SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT ☐ P. O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

MPC&D 03-088

July 31, 2003

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Docket No. 50-312
Rancho Seco Nuclear Station
License No. DPR-54

RANCHO SECO POST SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT, AMENDMENT 4

Attention: John Hickman

Attached is Amendment 4 to the Rancho Seco Post Shutdown Decommissioning Activities Report (PSDAR). PSDAR Amendment 4 is an update to reflect that we now plan to store Class B and C radioactive waste onsite until a suitable disposal facility becomes available. We may also proceed with a partial site release for the portions of the site not needed for the storage of this waste.

PSDAR Amendment 4 replaces PSDAR Amendment 3 in its entirety. Members of your staff requiring additional information or clarification may contact Bob Jones at (916) 732-4843.

Sincerely,

Steve Redeker

Steve Redeker
Manager, Plant Closure and Decommissioning

cc: NRC, Region IV, Arlington, Texas

NMSS01

Rancho Seco

Post Shutdown Decommissioning Activities Report

Amendment 4

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1.0 Introduction

In accordance with the results of a public referendum on June 6, 1989, the Sacramento Municipal Utility District (SMUD) decided to permanently shut down the Rancho Seco Nuclear Generating Station. Accordingly, on August 29, 1989, SMUD notified the U.S. Nuclear Regulatory Commission (NRC) of its intent to seek amendments to the Rancho Seco operating license to decommission the facility. The Commission acknowledged the notification on November 27, 1989 [Ref. 1].

On March 20, 1995, the NRC issued Rancho Seco's Decommissioning Order. The Order authorized SMUD to decommission Rancho Seco in accordance with the Decommissioning Plan, submitted to the NRC in May 1991 [Ref. 2]. The Decommissioning Plan described SMUD's intention to place Rancho Seco into safe-storage for the remainder of its originally licensed operating life, in 2008. After safe-storage, SMUD would begin decontamination and dismantlement activities, resulting in the termination of Rancho Seco's 10 CFR 50 license. Deferring decontamination and dismantlement activities until 2008, would allow SMUD additional time to accumulate funds sufficient to complete decommissioning.

In 1996, the NRC amended its regulations for decommissioning nuclear power reactors. The new regulations provide licensees with simplicity and flexibility in implementing the decommissioning process. A major change from past regulations was that the NRC no longer required licensees to have an approved decommissioning plan before performing major decommissioning activities. Licensees can now conduct major decommissioning activities under 10 CFR 50.59.

In March 1997, SMUD submitted its Post Shutdown Decommissioning Activities Report (PSDAR), in accordance with 10 CFR 50.82. The PSDAR superseded the original Decommissioning Plan, and provided the information required in 10 CFR 50.82.

On January 9, 1997, the SMUD Board of Directors approved an "incremental decommissioning" project for Rancho Seco. Incremental decommissioning began in early-1997, and was expected to last through 1999. Incremental decommissioning involved performing some decommissioning activities earlier than 2008, as described in the originally approved Decommissioning Plan. In accordance with 10 CFR 50.82, SMUD provided written notification to the NRC [Ref. 3] regarding SMUD's intent to begin incremental decommissioning. SMUD used the decommissioning funds accumulated to-date to accomplish incremental decommissioning.

On July 1, 1999, the SMUD Board of Directors voted to continue the decommissioning process at Rancho Seco until termination of the 10 CFR 50 license, by 2008. However, based upon the

lack of suitable waste disposal options, we now intend to store Class B and C radioactive waste in our Interim Onsite Storage Building until a suitable disposal facility becomes available.

On August 21, 2002, Rancho Seco completed placing all 493 spent fuel assemblies in dry storage at the onsite Independent Spent Fuel Storage Installation (ISFSI), licensed under 10 CFR Part 72.

SMUD maintains sufficient staff to meet NRC regulatory requirements. The current estimated cost to decommissioning Rancho Seco is $518.6 million (2002 dollars).

2.0 SITE DESCRIPTION

The Rancho Seco nuclear facility is located is in the southeast part of Sacramento County, California approximately 26 miles north-northeast of Stockton and 25 miles southeast of the city of Sacramento. The Rancho Seco nuclear facility is approximately 87 acres and sits within a 2480-acre plot of land that is owned and controlled by SMUD. The area around the site is almost exclusively agricultural.

