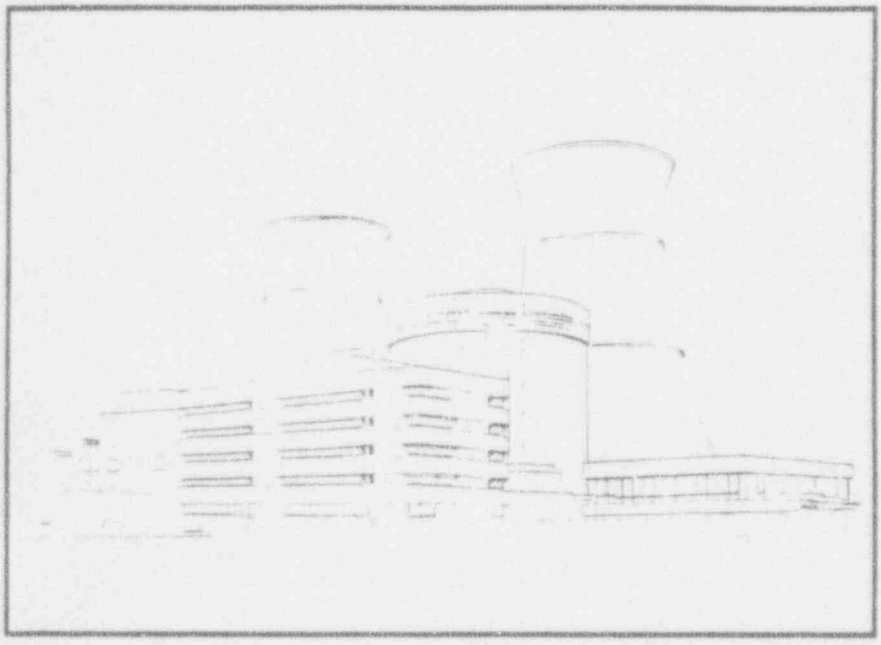
RANCHO SECO

RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION ENVIRONMENTAL REPORT REVISION 1



SMUD

SACRAMENTO MUNICIPAL UTILITY DISTRICT

THE RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION ENVIRONMENTAL REPORT REVISION 1

RANCHO SECO ISFSI ENVIRONMENTAL REPORT
REVISION 1

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1.0 INTRODUCTION

1.1 DESCRIPTION OF THE PROPOSED ACTION

In a letter dated October 4, 1991, the Sacramento Municipal Utility District (District) submitted an application to construct and operate an Independent Spent Fuel Storage Installation (ISFSI) at the site of its Rancho Seco Nuclear Generating Station (RSNGS). The District submitted its original license application using a reference cask, and is now submitting Revision 1 to the Environmental Report to reflect the selection of the NUHOMS* transportable storage system for use at the Rancho Seco ISFSI.

Consistent with the Rancho Seco Decommissioning Plan, the ISFSI is intended to provide storage capacity for Rancho Seco's 493 spent fuel assemblies. The storage system will be designed for 50 year service, and licensed for 20 years in accordance with 10 CFR 72.

The spent fuel and associated control components will be stored in the NUHOMS system for dry storage of pressurized water reactor (PWR) spent nuclear fuel assemblies. The NUHOMS system provides for the horizontal storage of spent fuel in dry shielded canisters (DSCs) which are placed in concrete horizontal storage modules (HSMs). This system provides radiation shielding, and ensures that radioactive material remains inside the DSCs. The DSCs are cooled by natural convection. The spent fuel will be stored in this manner until it is accepted by the Department of Energy (DOE).

In addition to the basic NUHOMS storage system, the Rancho Seco ISFSI will have two NUHOMS MP-187 multi-purpose casks. These casks will be available for use as an "overpack" to isolate a breached DSC from the environment should a breached DSC occur at the ISFSI.

1.1.1 General Description of Location

The Rancho Seco site comprises approximately 2,480 acres in Sacramento County, California. The site is characterized by isolation from population centers, a sound foundation for structures, and favorable conditions of meteorology, seismology, and hydrology. The ISFSI is located outside the Rancho Seco Industrial Area, approximately 600 feet west of the Interim

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* NUHOMS is a trademarked product of the Pacific Nuclear Corporation.

Onsite Storage Building (IOSB). Figure 1-1 provides a general area map of the Rancho Seco site. Figure 1-2 shows the general layout of the site.

The Rancho Seco ISFSI consists of a concrete slab, approximately 225 feet long, 170 feet wide, and 2 feet thick, onto which the HSMs and loaded DSCs will be placed. The ISFSI slab surrounding the HSMs will be tapered to approximately 6 inches thick. The two multi-purpose casks may also be stored at the ISFSI. The slab thickness under the casks will also be approximately 2 feet thick. The slab will be surrounded by a double security fence.

The only support systems required are those necessary for transferring the loaded and sealed DSCs from the Fuel Storage Building to the ISFSI. The DSCs, HSMs, MP-187 casks, and the cask lifting yoke are the only components associated with the Rancho Seco ISFSI that are important to safety. Other components including power supplies and lights do not perform safety functions. Figures 1-3a and 1-3b provide additional detail on the ISFSI layout.

1.1.2 General Storage System Description

The Rancho Seco ISFSI will use the NUHOMS system to store irradiated fuel and control components. The NUHOMS system will be based, to the greatest extent possible, on the system design documented in the Standardized NUHOMS-24P Safety Analysis Report.[1] The storage system will be designed to store Rancho Seco's 493 spent fuel assemblies, and associated radioactive material as follows:

- Twenty-one DSCs for storing spent fuel assemblies, divided approximately as:
  - Sixteen DSCs to accommodate fuel with control components (FC-DSCs)
  - Four DSCs to accommodate fuel only (FO-DSCs)
  - One DSC to accommodate failed fuel (FF-DSC, no control hardware)
- Twenty-two HSMs (one spare)
- Two NUHOMS MP-187 multi-purpose casks

Using this system, spent fuel assemblies (typically 24) will be loaded into a DSC (which will be placed inside of the multi-purpose cask) in the spent fuel pool. The multi-purpose cask containing the loaded DSC will be removed from the pool and placed in the cask decontamination area where it will be sealed, drained, and dried. The DSC cavity will then be backfilled with helium.

After being decontaminated, the multi-purpose cask will be placed onto a transport trailer, and towed to the ISFSI. At the ISFSI, the loaded multi-purpose cask will be aligned with the HSM, and the DSC will be pushed out of the multi-purpose cask into the HSM using a hydraulic ram. Once inside the HSM, the DSC is in safe, passive dry storage.

The NUHOMS system is a totally passive system, with natural convection cooling sufficient to maintain safe fuel cladding temperatures. The HSM provides adequate shielding to meet the requirements of 10 CFR 72.104. No radioactive material will be released under any credible conditions.

The ISFSI storage configuration will consist of two parallel, back-to-back rows of 11 HSMs.** In addition, the District will maintain two MP-187 multi-purpose casks. The multi-purpose casks will be designed to accommodate the DSCs, and will be licensed under 10 CFR 72 for spent fuel storage and 10 CFR 71 for spent fuel transport. Although the storage and transport licensing requirements are separate, they have a similar intent which is to provide safe confinement during handling, storage, and transport of spent nuclear fuel. Figure 1-4 illustrates the DSC and HSM of the proposed Rancho Seco ISFSI.

1.2 BACKGROUND INFORMATION

RSNGS is a light water PWR supplied by the Babcock and Wilcox Company (B&W). The plant achieved initial criticality on September 16, 1974, and began commercial operation on April 18, 1975. A complete description of RSNGS is contained in the Defueled Safety Analysis Report (DSAR),[2] Docket Number 50-312.

** The ISFSI pad is designed to be able to accommodate two back-to-back rows of 13 HSMs.

The current operating license is scheduled to expire on October 11, 2008. However, as the result of a public referendum of District voters on June 6, 1989, RSNGS has ceased operation, and the reactor has been defueled permanently. Accordingly, on May 20, 1991, the District submitted its Proposed Decommissioning Plan[3] to the NRC discussing the method to be used to decommission RSNGS. In addition, on October 21, 1991, the District submitted a Supplement to the Rancho Seco Environmental Report - Post Operating License Stage.[4]

As discussed in the Decommissioning Plan, the District has decided to store the spent nuclear fuel from RSNGS at an ISFSI. The Rancho Seco ISFSI will be located within the Rancho Seco owner controlled area. This area is owned and operated by the District, and the District has complete authority over all activities within this area. The District intends to operate the Rancho Seco ISFSI until the spent nuclear fuel is accepted by DOE.

The use of dry passive storage techniques for aged fuel has been demonstrated to be feasible and environmentally acceptable. Similar NUHOMS storage systems are licensed for use at H. B. Robinson, Oconee, and Calvert Cliffs. This environmental report addresses the expected, site-specific environmental impacts associated with the construction and operation of the Rancho Seco ISFSI.

