of contaminated water. The calculated average concentrations of Co-60, Cs-134, and Cs-137 in the water are $2.83X10^{-5}$, $7.29X10^{-5}$, and $5.57X10^{-4}$ μCi/ml, respectively. The total inventories of Co-60, Cs-134, and Cs-137 are ^.129, 0.331, and 2.53 curies, respectively, in the contaminated water at RSNGS [Ref. 7]. Tritium (H-3) concentrations at RSNGS yield a total of 245 curies. The tritium inventory is based on the concentrations in the SFP and borated water storage tank, which contain the highest concentration of H-3 at the site, i.e., $5.4X10^{-2}$ μCi/ml. The predicted annual radioactivity released in liquid effluents, based on 290,000 gallons of water released per year during Custodial and Hardened-SAFSTOR periods, for Co-60, Cs-134, Cs-137, and H-3, is expected to be $1.81X10^{-5}$, $2.80X10^{-5}$, $1.64X10^{-4}$, and 59.3 curies, respectively [Ref. 7]. Estimated radioactivity releases during SAFSTOR are less than actual releases during plant operation. The ratios of SAFSTOR to average annual operational releases in liquid effluents for Co-60, Cs-134, Cs-137, and H-3 are 0.2 percent, 0.11 percent, 0.3 percent, and 84.2 percent, respectively.

The licensee calculated the maximum annual dose from release of liquid effluents to be 0.663 mrem to the limiting total body (child), and 0.755 mrem to the limiting organ (child liver) [Ref. 7]. These doses are 22.1 percent and 7.55 percent of the whole-body and organ dose limits in Appendix I annual design objectives for liquid effluents.

Estimated gaseous releases from RSNGS are based on the plant present status and the plant operating history. Since 1989, the licensee has detected only H-3 in the gaseous effluent. The licensee derived a gaseous source term based on the tritium concentration in the water in the SFP. The source of the H-3 release is primarily evaporation from the SFP.

During the 15 month preparation period for Custodial-SAFSTOR, the licensee estimates that 25.6 Ci of H-3 will be released. During the 24 month Custodial-SAFSTOR period, from June 1993 to June 1995, the licensee anticipates that 40 Ci of H-3 will be released. Possible delays related to spent fuel removal to an ISFSI would extend the length of the Custodial-SAFSTOR period and would result in additional H-3 releases at a rate of $3.83X10^{-5}$ Ci/min. This release rate is insignificant when compared to an operating reactor. Also, the resulting dose will be well within the dose limits of the Appendix I annual design objectives. The licensee anticipates that approximately 54 Ci of H-3 will be released during the preparation for Hardened-SAFSTOR. During the Hardened-SAFSTOR period, there will be no releases of H-3, because the source of H-3 will be removed, when the remaining water in the SFP is processed and released.

The overall release of gaseous radionuclides, during the SAFSTOR period, is expected to be small, compared to releases during normal operation that were evaluated in the FES [Ref. 18]. The erection of barriers, the proposed surveillance activities, and the commitment to continue to operate the ventilation exhaust system will provide assurance that releases of airborne radionuclides during the SAFSTOR period will be very small. This finding is consistent with the finding in "Technology, Safety, and Cost of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130, June 1978 [Ref. 21].

3.2.3 Radiological Impact Findings

Based on the activities anticipated by SMUD, an estimated occupational radiation exposure of 134 man-rem will be incurred during the entire SAFSTOR period. The 134 man-rem is bounded by values provided in NUREG-0586 [Ref. 5]. SMUD is required by the RSNGS technical specifications to report annual exposure, therefore, the staff can assess the estimated exposure during SAFSTOR.

SMUD will continue to use the existing liquid radwaste system. This system was evaluated in detail and documented in the SER [Ref. 2]. Therefore, doses to the public will be within the dose limits of the Appendix I annual design objectives.

The exhaust from RSNGS will be monitored by the auxiliary building stack radiation monitor, and backup sampling capability is available. The gaseous releases will be calculated using the RSNGS Offsite Dose Calculation Manual (ODCM) to ensure that the 10 CFR Part 20 limits are met.

The staff found the radiological impacts are bounded by NUREG-0586 [Ref. 5] or are in compliance with 10 CFR Part 50 Appendix I annual design objectives and 10 CFR Part 20.