Dilution water for the liquid waste discharged from the plant is supplied from the Folsom South Canal, which is a feature of the Central Valley Water Project. The canal was constructed by the Bureau of Reclamation. A pipeline and pumping station are located between the plant and the Folsom South Canal.

Groundwater movement in the area is to the southwest with a slope of about ten feet per mile.

The soils at the Rancho Seco site can be categorized as hard to very hard silts and silty clays with dense to very dense sands and gravels.

State Route 104 runs along the northern boundary of the site and connects with State Route 99 and Interstate Route 5 to the west and State Route 88 to the east. Rail access is available via a rail spur from an existing Union Pacific Railroad line that runs roughly parallel to State Route 104 adjacent to the site. Figure 2-2 shows the routing of the rail spur.

The Rancho Seco Independent Spent Fuel Storage Installation (ISFSI) is located on District owned land approximately 600 feet west of the Rancho Seco Interim On-site Storage Building and within a security fence.

Figure 2-1 shows the general location of the Rancho Seco site. Figure 2-2 provides a more specific layout of the SMUD-owned land and a general layout of the site.

2.1 Topography

The plant site's rolling terrain is not directly intersected by any streams; however, drainage from higher levels is well defined and intercepts with run-off streams at lower levels. The plant's grade level of approximately 165 feet above sea level allows excellent drainage without danger of flooding. The elevation of the site acreage varies from 130 feet to 280 feet above sea level and drainage along natural gullies varies from 2 to 6 percent.

The station is located in a low-lying portion of the site, 1/2 mile from the site boundaries and adjacent public roadways. The site layout is shown in Figure 2-2. A brief description of structures relevant to decommissioning is given below:

- **Reactor Building** - a radiologically controlled building that is a domed, post-tensioned concrete, cylindrical structure containing the nuclear reactor and associated equipment.

- **Turbine Building** – supported the turbine generator, housed equipment and systems necessary for the operation of the turbine generator, and continues to support the gantry crane

- **Auxiliary Building** - contained the Control Room, Technical Support Center, chemistry laboratories, as well as systems and equipment that were necessary to support nuclear reactor operation. A portion of the building is radiologically controlled.

- **Fuel Storage Building** - a radiologically controlled building, where the spent fuel assemblies were once stored in the spent fuel pool.

- **Tank Farm** - an area north of the Reactor Building containing various storage tanks.

- **Interim On Site Storage Building** - a concrete, two-story building located west of the cooling towers that provides on-site storage of dry contaminated waste.

- **Retention Basins** - two concrete ponds that provide temporary diversion of plant effluent before discharge offsite.

- **Independent Spent Fuel Storage Installation** - Provides interim dry storage of 100% of Rancho Seco's spent fuel assemblies in a NUHOMS transportable storage system. The ISFSI is located west of the current Industrial Area.

- **220 kV Switchyard** - connects the plant with the off-site transmission system; major inter-tie between SMUD and adjacent utilities.