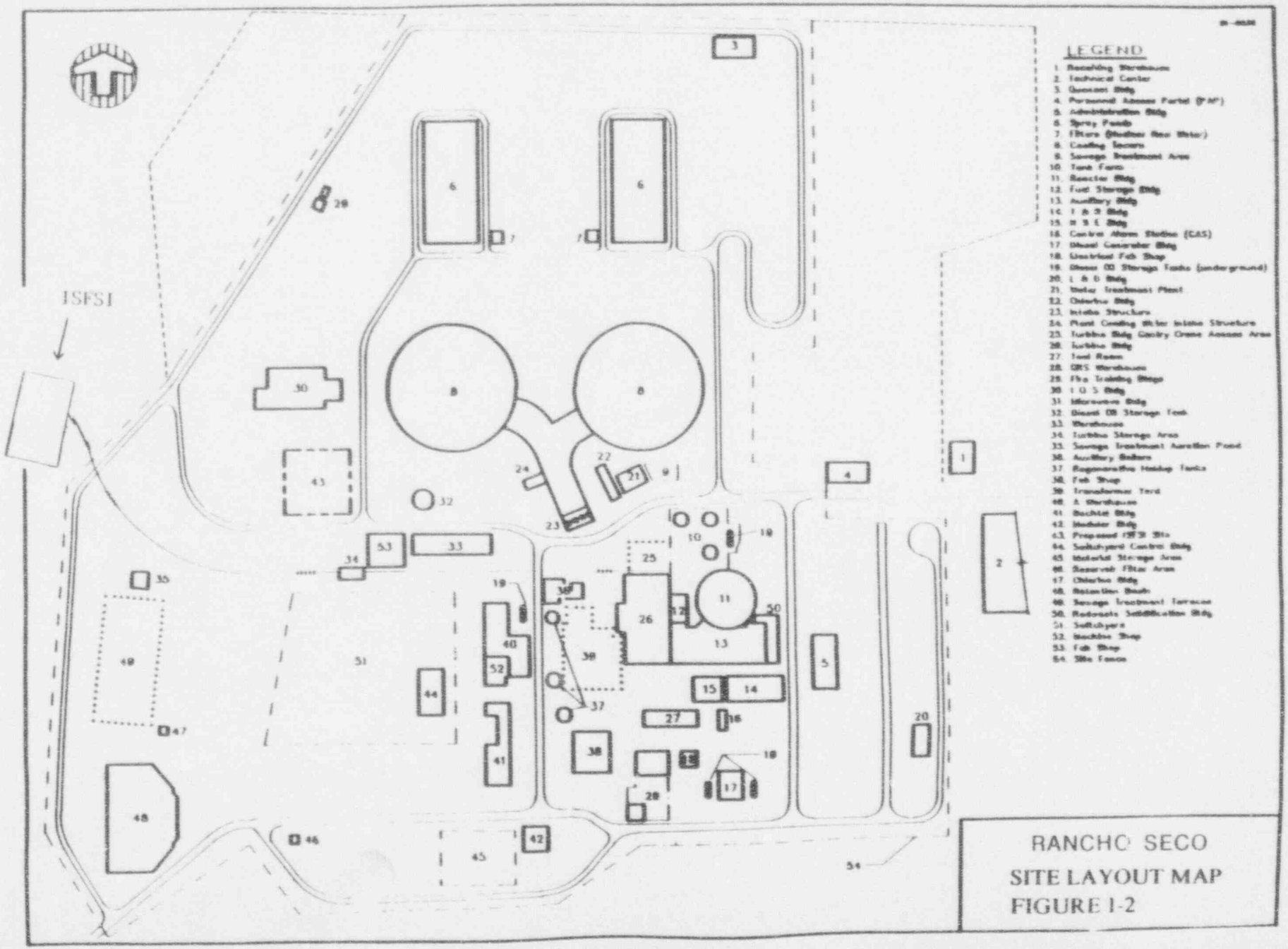
1.3 PREVIOUS ENVIRONMENTAL ASSESSMENTS

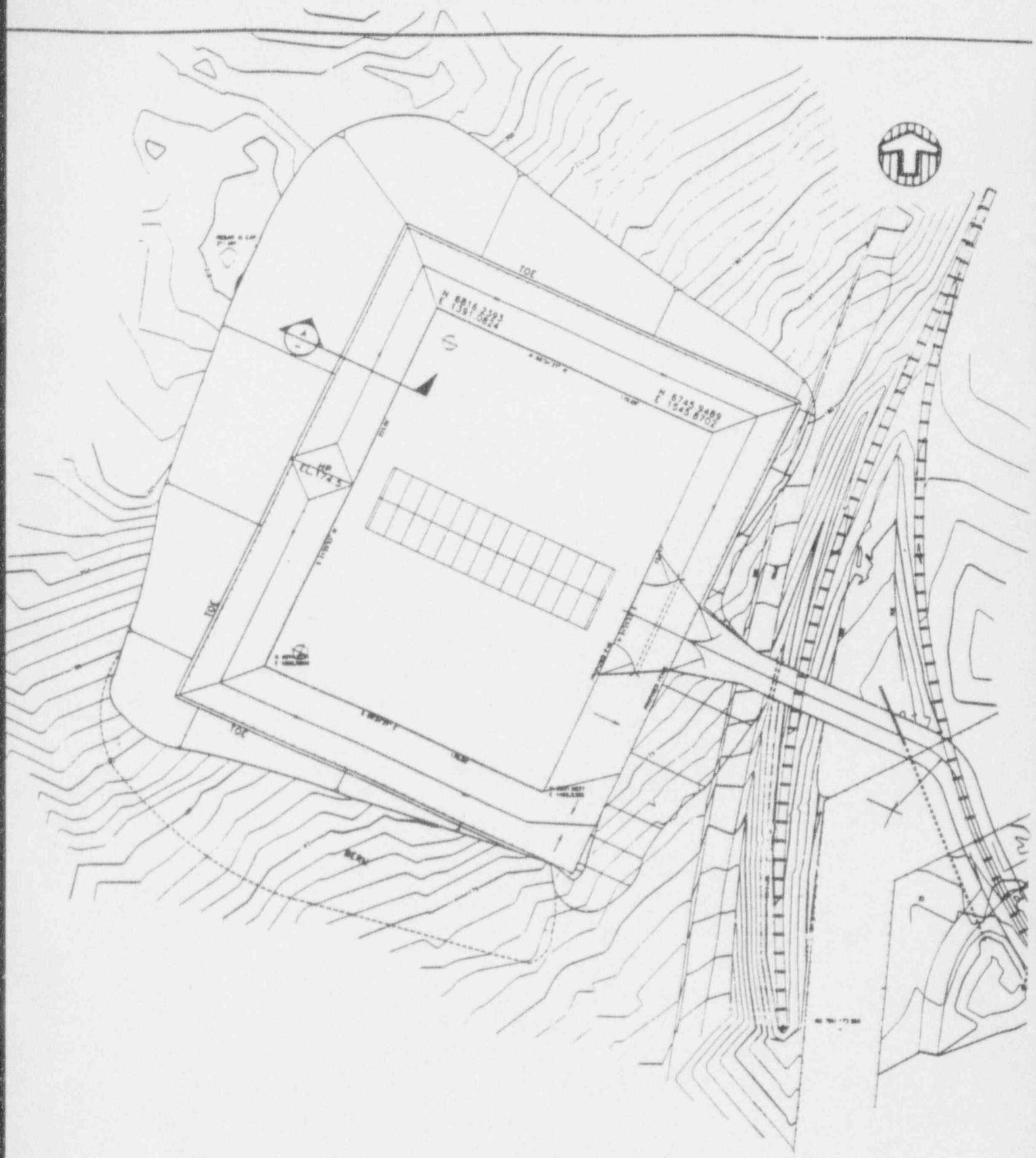
In March 1973, the Atomic Energy Commission issued its Final Environmental Statement[5] regarding the District's continued construction, startup, and operation of RSNGS. The environmental statement concluded that the environmental effects from the construction and operation of RSNGS would not impose a serious impact on the environment.

The Rancho Seco ISFSI will be located within the owner controlled area of the Rancho Seco site, which is owned and operated by the District. This site was included in the evaluations performed in Reference 5.

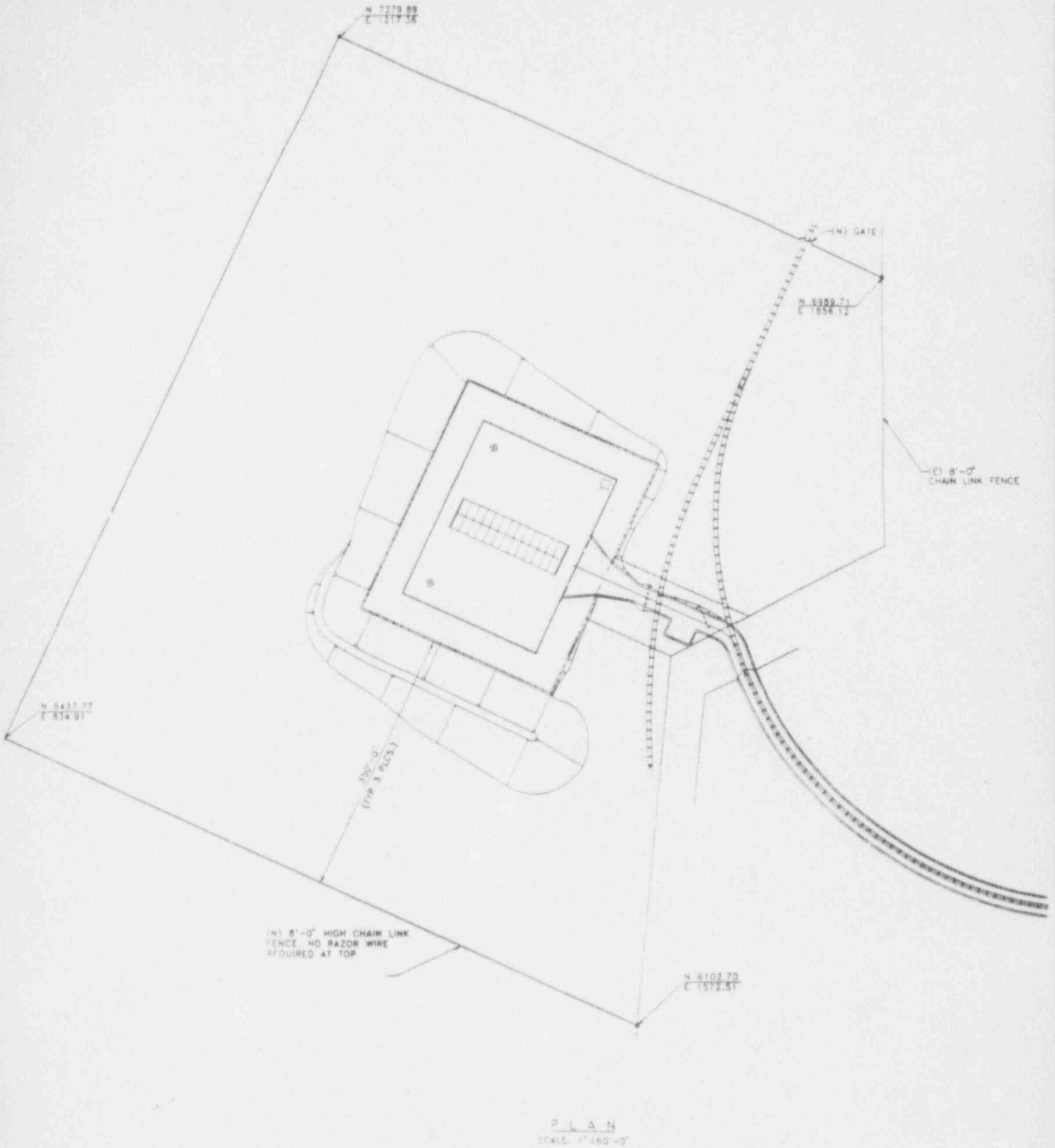
This environmental report describes the environmental effects associated with the construction and operation of the Rancho Seco ISFSI. The construction and operation of the ISFSI will not adversely effect the environment outside the bounds of what was evaluated, and determined to be acceptable, in Reference 5.