3.3 Waste Transportation Impacts

The radiation exposure to the public associated with the transportation of the RSNGS decommissioning wastes to a low-level waste disposal facility was estimated using methods described in NUREG/CR-0130 [Ref. 21]. The radiation dose estimates are based on the maximum allowable dose rates, for each shipment, in exclusive-use trucks. The licensee estimates that 15 waste shipments will be made during the first four phases of decommissioning (preparation for Custodial-SAFSTOR through preparation for Hardened-SAFSTOR). Using the methodology in NUREG/CR-0130 [Ref. 21], an estimated dose to the public of 0.075 man-rem was calculated. That dose is much less than the 14 man-rem estimate in Table 11.3-5 in NUREG/CR-0130 [Ref. 21]. In a similar fashion, the licensee estimates that it will require 370 truck shipments to remove the waste generated during dismantlement. Using the methods in NUREG/CR-0130 [Ref. 17], a dose of 0.52 man-rem was calculated for the final phase of decommissioning. Table 4.3-2, in NUREG-0586 [Ref. 5], page 4-8, for 10 and 30 years of decay, yields a dose of 5 and 0.4 man-rem, respectively, to the general public. The RSNGS calculated dose to the public, of 0.52 man-rem for a 20-year decay, is bounded by the values in NUREG-0586 [Ref. 5].

3.4 Impacts on Disposal Site

The total burial volume of low-level waste, because of the decommissioning of RSNGS, is estimated to be approximately 200,000 ft^3. It is anticipated that decommissioning waste generated at RSNGS will be shipped to an offsite low-level waste disposal site. The environmental impact of the disposal of approximately 5,500 ft^3 of solid waste during SAFSTOR is well within the burial volume impacts considered in NUREG-0586 [Ref. 5].

4.0 SPENT FUEL DISPOSITION

Spent fuel disposal is not considered part of the decommissioning process (53 FR 24028, 24019 June 27, 1988) [Ref. 22]. Spent fuel will remain stored in the SFP during the Custodial-SAFSTOR period. If the licensee cannot meet its proposed schedule for transferring the spent fuel to an onsite ISFSI, the Custodial-SAFSTOR period will be extended until all Part 72, ISFSI issues are resolved. The Commission, in 10 CFR 51.23(a), made a generic determination that spent fuel could be stored safely without significant environmental impacts for at least 30 years beyond the expiration of the operating license.

5.0 POSTULATED ACCIDENTS

The release of radioactive materials into the environs and the resulting public radiation exposure are the primary impacts of a decommissioning-related accident. The radionuclide inventory at RSNGS is less than the radionuclide inventory at the reference PWR evaluated in NUREG/CR-0130 [Ref. 21]. The accidents postulated for SAFSTOR at RSNGS are bounded by the accidents postulated in NUREG/CR-0130 [Ref. 21] which formed the basis of NUREG-0586 [Ref. 5].

In addition, during the Custodial-SAFSTOR period, fuel-handling accidents and complete loss of offsite power continue to be possible at RSNGS. These accidents were addressed in Chapter 14 of the licensee USAR [Ref. 1], and the Licensee Proposed Amendment No. 182, Revision 3 [Ref. 26] and its two supplements [Refs. 27 and 28]. The short-lived radionuclides in the spent fuel at RSNGS have undergone substantial radioactive decay since the plant shut down on June 7, 1989. Therefore, the dose impact for a fuel handling accident at RSNGS is now significantly less than the dose for an operating plant. The radionuclide of concern for a fuel handling accident is Kr-85. In the current plant condition, a 2-hour integrated total body dose attributed to the maximally exposed individual is 0.013 rem. This dose is a small fraction of the 10 CFR Part 100 accident dose limit of 25 rem. The 13-mrem whole-body dose is approximately 1.3 percent of the 1000-mrem protective action guideline recommended in the EPA's, "A Manual of Protective Action for Nuclear Incidents," EPA 520/1-75-001 [Ref. 23].