Figure 2-1

General Area Map

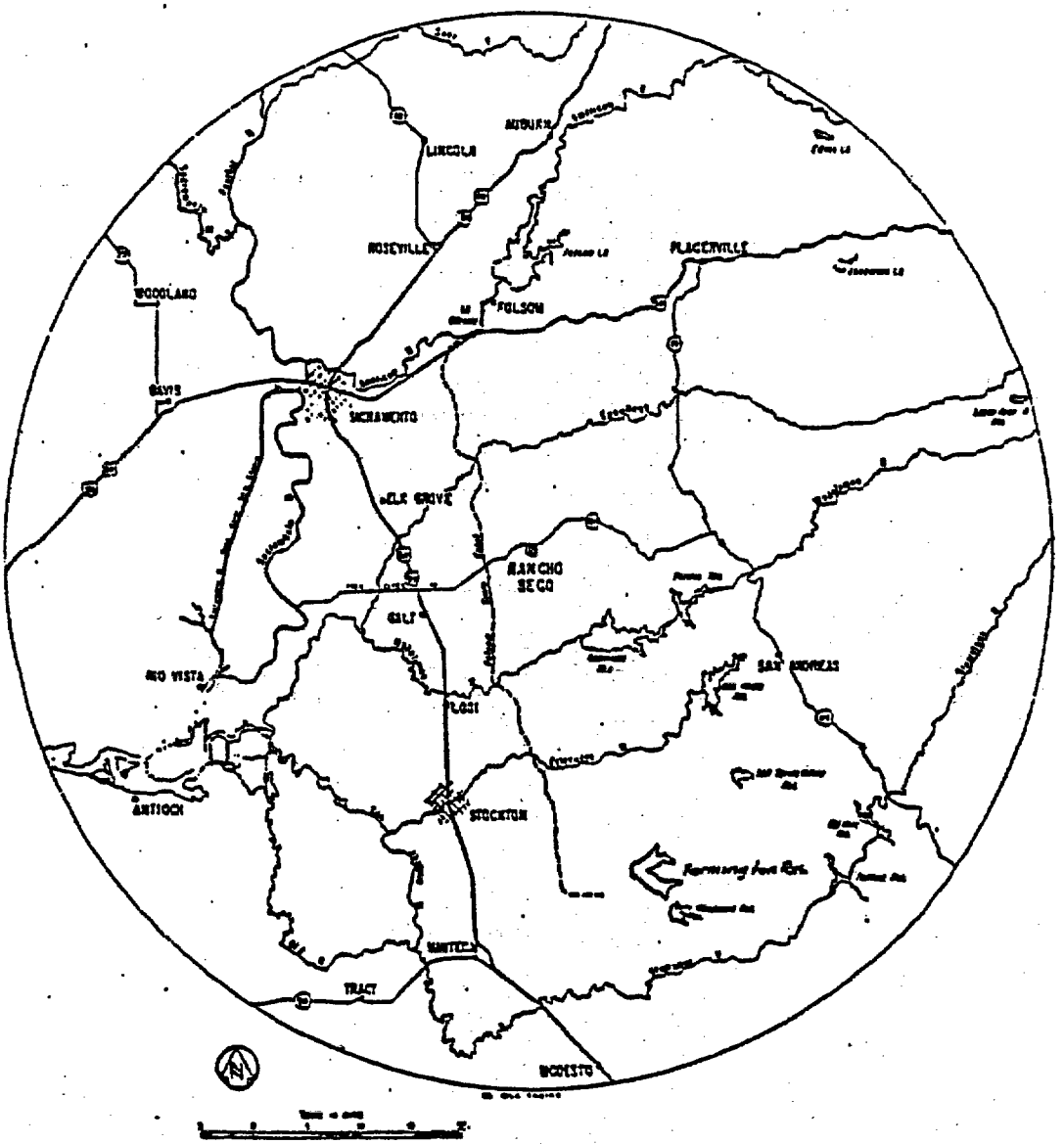
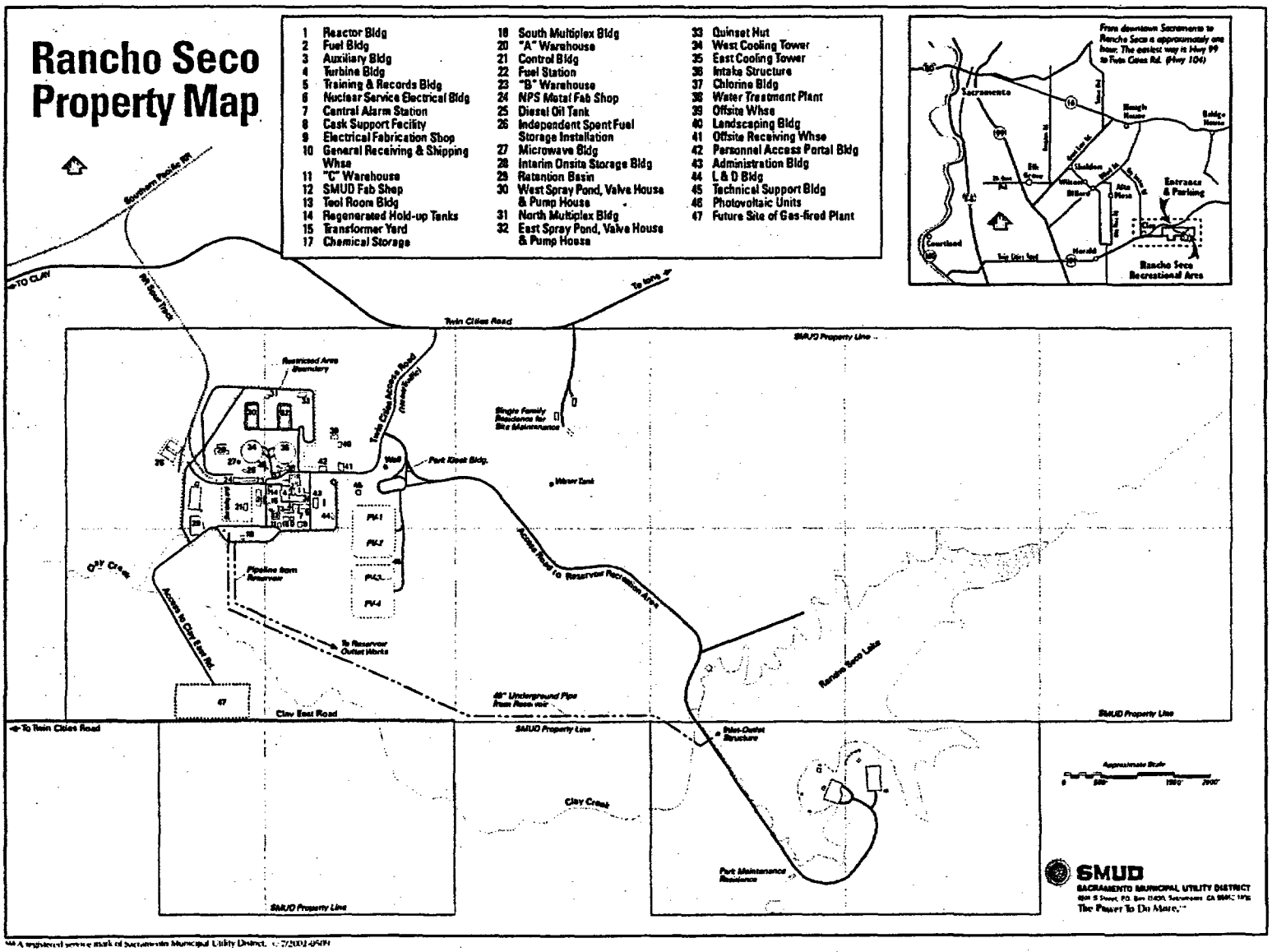