RANCHO SECO
GENERAL AREA MAP
FIGURE 1-1


ISFSI
LEGEND
1. Receiving Warehouse
2. Technical Center
3. Guardhouse Bldg
4. Personnel Access Portal (PAP)
5. Administration Bldg
6. Spray Ponds
7. Filters (Shallow Well Water)
8. Cooling Towers
9. Sewage Treatment Area
10. Tank Farm
11. Reactor Bldg
12. Fuel Storage Bldg
13. Auxiliary Bldg
14. I & D Bldg
15. H S E Bldg
16. Control Alarm Station (CAS)
17. Diesel Generator Bldg
18. Electrical Fab Shop
19. Diesel Oil Storage Tanks (underground)
20. L & D Bldg
21. Water Treatment Plant
22. Chlorine Bldg
23. Intake Structure
24. Plant Cooling Water Intake Structure
25. Turbine Bldg Gantry Crane Access Area
26. Turbine Bldg
27. Yard Room
28. QRS Warehouse
29. Fire Training Bldgs
30. I Q S Bldg
31. Maintenance Bldg
32. Diesel Oil Storage Tank
33. Warehouse
34. Turbine Storage Area
35. Sewage Treatment Aeration Pond
36. Auxiliary Boilers
37. Regenerative Makeup Tanks
38. Fab Shop
39. Transformer Yard
40. A Warehouse
41. Backlot Bldg
42. Modular Bldg
43. Proposed ISFSI Site
44. Switchyard Control Bldg
45. Material Storage Area
46. Reservoir Filter Area
47. Chlorine Bldg
48. Retention Basin
49. Sewage Treatment Terrace
50. Radwaste Solidification Bldg
51. Switchyard
52. Machine Shop
53. Fab Shop
54. Site Fence
RANCHO SECO
SITE LAYOUT MAP
FIGURE 1-2



ISFSI LAYOUT
FIGURE 1-3a



PLAN

SCALE: 1"=60'-0"