During a complete loss of offsite power, control of the spent fuel decay heat load, and thus the protection of the spent fuel integrity, is the primary consideration. The controls required to protect the spent fuel are based on anticipated decay heat generated by the spent fuel stored in the SFP. A complete loss of offsite power would result in loss of the spent fuel cooling system (SFC) and of the spent fuel building ventilation system. SMUD analyzed the effect of a complete loss of offsite power on the SFP [Ref. 28]. This analysis assumed the most limiting initial conditions allowed by the RSNGS technical specifications; i.e., the SFP water level as low as 23 feet 3 inches and the SFP bulk water temperature as high as 140 degrees Fahrenheit. The normal operating conditions of the SFP are the water level above 37 feet and the bulk water temperature below 90 degrees Fahrenheit. The results of the analysis for an initial temperature of 140 degrees and the initial water level of 23 feet and 3 inches indicated that it would take over 15 days, after bulk boiling begins, for boiling to reduce the level of water in the SFP to the top of the spent fuel assemblies. This analysis did not take credit for any convective cooling by the ventilation system. This period of 15 days did not include the time required to raise the SFP bulk water temperature from its initial temperature of 140 degrees Fahrenheit to 212 degrees Fahrenheit, the boiling point of water at standard conditions. Boiling of the water will not damage the fuel assemblies, because these fuel assemblies are designed to function at temperatures much higher than 212 degrees Fahrenheit. The staff, using very conservative assumptions, calculated that it would take at least 3 days to increase the SFP bulk temperature from 140 degrees Fahrenheit to 212 degrees Fahrenheit, with the initial SFP level at 23 feet and 3 inches. The assumptions the staff made to calculate SFP heat-up time to reach the bulk boiling temperature were the following:

(1) The energy addition rate to the SFP water was assumed to be 1.68E6 BTU/HR. This energy rate was based on the decay energy in the fuel as of November 1, 1991[1]. The current decay energy of the fuel is actually less than the value used because of the additional 1½ year-period the fuel has been stored in the SFP. The use of the November 1, 1991, decay rate artificially increased the amount of energy assumed to be added to the SFP water. This assumption was conservative because the net effect was to increase the rate the SFP temperature was raised.

(2) The boundary of the water volume in the SFP was assumed to be perfectly insulated. That is, <u>no</u> energy was allowed to be transferred from the SFP water volume to (or through) the walls, floor, or surface of the SFP. The energy that would have escaped from the SFP water was assumed artificially to be absorbed by the SFP water, increasing the SFP water temperature. This assumption was conservative because the net effect was to increase the rate the SFP temperature was raised.

(3) No credit was given for the energy absorption capability of the metal located in the SFP (fuel storage racks). This metal would act as a heat sink during a SFP water heat-up evolution (from 140 degrees Fahrenheit to 212 degrees Fahrenheit). The energy that would be absorbed by the metal was artificially assumed to be absorbed by the SFP water and increased the SFP water temperature. This assumption was conservative because the net effect was to increase the rate the SFP temperature was raised.

(4) The volume of the fuel and fuel racks were assumed to displace 20 percent of the water in the SFP. This displaced volume was not included in the calculation, reducing the mass of SFP water available to absorb the energy added to the SFP water. This assumption increased the amount of energy absorbed per unit mass of SFP water, which increased the rate the SFP water temperature was raised.

(5) The loss of water mass from the SFP due to evaporation during the heat-up evolution was not included in this calculation. It was the technical judgment of the staff that the added complexity to model this evaporation phenomenon (mass and associated energy loss) was not necessary because the net effect on the heat-up time would be minimal due to the counteracting effects of mass loss and associated energy loss. With each unit of SFP water mass lost due to evaporation, an

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[1] Sacramento Municipal District Utility letter to NRC, dated November 19, 1991, Attachment II at page 54.

associated amount of energy will also be removed from the remaining SFP water volume. The net effect of mass and energy removal would be to reduce the rate at which the SFP water temperature would rise.

Additionally, the licensee calculated that approximately 1 foot of SFP water level would evaporate every 70 hours if the SFP water temperature was at a steady-state temperature of 180 degrees Fahrenheit. This steady-state temperature is approximately the mean temperature for the heat-up evolution considered. This further supports the decision not to include the evaporation phenomenon because of the minimal effect on the time to raise the SFP water temperature from 140 degrees Fahrenheit to 212 degrees Fahrenheit.