Figure 2-2

SMUD Property and Rancho Seco Layout



3.0 OVERVIEW OF DECOMMISSIONING ACTIVITIES

3.1 Initial Decommissioning Alternative

In the original decommissioning plan, SMUD proposed to decommission Rancho Seco using SAFSTOR until 2008, which would be followed by Deferred-DECON being completed by 2011.

Maintaining Rancho Seco in SAFSTOR until 2008 would allow additional time to accumulate sufficient funds to complete decommissioning. Since submitting the original Decommissioning Plan in May 1991, the cost to decommission Rancho Seco continued to escalate due primarily to the rising low-level waste disposal cost projections for the Southwest Compact, and increasing facility maintenance and staff costs. In response, SMUD continued to review options for decommissioning Rancho Seco.

When alternative waste disposal options became available, SMUD determined that a reduction in the risk and costs associated with maintaining radioactive systems could be realized by implementing some decommissioning activities starting in 1997, instead of waiting until 2008. Initial decommissioning activities included dismantling and disposing of the least contaminated portions of the plant, in what SMUD called "incremental decommissioning."
Due to the success of incremental decommissioning, on July 1, 1999, the SMUD Board of Directors decided to continue decommissioning until the NRC terminates Rancho Seco's 10 CFR 50 license and releases the site for unrestricted use, by 2008. However, based upon the lack of suitable waste disposal options, we now intend to store Class B and C radioactive waste in our Interim Onsite Storage Building until a suitable disposal facility becomes available.

3.2 Decommissioning Activities

3.2.1 Dry Fuel Storage

In August 2002, SMUD completed the transfer of Rancho Seco's spent nuclear fuel into dry storage at the onsite ISFSI. SMUD will maintain Rancho Seco's spent fuel in dry storage, in a NUHOMS transportable storage system,[1] until it is transferred to a DOE facility.

Systems previously required to support spent fuel storage (e.g., cooling, filtration, handling, etc.) are no longer required and are available for decommissioning.

[1] A system licensed both for dry storage under 10 CFR Part 72, and for transportation under 10 CFR Part 71.