ISFSI LAYOUT
FIGURE 1-3b

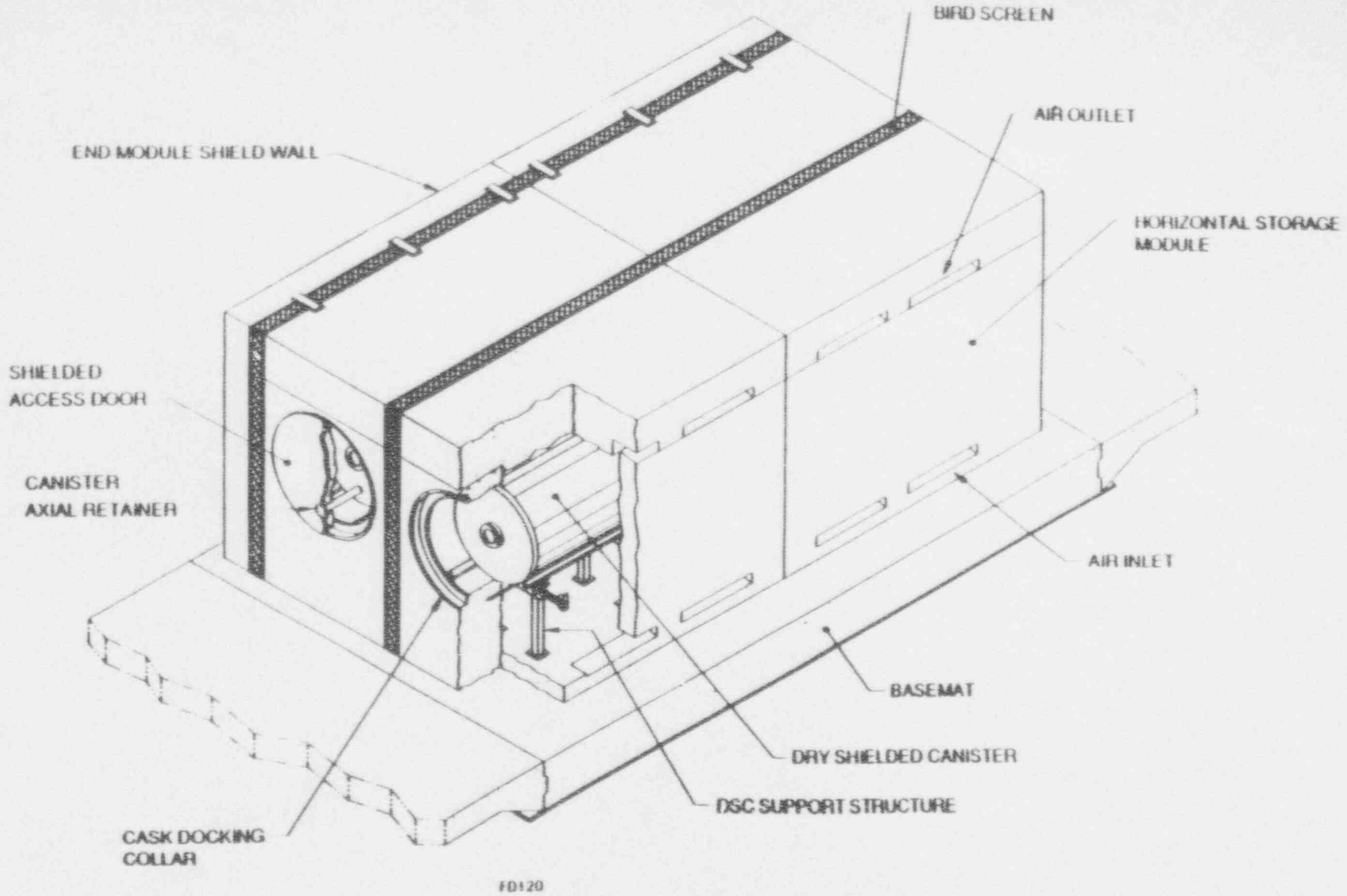


FIGURE 1-4
HORIZONTAL STORAGE MODULE ARRANGEMENT

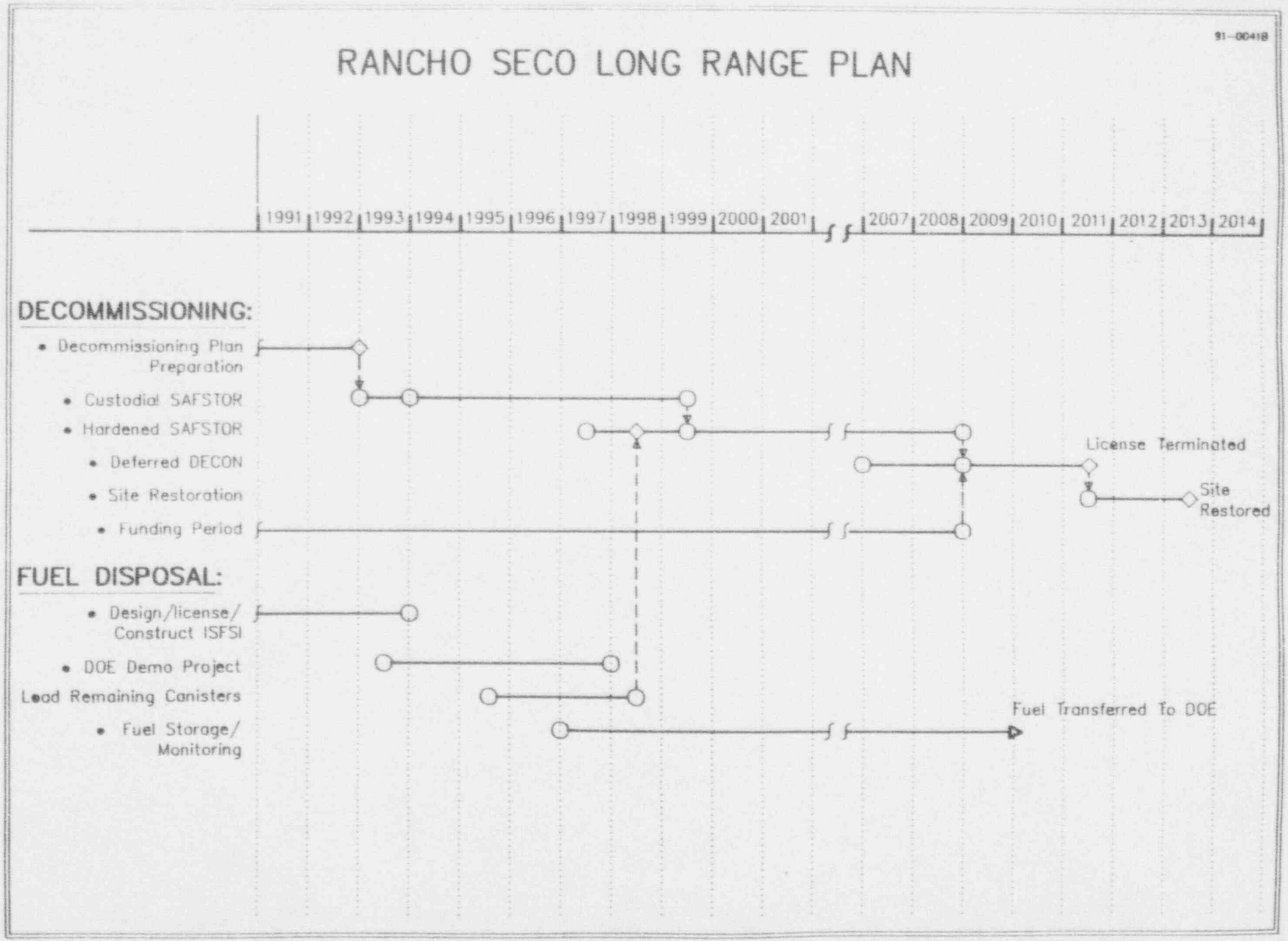
2.0 NEED FOR THE PROPOSED ACTION

As the result of a public referendum of District voters on June 6, 1989, RSNGS has ceased operation, and the reactor has been permanently defueled. On May 20, 1991, the District submitted its Proposed Decommissioning Plan to the NRC discussing the method to be used to decommission RSNGS.

As discussed in the Decommissioning Plan, the District has decided to store the spent nuclear fuel from RSNGS at an ISFSI. Storing the fuel in a transportable storage system, at an ISFSI, will allow the District to abandon the Rancho Seco spent fuel pool as the District proceeds to place Rancho Seco into the Hardened-SAFSTOR phase of decommissioning. The District intends to operate the Rancho Seco ISFSI until the spent nuclear fuel is accepted by DOE.

Figure 2-1 shows the District's long range plan for decommissioning and fuel disposition at Rancho Seco.

FIGURE 2-1


91-00418
RANCHO SECO LONG RANGE PLAN
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2007
2008
2009
2010
2011
2012
2013
2014
DECOMMISSIONING:
• Decommissioning Plan Preparation
• Custodial SAFSTOR
• Hardened SAFSTOR
• Deferred DECON
• Site Restoration
• Funding Period
License Terminated
Site Restored
FUEL DISPOSAL:
• Design/license/ Construct ISFSI
• DOE Demo Project
Lead Remaining Canisters
• Fuel Storage/ Monitoring
Fuel Transferred To DOE

3.0 ALTERNATIVES TO THE PROPOSED ACTION

The District evaluated the several alternatives for long term storage of Rancho Seco's spent fuel. The District's objective in selecting the storage technology was to minimize the cost associated with spent fuel storage, while ensuring the health and safety of the public, as the District proceeds with decommissioning RSNGS. Plant staff concluded that dry storage of the fuel at an onsite ISFSI provides the most effective means of storing the spent fuel until DOE is ready to take possession of the fuel. The District considered the following alternatives in its evaluation:

a. Ship spent fuel to a permanent Federal repository.

b. Store spent fuel at the Rancho Seco ISFSI.

c. Ship spent fuel from RSNGS to a reprocessing facility.

d. Other dry storage technologies.

e. Ship spent fuel to other utility spent fuel pools.

f. Continue to store spent fuel wet in the spent fuel pool.

Each alternative is discussed below.

3.1. SHIP SPENT FUEL TO A PERMANENT FEDERAL REPOSITORY

This is the District's preferred solution to the storage of spent fuel from RSNGS. However, permanent federal repositories are not currently available for the District's use. Furthermore, a Federal repository is not expected to be in place prior to the late-1990s.

This is not a viable alternative for solving the District's near-term storage needs.

3.2 STORE SPENT FUEL AT THE RANCHO SECO SITE IN DRY SHIELDED CANISTERS

Storage of spent fuel in dry shielded canisters above ground appears to be the most desirable method for onsite storage at Rancho Seco at the present time, and in the absence of a federal repository, is the District's primary alternative for spent fuel storage at the RSNGS.

The District is pursuing this alternative as the means of spent fuel storage.

3.3 SHIP SPENT FUEL FROM RANCHO SECO TO A REPROCESSING FACILITY

There is no operating commercial reprocessing facility in the United States. Reprocessing facilities are in operation in the United Kingdom, France, Germany, and Japan. However, the prospect of shipping domestic spent fuel to a foreign country for storage or disposal is obscure, extremely expensive, and may conflict with government policies.

Reprocessing is not a viable alternative.

3.4 OTHER DRY STORAGE TECHNOLOGIES

In December 1991, the District issued a Request for Proposal to store Rancho Seco's 493 spent fuel assemblies. In February 1992, the District received proposals from 5 cask vendors. After evaluating the proposals, the District concluded that storing the fuel in a NUHOMS transportable storage system would provide the most effective way to meet the District's long term storage needs.

3.5 SHIP SPENT FUEL TO OTHER UTILITY SPENT FUEL POOLS

In 1989, the District asked several neighboring utilities if they would be willing to store spent fuel from RSNGS in their spent fuel storage pools. The utilities that responded uniformly rejected this proposal. This is understandable, since many of the utilities face spent fuel storage space shortages, and the acceptance of Federal storage and disposal under the Nuclear Waste Policy Act is uncertain.

Therefore, this option is not viable.

3.6 CONTINUE TO STORE SPENT FUEL WET IN THE SPENT FUEL POOL

If the fuel remains in the Rancho Seco spent fuel pool, the District will not be able to complete decommissioning RSNGS until DOE removes the fuel from the Rancho Seco site. The additional costs associated with maintaining the spent fuel pool is estimated to be between $6-8 million per year. Maintaining this additional expense, and delaying decommissioning, until DOE is ready to accept Rancho Seco's spent fuel, is unacceptable to the District.

3.7 SUMMARY

The District considers storage of spent fuel above ground in dry shielded canisters to be the best method of storing spent fuel from RSNGS until acceptance by DOE. Dry storage in canisters is estimated to be the most viable and economical method of providing long-term storage of Rancho Seco's spent fuel.

4.0 SITE AND ENVIRONMENT

4.1 SITE LOCATION AND DESCRIPTION

4.1.1 Location

The Rancho Seco site is in the southeast part of Sacramento County, California. It lies either wholly or partly in Sections 27, 28, 29, 32, 33, and 34 of Township 6 North, Range 8E. The site is approximately 26 miles north-northeast of Stockton and 25 miles southeast of Sacramento, as shown in Figure 1-1. RSNGS and the ISFSI are shown in Figure 1-2. The distance and direction from the ISFSI boundary to other nearby features is discussed below:

Nearby Feature	Distance (feet)	Direction
Clay East Road	3400	South
Nearest Resident	4900	South
Uptight Feedlot (Grain processing plant)	3820	South
Owner controlled area boundary	1200	West
	1500	North
Rancho Seco Park entrance	3200	East
Nearest roadway (Twin Cities Road)	2700	North-east

More generally, the site is located between the Sierra Nevadas to the east and the Coast Range along the Pacific Ocean to the west in an area of flat to lightly rolling terrain at an elevation of approximately 200 feet mean sea level. East of the site the land becomes more rolling, rising to an elevation of 600 feet at a distance of about seven miles, and increasing in elevation thereafter approaching the Sierra Nevada foothills.

4.1.2 Description

The site is approximately 2,480 acres with all acreage being owned by the District. The nearest population of 25,000 or more is Lodi, about 17 miles southwest of the site. The site area is almost exclusively agricultural and is presently used as grazing land.

The climatology of the Rancho Seco site is typical of the Great Central Valley of California. Cloudless skies prevail during summer and much of the spring and fall seasons due to the Pacific anticyclone off the California coast which prevents Pacific storms from entering inland. The rainy season usually occurs between October and May, with more than two-thirds of the rainfall occurring in December through March. Atmospheric dispersion factors for the site are considered favorable.

Groundwater in the site area occurs under free or semi-confined conditions. It is stored chiefly in the alluvium, the older alluvial type deposits, and the Mehrten Formation. Groundwater movement in the area is to the southwest with a slope of about ten feet/mile.

There is no indication of faulting beneath the site. The nearest fault system, the Foothill Fault System, is about ten miles east of the site and has been inactive since the Jurassic Period, some 135 million years ago. Ground accelerations of no greater than 0.05g are anticipated at the site during the life of the plant.

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.

4.1.3 History and Archeology

As discussed in the RSNGS environmental report,[6] the District conducted a study of the area surrounding Rancho Seco to determine its historical significance. There are no state or Federal historical landmarks within a 10-mile radius of Rancho Seco. Further, archeological surveys of the area revealed no archeological sites within the Rancho Seco area, and there is no evidence of prehistoric occupation.

4.2 POPULATION DISTRIBUTION AND TRENDS

The land surrounding the site is presently undeveloped and is used primarily for grazing cattle and other agricultural activities. The most recent population distribution estimates are contained in the "Evacuation Time Estimate for the Rancho Seco Plume Exposure Pathway Emergency Planning Zone" Prepared by HMM Associates, Inc., in December 1989.[7]

There are five counties (Amador, San Joaquin, Sacramento, El Dorado, and Calaveras) within a 15-mile radius of Rancho Seco. Only very small portions of El Dorado and Calaveras counties are within the 15-mile radius of Rancho Seco. There is no significant projected growth within these portions of these two counties.