SMUD also has procedures that address loss of offsite power to RSNGS. SMUD has equipment onsite (a diesel powered fire pump) which may be used to add water to the SFP, if necessary, even during periods when offsite power is unavailable. The 18-day period provides ample time to take corrective action even with a complete loss of offsite power.

The staff has concluded that the complete loss of offsite power to RSNGS during decommissioning will not significantly impact the health and safety of the public. The staff bases its conclusion on the considerable length of time available for SMUD to implement its loss of offsite power procedures to either restore offsite power or take corrective measures such as adding water to the SFP with existing equipment which does not need offsite power to function.

6.0 AGENCIES AND PERSONS CONSULTED, AND SOURCES USED

This EA was prepared by NRC staff, primarily within the Office of Nuclear Material Safety and Safeguards, Rockville, Maryland. The staff consulted with the State of California regarding the environmental impact of the proposed action.

7.0 CONCLUSIONS

Based on its review of the proposed RSNGS Decommissioning Plan and its supplements, the staff has determined that the environmental impacts associated with the decommissioning of RSNGS in accordance with the proposed plan are either bounded by the conditions evaluated in NUREG-0586 [Ref. 5] or the FES [Ref. 18] or are in compliance with 10 CFR Part 50 Appendix I annual design objectives for offsite releases or 10 CFR Part 20. Thus, the staff has concluded that there are no significant environmental impacts associated with the proposed actions and that the proposed actions will not have a significant effect on the quality of the human environment. Therefore, the NRC has determined, pursuant to 10 CFR 51.31, not to prepare an environmental impact statement.

Principal Contributor: Larry Bell

Date: June 16, 1993

8.0 REFERENCES

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(3) "Rancho Seco Nuclear Generating Station Proposed Decommissioning Plan," May 1991 (PDP).

(4) "Plan for Ultimate Disposition of the Facility" (PUDF), July 1990.

(5) U.S. Nuclear Regulatory Commission, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," NUREG-0586, August 1988.

(6) Sacramento Municipal Utility District, "Supplement to Applicant's Environmental Report--Post Operating License Stage," October 1991.

(7) Sacramento Municipal Utility District, "The Response to the Request for Additional Information in Support of the Rancho Seco Decommissioning Plan and Associated Environmental Report," April 15, 1992.

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(9) Sacramento Municipal Utility District, "Decommissioning Plan Revisions Errata," April 19, 1993.

(10) Staff Requirements Memorandum from Samual J. Chilk, U.S. Nuclear Regulatory Commission to William C. Parler, U.S. Nuclear Regulatory Commission, January 14, 1993.

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(12) Sacramento Municipal Utility District, "Response to Request for Additional Information in Support of the Rancho Seco Decommissioning Plan," August 31, 1992.

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(15) Pacific Northwest Lab, "Residual Radionuclide Distribution and Inventory at Rancho Seco Nuclear Generating Station," PNL-5146, June 1984.

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(17) U.S. Nuclear Regulatory Commission, "Termination of Operating License for Nuclear Reactors," RG 1.86, June 1984.

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(19) Sacramento Municipal Utility District, "Response to NRC RAI-2," April 1992.

(20) Federal Register Notice, August 29, 1991, 56 Fed. Reg. 42730-42734.

(21) U.S. Nuclear Regulatory Commission, "Technology, Safety, and Costs of Decommissioning a Reference Pressurize Water Reactor Power Station," NUREG/CR-0130, June 1978.

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(24) ANSI/ANS 5.1-199 American National Standards Institute/American National Standard.

(25) U.S. Nuclear Regulatory Commission, Branch Technical Position ASB 9-2.

(26) Sacramento Municipal Utility District, "Proposed Amendment No. 182, Revision 3, the Permanently Defueled Technical Specifications," November 19, 1991.

(27) Sacramento Municipal Utility District, "Revision to Permanently Defueled Technical Specification Bases," September 23, 1992.

(28) Sacramento Municipal Utility District, "Clarification of the Permanently Defueled Technical Specification Loop and SFP Decay Heat Analyses," April 1, 1993.

(29) Lawrence Livermore Laboratory, "Environmental Radiological Studies in 1989 Near the Rancho Seco Nuclear Power Generating Station," UCRL-ID-106111, November 1990.

(30) U.S. Nuclear Regulatory Commission, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Regulatory Guide 1.109, October 1977.