3.2.2 Decommissioning

The goal of decommissioning is to reduce the radioactive material at the site to acceptable levels such that the NRC can terminate Rancho Seco's 10 CFR 50 license. After systems, components, and equipment are dismantled/removed, they are surveyed to determine the contamination level. Non-contaminated material is free-released for asset recovery, recycling, or disposal at an offsite landfill. Contaminated material is prepared for onsite or offsite decontamination, if required, and subsequently recycled or shipped to a disposal site, as appropriate. LLW is packaged for transport in accordance with applicable NRC and Department of Transportation (DOT) regulatory requirements.

The following is typical of how SMUD conducts decommissioning:

1. Identify the systems, equipment, and components for removal and disposal.
2. Develop work packages to implement in accordance with established plant procedures.
3. Determine appropriate radiological precautions.
4. Determine component removal sequences based on accessibility, safety, material handling restrictions, and ALARA considerations.
5. Isolate systems to be dismantled from operating plant systems.
6. Install required temporary services (e.g., electrical, liquid radwaste processing).
7. Determine the best method for large vessel (e.g., reactor vessel, pressurizer, steam generators, reactor coolant pumps, etc.) removal and transportation.
8. Solicit bids for all necessary outside equipment and services to perform the work activities, including radwaste disposal containers, transportation services, and disposal/burial services.
9. Decontaminate and/or package for shipment for disposal.
10. Ship radwaste for disposal.

11. Store Greater-than-Class-C (GTCC) radwaste at the ISFSI until DOE and SMUD arrange for its ultimate disposal.[2]

12. Store Class B & C radioactive waste in the Interim Onsite Storage Building until a suitable disposal facility becomes available.

13. Conduct a final site survey in accordance with the NRC-approved license termination plan. A partial site release, and appropriate surveys, may be performed for those portions of the site not needed for the storage of Class B & C radioactive waste.

[2] Storing GTCC at the ISFSI may require additional licensing under 10 CFR Part 72.

3.3 Forecast Decommissioning Schedule

The forecast schedule dates for major decommissioning activities include:

Description	Forecast Schedule Dates
Transfer of spent fuel to ISFSI	Completed August 2002
Complete dismantlement and decontamination	2008
License termination survey and NRC license termination after the removal of stored Class B & C radioactive waste	After 2008[3]
Site restoration[4]	After 2008
Final spent fuel removal from site by DOE[5]	2024

Figure 3-1 shows a summary schedule forecasting key milestone dates.

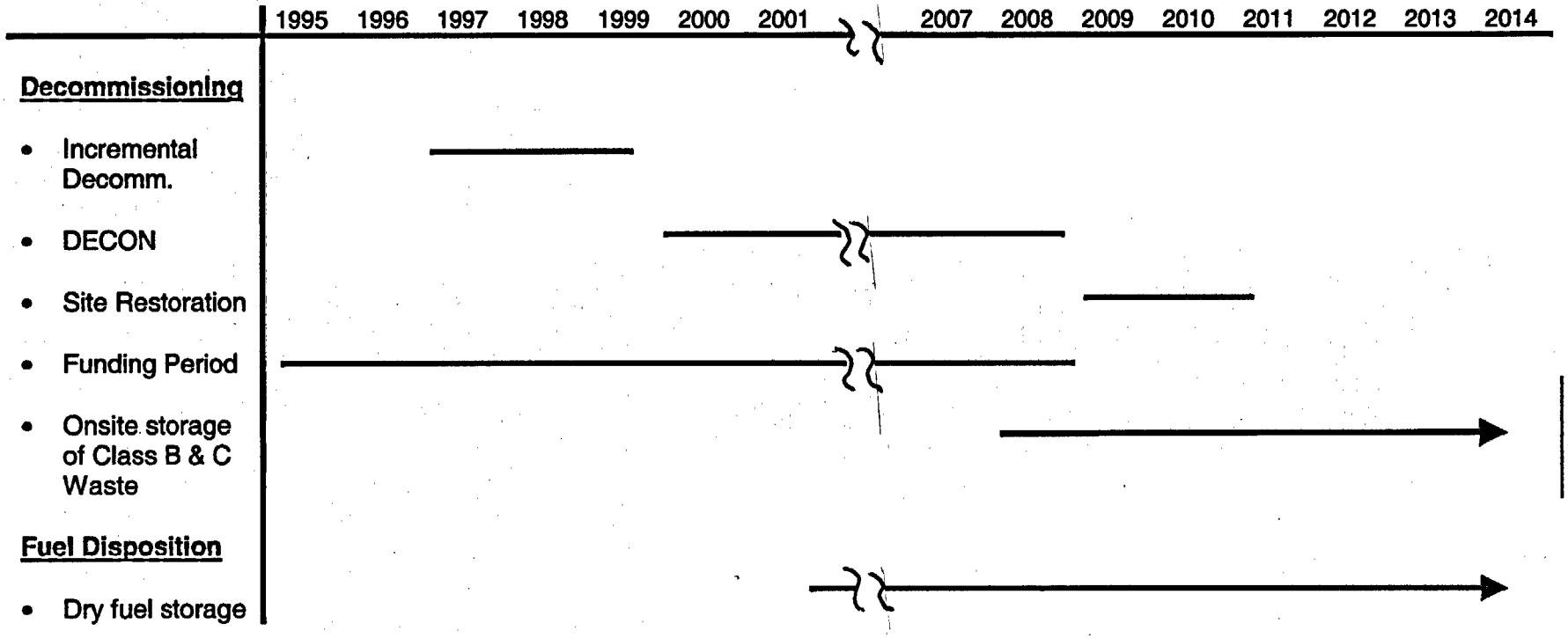
[3] This may be preceded by a partial site release for the portions of the site not need for the storage of Class B & C radioactive waste.