The projected development within Amador, Sacramento, and San Joaquin counties is as follows:

AMADOR COUNTY

The following six planned developments are currently being considered by Amador County:

1. East Lambert Mine Reactivation and Clay Industrial Tile Plant. This will be a strip-mining plant for stone and gravel. There will be no explosive type mining. The facility will be located approximately 11 miles northwest of Rancho Seco. The plant will employ approximately 109 employees. This project has been approved by the board; however, a subsequent lawsuit has placed the project in limbo. The county is now waiting for results of the court action.

2. Buena Vista Meadows. This a newly proposed housing development still in the preliminary stages. The proposal calls for 125 residential lots. It is located approximately 13 miles east-southeast of Rancho Seco. At this time no Environmental Impact Report (EIR) has been completed.

3. Comanche Oaks. Located 12 miles southeast of Rancho Seco, this housing proposal calls for 131 residential lots. Amador County has been waiting approximately 1-1/2 years for an EIR to be completed. At this time the county believes that this project will die.

4. Comanche Greens. Located approximately 9 miles southeast of Rancho Seco, these housing plans include 683 residential lots and an 18-hole golf course. Amador county has been waiting approximately 1-1/2 years for an EIR to be completed. At this time the project is at the application stage.

5. Goose Hill. This is a new housing proposal in the preliminary stages. It is located approximately 14 miles east-southeast of Rancho Seco with plans for [illegible]dential lots. At this time no EIS has been completed, and the project is at the ap[illegible]on stage.

6. Murieta Ranches. Located approximately 14 miles east-northeast of Rancho Seco. This development will have 10 residential lots. No EIR has been completed. This project has been approved by the planning board.

City of Ione (Amador County)

Ione is located 11 miles east of Rancho Seco. Within the next ten years, Ione is planning several developments. Upon completion of these developments there will be a total of 252 multiple family units, and 1,861 single family units, for a total of 2,113 units. The average single family in Ione consists of 2.66 people. This gives a predicted growth of approximately 5,621 people over the next ten years.

Currently there are fourteen planned housing developments in the City of Ione. All developments are expected to be within two miles area of each other.

1. Castle Oaks - This housing development will have 96 multiple family (MF) units and 823 single family (SF) units for a 919 unit total. It is under construction and its estimated time of completion is 10 years. Also as a part of this development there will be an 18-hole golf course.

2. Country Club Place - This development has plans for 160 SF units. This project has been approved though construction has not yet begun. Its estimated completion will be 10 years.

3. Edgebrook Estates Units 1 & 2 - This development will have 83 SF units. It is currently under construction with an estimated completion time of 2 years.

4. Edgebrook Estates Units 3-5 - Housing development with 109 SF units planned. It has been approved but is not yet under construction. Estimated time frame 5 years.

5. Golden Gate Estates - 121 SF units planned. It is currently under construction. Estimated completion is 2 years.

6. Harvest Town Houses - 14 MF units planned. The development has been approved but is not yet under construction. Estimated completion time is 2 years.

7. Ione Oaks - 52 SF unit development. It has been approved but is not yet under construction. Estimated completion time is 2 years.

8. Preston Glen - This development is on the planning board but very questionable.

9. Regan - This development is on the planning board but very questionable.

10. Sutter Place - 12 SF units planned. This development has been approved but is not yet under construction. Estimated completion 2 years.

11. Sutter Mill Estates - This development is on the planning board but very questionable.

12. Villa Arroyo Seco - This development is on the planning board but very questionable.

13. Vimini Estates - 27 units planned. This development has been approved but is not yet under construction. Estimated completion 2 years.

EIRs completed for Castle Oaks and Q Ranch found no hazard or significant impact due to Rancho Seco. All other developments filed negative declarations.

SACRAMENTO COUNTY

The Planning Department for the City of Sacramento has every intention of leaving the majority of the area included in the 15-mile radius of Rancho Seco as agricultural. Sacramento county projects the following development:

1. Elk Grove/Vineyard - Located 14 miles west-northwest of Rancho Seco, construction is currently underway. This development has planned a site with approximately 40,000 units over the next ten years. The boundaries are Gerber Road to the north, Grant Line Road to the south, Excelsior Road to the east, and Highway 99 to the west. The EIR makes no reference to Rancho Seco. No major highways are planned, nor are any airports.

2. Galt - There is currently construction underway on a 4,200 unit housing development. No new highways are planned. The EIR shows no hazard or significant impact due to Rancho Seco.

3. Clay Station 1200 - This development will be located approximately 5 miles northwest of Rancho Seco. Although this project has been on the table for some time it still has not been approved by the planning board. When approved the project calls for 222 residential lots, 1 school, 1 equestrian arena, 1 fire station, and 4 wetland conservation areas.

SAN JOAQUIN COUNTY

The following areas are being developed at this time:

1. Ramm Ranch - This housing development is located 14 miles south-southwest of Rancho Seco. There are 12 planned lots. The schedule for development is still unknown. The developer filed a negative declaration for the project. This project has been approved, however construction has not yet begun.

2. River Oaks - This housing development is located approximately 13 miles south of Rancho Seco. The project includes construction of 300 single-family homes on 124.7 acres. The project includes a man-made lake on the southern end of the project site, a park, library, and fire station. The estimated timeframe for completion is approximately 6 years. The EIR found no hazard or impact due to Rancho Seco.

3. Buckeye Ranch - The project is to be a 26-unit development, with an 18-hole private golf course, a private equestrian center, enhancement of two lakes, and a 720-acre nature preserve. The outer perimeter of the site is located approximately 14 miles

southwest of Rancho Seco. The project is currently in the Draft EIR stage. If the plan is approved, the development should take 2 to 3 years to complete.

4. Dry Creek Village - Located approximately 12 miles southwest of Rancho Seco, the housing development calls for 187 units. This project is presently in the Initial Study and Notice of Preparation phase. Actual project time and development has not yet been determined.

Population Within 10 Miles

Figure 4-1 shows the 1989, permanent population for 22-1/2 degree sectors, at one-mile increments, surrounding the Rancho Seco site. Permanent residents are defined as those persons having year-round residences within the described area. There are currently less than 15,550 permanent residents within a 10 mile radius of the Rancho Seco site. Table 4-1 presents in tabular form the permanent population distribution within 13 miles of the Rancho Seco site.

A five-mile radius area surrounding the Rancho Seco facility is defined as the low population zone. This area is primarily farm land, with few tourist attractions and little seasonal variation in the population.

The Rancho Seco Reservoir and Recreation Area attracts a number of day visitors to the area. In 1977, there was a peak of 240,000 visitors. A maximum occurrence was recorded when 600 cars (approximately 3 people per car) visited the area in a single day. It was further estimated that there will be a turnover factor of 3, so that at any given time on the maximum day there will be an additional 600 people in the low population zone around Rancho Seco. Rancho Seco Park is also available for overnight and weekend camping for self-contained recreational vehicles only.

Annual park attendance is as follows:

Year	Attendance
1991	164,933
1990	161,118
1989	147,316
1988	210,849
1987	225,343
1986	187,152
1985	179,161

The District is also moving ahead with plans to build a golf course at Rancho Seco Park. Under the current schedule, the golf course will open in the fall of 1995, with expected crowds of approximately 80,000 people per year.

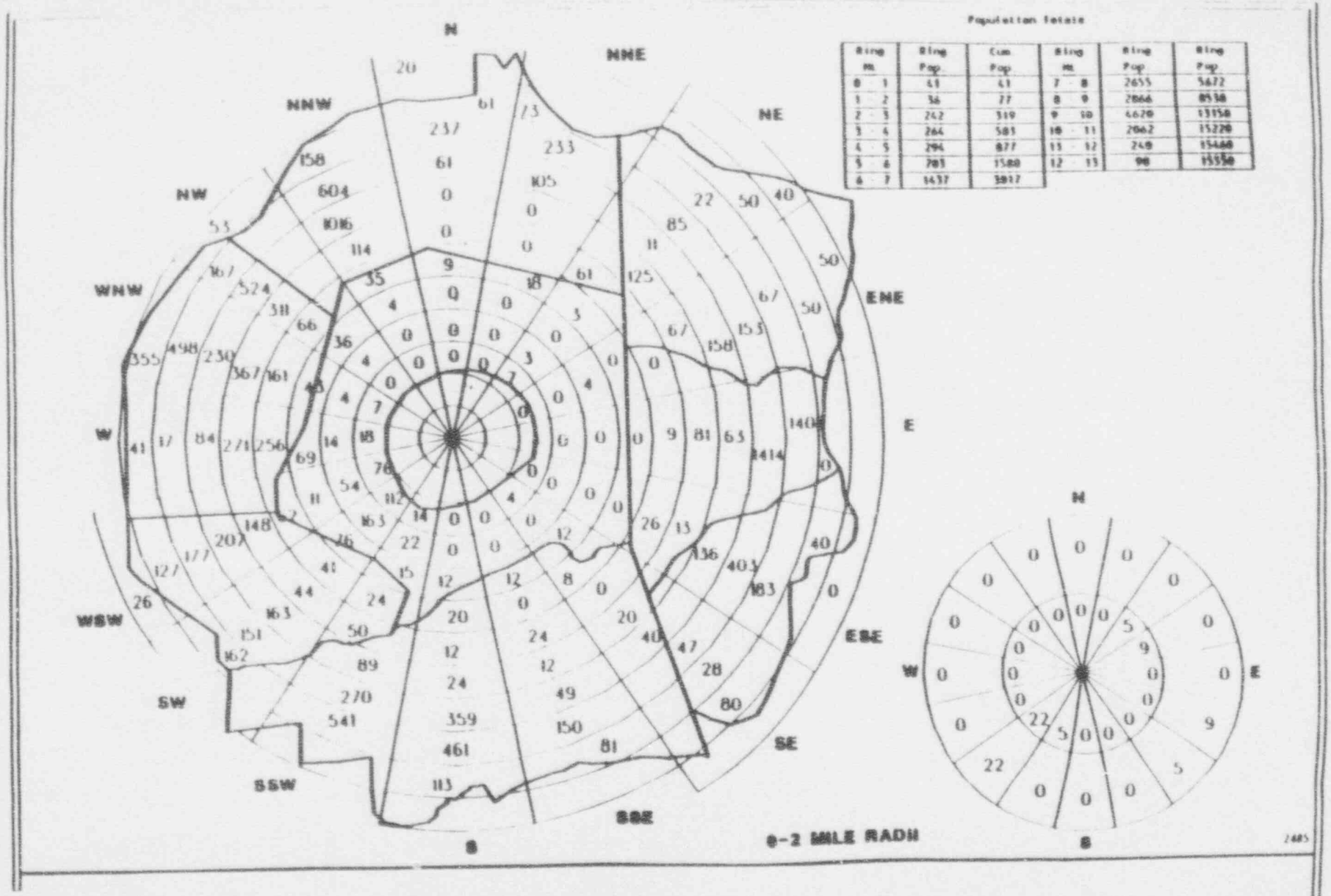


FIGURE 4-1
PERMANENT POPULATION WITHIN A 10 MILE RADIUS OF RANCHO SECO

TABLE 4-1

PERMANENT POPULATION DISTRIBUTION WITHIN 13 MILES

Sector	0-1 Mi.	1-2 Mi.	2-3 Mi.	3-4 Mi.	4-5 Mi.	5-6 Mi.	6-7 Mi.	7-8 Mi.	8-9 Mi.	9-10 Mi.	10-11 Mi.	11-12 Mi.	12-13 Mi.	Total
N	0	0	0	0	0	9	0	0	61	237	61	20	0	388
NNE	0	0	0	0	0	18	0	0	105	233	73	0	0	429
NE	5	0	7	3	0	3	61	125	11	85	22	50	40	412
ENE	9	0	0	0	4	0	0	67	118	153	67	50	50	558
E	0	0	4	0	0	0	9	81	63	1414	1408	0	0	2979
ESE	0	9	0	0	0	0	26	13	136	403	183	40	0	810
SE	0	5	4	0	12	8	0	20	40	47	28	80	0	244
SSE	0	0	0	0	12	0	24	12	49	150	81	0	0	328
S	0	0	0	0	12	20	12	24	359	461	113	0	0	1001
SSW	5	0	14	22	15	24	50	89	270	341	0	0	0	1030
SW	22	22	112	163	76	41	44	163	151	162	0	0	0	956
WSW	0	0	76	54	11	62	148	207	177	127	26	0	0	888
W	0	0	18	14	69	256	271	84	17	41	0	0	0	770
WNW	0	0	7	4	43	161	367	230	498	355	0	0	0	1665
NW	0	0	0	4	36	66	311	524	167	53	0	0	0	1161
NNW	0	0	0	0	4	35	114	1016	604	158	0	0	0	1931
TOTAL	41	36	242	264	294	703	1437	2655	2866	4620	2062	240	90	15550

4.3 ADJACENT LAND USE

4.3.1 Land Use

The site area is almost exclusively agricultural. DSAR Figure 2.2-4 provides a detailed description of all agriculture and residential activities within a 5-mile radius of the site.

There are at present three large-scale commercial dairies in the vicinity, each with over 200 cows. The closest dairy is approximately 8 miles northwest of the site. A ranch 1 mile east of the site has dairy cows for domestic use only.

Activities in the area immediately surrounding the site are not expected to change extensively. Proposed land use for the southeast section of Sacramento County as adopted by the Sacramento Planning Department is predominantly (70 percent) agricultural and is expected to remain agricultural.

4.3.2 Access and Egress

As shown in Figure 1-1, State Route 104 runs just north of the site in a general east-west direction and connects with State Route 99 to the west and State Route 88 to the east. There are no public highways that transverse the exclusion area.

The Twin Cities Access Road is the main access road to the plant and to nearby recreation facilities. This road is not a through road and is designed to handle heavy construction vehicles.

Rail access to the site is available via a rail spur from the existing Southern Pacific Railroad line that runs roughly parallel to State Route 104 adjacent to the site. The routing of the rail spur is shown in Figure 1-2.

4.3.3 Water Supply

Potable water for the Rancho Seco site is obtained from the site well. Water for RSNGS is from the Folsom South Canal. The Bureau of Reclamation constructed the canal as part of

the Central Valley Project. A pipeline and pumping station are located between the plant and the Folsom South Canal.

4.4 METEOROLOGY

4.4.1 General Climate

The climate of the Rancho Seco site is generally that of the Great Central Valley of California. Summers are hot and cloudless and the winters are mild. The rainy season occurs between October and May, with more than two-thirds of the annual rainfall occurring in December through March. Heavy fog occurs in mid-winter, primarily in December and January, and may last for several days.

The most important controlling geographical influence on the climate results from the mountains which surround the valley to the west, north, and east. During the winter, storms which pass through the area are moderated by the mountains which collect much of the precipitation. The rains that occur in the valley are usually accompanied by south to southeast winds. The cold north and northwest winds pass over the mountains to the north where the air is warmed dynamically by descent into the valley resulting in comparatively warm, dry winds. A similar condition occurs infrequently in the summer when a steep northerly pressure gradient develops, producing a heat wave.

The Central Valley warms greatly during the day resulting in a marked thermal contrast between the valley and the air over the Pacific. The Coast Range separates the marine air from the valley air except for a gap through the range formed by the Sacramento and San Joaquin Rivers. The heavy marine air flows through this gap and splits into a northerly flow into the San Joaquin Valley and a southerly flow into the Sacramento Valley.

4.5 HYDROLOGY

4.5.1 Characteristics of Streams and Lakes in the Vicinity

DSAR Table 2.4-1 provides a summary of reservoirs and lakes in the vicinity of RSNGS. Each reservoir and lake is coded by number in DSAR Table 2.4-1 for easy location on the location map, DSAR Figure 2.4-1.

4.5.2 Topography

The site is gently rolling and is not intersected by any streams, but is bounded by well-defined drainage courses that intercept surface runoff from the higher site topography. Plant grade at approximately 165 feet elevation above sea level permits excellent drainage at all times without danger of flooding. Plant areas are graded to provide natural drainage to lower ground. The rolling terrain of the site affords excellent drainage along natural gullies at gradients varying from 2 to 6 percent. Elevations vary from 130 feet to 280 feet above sea level.

4.5.3 Terminal Disposal of Storm Runoff

The site is bounded on the north by Hadselville Creek, which intercepts all drainage from the site and empties into Laguna Creek to the west. Flow is continued westerly by Laguna Creek South, a tributary of the Consumnes River, and into the Mokelumne River. The Mokelumne is a tributary of the southerly flowing Sacramento River and enters the Sacramento River approximately 20 miles south of the city of Sacramento.

Storm water runoff at the Rancho Seco site is controlled primarily by surface ditches. Generally, overland flows will be intercepted by the ditches and diverted around the plant to natural stream channels. When this is not possible, runoff will be diverted down cut slopes in culvert pipes and discharged to the plant drainage ditch system. The drainage system was designed to accommodate the 25-year recurrence storm with a minimum of six inches freeboard and the 100-year recurrence storm with zero freeboard.

4.5.4 Historical Flooding

Within recent historical times, no flooding or inundation from storms or runoff has occurred within the site boundaries. It is unlikely that the site can be inundated or flooded, even with abnormal rainfall intensities.

4.5.5 Prediction of Land Urbanization

A survey conducted by Sacramento County indicates that the land adjoining the site within approximately a 15-mile radius will remain primarily for agricultural and grazing use; therefore, the rainfall runoff factors will remain constant and not cause any difference in hydrological properties.

4.5.6 Groundwater

Pumping tests conducted in exploratory holes indicated the presence of groundwater underlying the site approximately 150 feet below the original ground surface. The water is of good quality and is readily extracted by wells.

Groundwater in this area occurs under free or semi-confined conditions as a part of the Sacramento Valley Groundwater Basin. The water is stored chiefly in the Mehrten Formation. The sand and gravel zones of that formation yield water readily to wells.

Galt and Lodi are the closest communities with public groundwater supplies to the south and west. They are supplied by the City of Galt Water System, the Lodi Municipal Water Works, and the North San Joaquin Water Conservation District (Lodi area). The City of Galt Irrigation District buys Rancho Seco discharge water for irrigation.

The wells supplying Galt and Lodi penetrate a number of aquifers. The Lodi wells draw water from recent alluvium, the Victor Formation, the Laguna Formation, and probably the Mehrten Formation. The Galt wells tap the Laguna Formation and probably the Mehrten Formation. The approximate time required for groundwater moving through the Mehrten Formation aquifer from the Rancho Seco site to the Galt area can be calculated from available data, and is discussed in DSAR Section 2.4.6.1.

4.6 GEOLOGY AND SEISMOLOGY

4.6.1 Geology

The Rancho Seco site is about 25 miles southeast of Sacramento in the low hills at the edge of the Sierra Nevada Mountains. The site is founded on the Pliocene Laguna Formation and is underlain by an estimated 1,500 to 2,000 feet of Tertiary or older sediments deposited on a basement complex of granitic to metamorphic rocks.

Explorations at the site included field mapping, 1,552 feet of bucket auger holes logged in detail, a 602-foot core hole visually and geophysically logged, 2,016 feet of small-hole borings that were logged and from which soil samples were taken for laboratory testing, and approximately 11,500 feet of geophysical refraction profiles. The data obtained indicated the unfaulted nature of the sediments and their suitability as a foundation upon which RSNGS was constructed.