[4] Extent to be defined in accordance with future SMUD needs.

[5] DOE fuel acceptance based on Yucca Mountain repository opening in 2010 and fuel transfer at projected fuel acceptance rates.

Figure 3-1

Rancho Seco Milestone Summary Schedule



3.4 Final Site Survey Plan

In decommissioning Rancho Seco, SMUD will reduce radioactivity at the site to acceptable levels, thereby allowing release of the site for unrestricted use. In accordance with 10 CFR 50.82, SMUD will submit a license termination plan to the NRC for approval. Upon completion of decommissioning, SMUD will conduct a final site radiological survey on suspected and known contaminated structures, systems, components, equipment, onsite grounds, and adjacent environs. The objective of the final survey is to demonstrate that residual radioactivity levels meet release criteria. The final survey will follow appropriate regulatory requirements for survey methodology and radiological instrument selection.

3.5 Decommissioning Cost Estimate

Based on the 2002 decommissioning cost study [Ref. 5], the estimated cost to decommission Rancho Seco and terminate the license is $518.6 million (2002 dollars). The following is a summary of the estimated remaining costs for decommissioning Rancho Seco:

Activity	Cost Estimate ($1,000s)
Decontamination	$6,500
Removal	$32,041
Packaging	$2,952
Transportation	$3,717
Waste Disposal	$25,312
Other Decommissioning Costs	$29,208
License Termination Survey	$9,570
Project Staffing	$97,130
Materials and Equipment	$5,982
Insurance	2,135
Other Undistributed Costs	$22,714
Material, Contract, and Waste Surcharges	$3,396
Earned Contingency	$2,025
Stored Waste Oversight	$1,176
Total Remaining Costs	$243,860
Amount Expended Through 2002	$274,704
Grand Total	**$518,564**

3.6 Amount of Available Funds

SMUD has established an external trust fund agreement with Bankers Trust of New York. Because of the premature shutdown of Rancho Seco, the NRC allowed SMUD to collect decommissioning funds through the remaining plant operating licensed period (i.e., the year 2008).

Based on the cost estimate, SMUD makes annual contributions to the external trust fund to complete funding by the end of the Rancho Seco operating license in 2008. The annual contribution is subject to adjustment based on periodic reviews of the decommissioning cost estimate. SMUD concurrently requests dispersals to fund ongoing decommissioning activities.

3.7 Programs

3.7.1 Quality Assurance

The Rancho Seco Quality Assurance Program for decommissioning is defined in the NRC-approved Rancho Seco Quality Manual (RSQM). SMUD maintains the RSQM in accordance with 10 CFR 50.54(a) ensuring that decommissioning will be accomplished in accordance with the license, applicable codes and standards, and regulatory requirements. In addition to administrative controls, the RSQM provides an audit program to determine compliance with specified requirements and a corrective action program to address deficiencies.