A detailed account of the conditions at the site can be found in USAR, Appendix 2C (Geology and Seismology)

4.6.2 Seismology

There is no indication of faulting beneath the site. The nearest fault system, the Foothill Fault System, is about 10 miles to the east of the site. It has been inactive since the Jurassic Period, some 135 million years ago. The nearest active faulting along which historic large earthquake shocks have originated are the Hayward and San Andreas Faults, some 70 and 79 miles to the west, respectively, and the faults over 80 miles to the east beyond the Sierra Nevada Range.

Fault propagation in the site area is not expected. Earthquake shaking may occur as the result of shocks along distant faults, but because of their distant origin and the nature of the foundation material beneath the site, ground accelerations greater than 0.05g should not occur during the life of the ISFSI. Conservative values of 0.25g horizontal and 0.17g vertical were used for the Design Basis Earthquake (DBE) for the Rancho Seco ISFSI.

Further discussion of the site seismicity may be found in the Seismic Report in USAR Appendix 2D and supplements. Earthquake design criteria for the site can be found in USAR Appendix 5B.

4.7 BIOTA

4.7.1 Ecology of the Site

The site is located at the eastern edge of the Central Valley grassland in the vegetation type known as the California prairie or the California annual grasslands. These grasslands are part of the complex of plant communities that evolve in seasonally hot and dry climates dominated by maritime influences.

Such community complexes were first described for the eastern Mediterranean basin and are consequently called Mediterranean-type ecosystems. The Rancho Seco grassland is a fairly typical Mediterranean-type annual grassland, both with respect to important physical parameters and the ecosystem structure and function.

The gently rolling topography characteristic of the site stretches along the low foothills to the northwest and southeast. To the west, the grassland continues onto the flat alluvial plain of the Central Valley floor less than four miles away. Since the site is so severely water-limited, nearby areas having abundant water may be particularly important sources of immigrant species which are either accidental or temporarily resident in the Rancho Seco region. Example of such areas include the Sacramento - San Joaquin Delta, 20 miles to the southwest, and the Folsom and Comanche Reservoirs, 27 miles to the north and 10 miles to the southeast, respectively.

The Rancho Seco grassland ecosystem appears to be the same as other sections of grazed annual grassland along the east side of the Central Valley, except for the large areas of vernal pools found about 1-1/2 to 2 miles to the south and east of the powerplant.

4.7.2 Vegetation Patterns at Rancho Seco

Like other annual grasslands, Rancho Seco is highly seasonal and limited by annual precipitation. Its productivity is a function of variation in rainfall, which in turn affects soil moisture and ultimately the length of the growing season. In addition, the combined stress of high temperatures, strong solar insolation, low atmospheric humidity, and low soil moisture force the grassland into dormancy during the summer season (approximately May to October).

The Rancho Seco grassland has the additional stress of cattle grazing. In the final analysis, the grassland is essentially a cow pasture, in which the dual effect of grazing and cover reduction limit the diversity of both the flora and the fauna.

Although the vegetation of the Rancho Seco area is basically all annual grassland, it is not homogeneous. A number of local associations are discernible:

The "Upland" Annual Grasslands are distinguished as land which is relatively well drained, not containing areas of standing water, and dominated by grasses and forbs (broad-leaved plants) characteristic of annual grasslands.

The Vernal-pool areas correspond to the extent of hardpan Redding soil. The vernal-pool areas, generally about 1-1/2 to 2 miles to the southeast and east of the site, consist of rolling topography underlaid by hardpan. Winter rains fill the depressions to begin the annual cycle of vernal-pool development. The plant species of vernal pools are quite unique to this kind of habitat, and the vernal pools tend to retain their unique character except when insufficient rainfall allows typical annual grassland species to successfully invade the vernal pool areas. Often vernal-pool basins will remain bare or have only a few nonvernal species during the dry season.

4.7.3 The Fauna of Rancho Seco

The list of vertebrate species that could potentially occur in the Rancho Seco area is quite long. Mouse burrows and meadow-vole runs (Microtus californicus) are common, especially where there is cover and where water is nearby. Pocket gophers (Thomomys bottae) are the most common mammal on site. Cattle grazing reduces low ground cover that is valuable to common species such as rabbit (Lepus californicus) and California quail (Lophortyx californicus).

Skunk and raccoon signs are seen near water. Several species of water-fowl, including geese, are common. Grassland birds (savannah sparrows, Brewer's blackbirds, meadowlarks, and horned larks) and various raptors (redtailed hawks, turkey vultures, sparrow hawks) are sighted frequently. The most important natural consumer is the gopher (Thomomys bottae), but cattle pastured by local ranchers are the most important faunal species affecting the vegetation.

The cattle are the dominant consumers. The next largest herbivore is probably the jackrabbit; the site is not a suitable deer habitat, because of the lack of browse and cover.

Feral cats are numerous and may be the dominant carnivores, especially on smaller ground-nesting birds.

The fauna is probably most diverse during the winter and early spring. Many migratory bird species use the area during the late fall and winter, but leave during the spring to breed in other areas. Populations of the resident species, especially the mammals, can be expected to fluctuate seasonally from high densities near the end of the growing season to low densities at the end of the dry season.

The major limitation on the diversity of fauna in the grassland is the extremely simple structure of the vegetation, consisting almost solely of short, close-cropped grasses and forbs. The lack of tall, herbaceous and shrubby vegetation makes the area unsuitable for species requiring this type of vegetation for foraging, nesting, roosting, or resting sites.

The species in the Rancho Seco grassland are generalist feeders, well adapted to disturbance, and in general not dependent upon heavy cover. Species that are sensitive in one way or another are restricted to a few suitable areas, principally near the reservoir, ponds, or streams. These observations reaffirm impressions of the substantial impact of the cattle upon the natural faunal elements of the ecosystem.

The Rancho Seco ecosystem, as water limited as it is, has responded strongly to the additional water resulting from the operation of RSNGS. Riparian elements are invading areas where year-round moisture is available, and a number of waterfowl/wading-bird species are using the area. These elements are expected to use the ecosystem seasonally, coinciding with the vegetative growth cycle, and to provide interchange between Rancho Seco, the Delta, and other aquatic habitats.

The fish fauna of the Rancho Seco reservoir is partially introduced and heavily managed. The role of the fish and the reservoir as part of the trophic web of the Rancho Seco grassland has not been clarified, although the lake itself provides an important riparian ecotone that probably increases use of the grassland, particularly by birds.

5.0 DESCRIPTION OF THE RANCHO SECO ISFSI

5.1 GENERAL DESCRIPTION

The proposed ISFSI is based, to the greatest extent possible, on the NUHOMS system design documented in Reference 1. The most notable design features unique to Rancho Seco include the MP-187 multi-purpose cask, and the use of neutron poison in the DSC guide tubes. The NUHOMS transportable storage system is designed to protect onsite personnel and the public from the radioactivity contained in the spent nuclear fuel by ensuring that the integrity of the confinement and shielding barriers is maintained. The physical components of the transportable storage system are described in Section 5.2, the operational and administrative controls are discussed in Section 5.3, and the monitoring program planned for the ISFSI is discussed in Section 5.4.

5.2 ISFSI COMPONENTS AND DESIGN

The Rancho Seco ISFSI consists of a concrete slab, approximately 225 feet long, 170 feet wide, and 2 feet thick, onto which the HSMs and loaded DSCs will be placed. The ISFSI slab surrounding the HSMs will be tapered to approximately 6 inches thick. The slab is surrounded by a double security fence. The only support systems required are those necessary for transferring the loaded and sealed DSCs from the Fuel Storage Building to the ISFSI. The DSCs, HSMs, MP-187 casks, and the cask lifting yoke are the only components associated with the Rancho Seco ISFSI that are important to safety. Other components including power supplies and lights do not perform safety functions. Figure 1-3 provides additional detail on the ISFSI layout.

The Rancho Seco ISFSI will use the NUHOMS system to store irradiated fuel and control components. Using this system, 24 spent fuel assemblies will be loaded into a DSC (which will be placed inside of the multi-purpose cask) in the spent fuel pool. The multi-purpose cask containing the loaded DSC will be removed from the pool and placed in the cask decontamination area where it will be sealed, drained, and dried. The DSC cavity will then be filled with helium.

Multi-pass double seal welds at each end of the DSC, and multi-pass circumferential and longitudinal welds will be used to seal the DSC. These welds will be examined to minimize the possibility of helium leakage.

After being decontaminated, the multi-purpose cask will be placed onto a transport trailer, and towed to the ISFSI. At the ISFSI, the loaded multi-purpose cask will be aligned with the HSM, and the DSC will be transferred from the multi-purpose cask into the HSM using a hydraulic ram. The HSM access door will be welded shut. Once inside the HSM, the DSC is in safe, passive dry storage.

The NUHOMS system is a totally passive system, with natural convection cooling sufficient to maintain safe fuel cladding temperatures. The HSM provides adequate shielding to meet the requirements of 10 CFR 72.104. No radioactive material will be released under any credible conditions.

The ISFSI storage configuration will consist of two parallel, back-to-back rows of 11 HSMs. In addition, the District will maintain two multi-purpose MP-187 casks. The multi-purpose casks will be designed to accommodate the DSCs, and will be licensed under 10 CFR 72 for spent fuel storage and 10 CFR 71 for spent fuel transport. Figure 1-4 illustrates the DSC and HSM of the proposed Rancho Seco ISFSI.

Each of the transportable storage system components are discussed below. Table 5-1 Presents the key design parameters for the NUHOMS transportable storage system, and Table 5-2 presents the characteristics of control components used at RSNGS. Detailed design information will be presented in the ISFSI SAR, Revision 1.

Spent Fuel

Because it is highly radioactive, spent nuclear fuel and its associated control components present a potential hazard to plant personnel, the public, and the environment. The transportable storage system is designed to safely store this irradiated material by confining the material and providing shielding from direct radiation.