3.7.2 Decommissioning Fire Protection Plan

SMUD maintains a fire protection plan in accordance with plant administrative procedures. SMUD assesses the fire protection program on a regular basis, and will revise it, as appropriate, as decommissioning progresses.

3.7.3 Radiation Protection Program

SMUD maintains a radiation protection program to control radiation hazards, maintain worker doses as low as reasonably achievable (ALARA), and ensure compliance with applicable regulations.

3.7.4 Process Control Program

SMUD implements the Process Control Program to ensure compliance with applicable regulations and disposal site rules.

3.7.5 Radiological Environmental Monitoring Program

SMUD implements the Radiological Environmental Monitoring Program (REMP) to monitor the site and environs for radioactivity to ensure compliance with applicable regulations.

3.7.6 Offsite Dose Calculation Manual

The Offsite Dose Calculation Manual (ODCM) is used to calculate offsite doses due to gaseous and liquid effluents.

4.0 Environmental Review

NUREG-0586 "Final Generic Environmental Impact Statement on decommissioning of nuclear facilities" (GEIS) [Ref. 6], provides a generic environmental assessment of decommissioning a reference nuclear facility. Based on the findings in NUREG-0586 and NUREG-0586, Supplement 1, the NRC reached a generic finding of "no significant (environmental) impact." Further, the NRC concluded that licensees need not prepare an additional environmental impact statement, in connection with the decommissioning of a particular nuclear site, unless the impacts of their plant have site-specific considerations significantly different from those studied generically.

Section 4.0 of NUREG-0586 provides a description of a generic PWR of a size and rating larger than Rancho Seco. Specifically, the reference facility is an 1175-MWe Westinghouse PWR[6] that had operated over its 40-year design life. Rancho Seco is a 913-MWe PWR, designed by Babcock and Wilcox. Although Rancho Seco operated for about 14 years, it accumulated only approximately six full power effective years of reactor operation.

While the design of the facilities and their Nuclear Steam Supply Systems (NSSS) are slightly different, the B&W design includes the same types of major components, buildings, and structures as the reference PWR. Consequently, decommissioning Rancho Seco involves the same types of decommissioning tasks and considerations, and has similar environmental impacts, as the reference facility evaluated in NUREG-0586.

In October 1991, SMUD submitted the "Supplement to Rancho Seco Environmental Report - Post Operating License Stage," [Ref. 7] in support of the proposed Rancho Seco Decommissioning Plan. The supplemental report compares Rancho Seco's decommissioning attributes with those of the reference plant in NUREG-0586. The report concludes that all of the decommissioning attributes identified for Rancho Seco are within the envelope of NUREG-0586, except for the decommissioning cost estimate, which is not directly comparable.

In addition, SMUD staff conducted an environmental evaluation under the California Environmental Quality Act (CEQA), and determined that decommissioning Rancho Seco will not have a significant effect on the environment. Consistent with the applicable provisions of CEQA, SMUD issued a Negative Declaration for the project.

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[6] The reference facility is based on the reference facility described in NUREG/CR-0130 "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station. The actual reference facility is the Trojan Nuclear Plant, owned by Portland General Electric.

For environmental attributes including estimated radwaste volumes, occupational exposure, and public exposure, the estimated values for the reference plant bound the estimated values for Rancho Seco.

5.0 REFERENCES

1. Letter from Thomas E. Murley to David Boggs, "Closure of Rancho Seco Nuclear Generating Station," November 27, 1989.

2. Rancho Seco Nuclear Generating Station Proposed Decommissioning Plan, May 20, 1991.

3. Letter from Steve Redeker to Seymour Weiss, "Rancho Seco Decommissioning Schedule Change," January 29, 1997.

4. Regulatory Guide 1.86 "Termination of Operating Licenses for Nuclear Reactors," June 1974.

5. 2002 Decommissioning Cost Estimate for the Rancho Seco Nuclear Generating Station.

6. NUREG-0586 "Final Generic Environmental Impact Statement on decommissioning of nuclear facilities," August 1988.

7. "Supplement to Rancho Seco Environmental Report - Post Operating License Stage," October 1991.

8. NUREG-0586, Supplement 1, "Generic Environmental Impact Statement of Decommissioning Nuclear Facilities," November 2002.