The District's objective is to place Rancho Seco's 493 spent fuel assemblies into dry storage at the ISFSI. All of the fuel, and associated irradiated material, will be stored such that:

1. There is no potential for nuclear criticality.

2. Maximum allowable fuel cladding temperatures will not be exceeded.

3. Dose rates outside the HSMs are within the allowable design limits.

Dry Shielded Canister

The DSCs are based on the standard DSC design, as documented in Reference 1. The cylindrical shell, and top and bottom cover plate assemblies form the pressure retaining containment boundary for the spent fuel. The internal basket assembly contains discrete storage positions for 24 PWR spent fuel assemblies. The DSCs contain neutron poison, and are equipped with two shield plugs so that occupational doses at the ends are minimized for drying, sealing, and handling operations. Three types of DSCs will be used at the Rancho Seco ISFSI:

1. Poisoned DSCs capable of handling spent fuel only.

2. Poisoned DSCs capable of handling fuel with control components.

3. One non-poisoned DSC capable of accommodating failed fuel.

The DSCs (with the exception of the failed fuel DSC) will contain neutron poison material. This material is being used to expedite licensing for transport under 10 CFR 71.

Multi-purpose Cask

The District will have two MP-187 multi-purpose casks at the Rancho Seco site. These casks will be designed to perform three functions:

1. Transfer loaded DSCs from the spent fuel pool to the ISFSI, or from the ISFSI to the spent fuel pool.

2. A transport cask, licensed under 10 CFR 71, capable of transporting loaded DSCs offsite.

3. Used at the ISFSI as an "overpack" to isolate a breached DSC from the environment, if needed to recover from an off-normal event.

The cask body includes the containment boundary, a structural shell, gamma shielding, and neutron shielding. The cask body will be designed and fabricated to ASME Section III, Class 1 component (Subsection NB). No credit will be taken for the DSC shell providing a containment function during transport. A cover plate is provided to seal the bottom hydraulic ram access penetration of the cask during fuel loading. Removable shield covers are provided to cover the exposed ram access penetration during transport to or from the ISFSI to keep personnel exposures ALARA. Removable upper and lower trunnions are provided for cask handling and downending operations.

Horizontal Storage Module

Each HSM provides a self-contained modular structure for storing a DSC. The HSM is constructed from reinforced concrete and structural steel. The storage modules will be pre-fabricated, transported to the site, and set in place. The modular design allows the storage modules to be transported offsite, and will greatly facilitate decommissioning the ISFSI after the fuel has been moved offsite.

The thick concrete roof and walls of the HSM provide substantial gamma and neutron shielding. Contact doses for the HSM are designed to be ALARA.

Transfer Trailer/Hydraulic Ram

The transfer trailer transports the cask support skid and the loaded multi-purpose cask between the Fuel Storage Building and the ISFSI. The trailer is a heavy industrial trailer with a payload capacity of 125 tons. The trailer is designed to ride low to the ground to minimize the HSM height and the multi-purpose cask height during transport and DSC transfer operations.

Hydraulic Ram

The hydraulic ram is used to move the DSC from the multi-purpose cask into the HSM or from the HSM into the cask. The design of the ram system provides positive alignment of the major components during DSC transfer operations.

Table 5-1

Key Design Parameters for the NUHOMS Transportable Storage System

Fuel Assembly Criteria

1. Fuel Assemblies

a.	Rod array	15 x 15
b.	Fueled rods per assembly	208
c.	Control rod guide tubes per assembly	16
d.	In-core instrument positions per assembly	1
e.	Fuel rod outside diameter, in.	0.430
f.	Cladding thickness, in.	0.0265
g.	Fuel rod pitch, in.	0.568
h.	Fuel assembly pitch spacing, in.	8.5875
i.	Clad material	Zircaloy - 4 (cold worked)

2. Fuel Pellets

a.	Material	U02 Sintered
b.	Form	Dished-end cylindrical pellets
c.	Pellet diameter, in.	0.3680 - 0.3700
d.	Active length, in.	141.75 - 142.08
e.	Initial density, % theoretical	94.0 - 95.0

Table 5-1 (Con't)

3. Design Basis Fuel Conditions for Storage in DSCs

a.	Maximum initial enrichment	3.43 weight percent U-235
b.	Maximum burnup	38,268 MWd/MtU
c.	Maximum heat generation at time of storage	1 Kw per assembly
d.	Total gamma per assembly	1.79E17 photons/sec
e.	Total neutron per assembly	5.40E9 neutrons/sec

* All dimensions are for cold conditions.

Table 5-1 (Con't)

Category	Criteria or Parameter	Value
Dry Shielded Canister:	Fuel Assemblies per DSC	24
	Size:	
	Overall Length	4.72m (186.0 in.)
	Outside Diameter	1.71m (67.25 in.)
	Shell Thickness	16mm (0.625 in.)
	Heat Rejection (kW)	24.0
	Internal Atmosphere	Helium
	Maximum Design Pressure	50.0 psig
	Equivalent Cask Drop	75g Vertical (End) Deceleration and Horizontal (Side), 25g Oblique (Corner)
	Materials of Construction	Carbon Steel Internals, Carbon Steel or Lead Shield Plugs, Stainless Steel Shell, and Neutron Absorbing Material
	Service Life	50 Years(***)

(***) Expected life is much longer (hundreds of years), however, for the purpose of this document, the service life is taken as 50 years.

Table 5-1 (Con't)

Category	Criteria or Parameter	Value
OnSite Multi-purpose Cask:	Payload Capacity	36,300 kg (80,000 lbs.) (dry) 40,900 kg (90,000 lbs.) (wet)
	Gross Weight	90,700 kg (200,000 lbs.) (handling) 86,200 kg (190,000 lbs.) (transport)
	Equivalent Cask Drop Deceleration	75g Vertical (End) and Horizontal (Side) 25g Oblique (Corner)
	Materials of Construction	Stainless Steel, Lead, and Neutron Absorbing Material
	Service Life	50 Years

Table 5-1 (Con't)

Category	Criteria or Parameter	Value
Horizontal Storage Module:	Capacity	One DSC per HSM
	Array Size	22 Module Array
	HSM Size:	
	Length	5.5m (18.1 ft.)
	Height	3.5m (15 ft.)
	Width	2.9m (9.7 ft.)
	Heat Rejection Capacity	24.0 kW (5 yr. cooled)
	Heat Removal	Natural Circulation
	Materials of Construction	Reinforced Concrete and Structural Steel
	Service Life	50 Years

Table 5-2

Characteristics of Control Components Used at Rancho Seco Nuclear Generating Station

Axial Power Shaping Rod Assemblies (Gray)

Number of rods per assembly	16
Outside diameter	0.440 in.
Cladding thickness	0.024 in.
Cladding material	Type 302 SS, cold worked
Plug material	Type 304 SS, annealed
Poison material (gray absorber)	Inconel
Spider material	SS, Grade CF3M
Female coupling material	Type 304 SS, annealed
Length of poison section	63 in.

Axial Power Shaping Rods Assemblies (Black)

Number of rods per assembly	16
Outside diameter	0.440 in.
Cladding thickness	0.021 in.
Cladding material	Type 304 SS, cold-worked
Plug material	Type 304 SS, annealed
Poison material	80% Ag, 15% In, 5% Cd
Spider material	SS, Grade CF3M
Female coupling material	Type 304 SS, annealed
Length of poison section	36 in.

Table 5-2 (Con't)

Burnable Poison Rod Assemblies	
Outside diameter	0.430 in.
Cladding thickness	0.035 in.
Cladding material	Zircaloy-4, cold worked
End plug material	Zircaloy-4, annealed
Poison material	B_4C in Al_2O_3
Length of poison section	126 in.
Spider material	SS, Grade CF3M
Coupling mechanism material	Type 304 SS, annealed
Orifice Rod Assembly	
Number of rods per assembly	16
Outside diameter	0.480 in.
Orifice rod material	Type 304 SS, annealed
Spider material	SS, Grade CF3M
Coupling mechanism material	Type 304 SS, and 17-4, PH condition H 1100
Control Rod Assembly	
Number of control rods per assembly	16
Outside diameter	0.440 in.
Cladding thickness	0.021 in.
Cladding material	Type 304 SS, cold-worked
End plug material	Type 304 SS, annealed
Spider material	SS Grade CF3M
Poison material	80% Ag, 15% In, 5% Cd
Female coupling material	Type 304 SS, annealed
Length of poison section	134 in.

5.3 ISFSI OPERATIONS

The District will operate the ISFSI in accordance with procedures and administrative controls consistent with those in place at RSNGS. The system for preparing, reviewing, approving, and implementing procedures and instructions for the ISFSI will be the same as those used for RSNGS. Any changes to, or deviations from, these procedures and instructions will be reviewed and approved in accordance with Technical Specification requirements. Table 5-3 presents an overview of the NUHOMS transportable storage system operations.

Preoperational Testing

Prior to any fuel loading or transfer operations, the District will conduct preoperational tests to ensure that equipment is functioning properly so that the fuel can be transferred safely. Tests will be performed in accordance with approved procedures. The acceptance criteria for each test will be specified in individual test procedures. Test results that do not meet the acceptance criteria will be evaluated and corrective action taken, as appropriate, to achieve acceptable test results.

Quality Assurance

The District will conduct activities associated with the Rancho Seco ISFSI that could affect plant personnel or public safety in accordance with applicable site procedures, and the NRC-approved Rancho Seco Quality Manual (RSQM). The quality assurance program applies to activities, plans, and programs affecting the operation and quality of structures, systems, components, and services. The program is implemented by organizations responsible for achieving and verifying quality.

Fuel Selection

Procedural controls, including quality control requirements, will be applied to the fuel selection and verification process to ensure that the appropriate fuel assemblies are selected for placement into their predetermined DSCs.

Contamination Control of DSC External Surface

Prior to placing the transfer cask and DSC into the spent fuel pool, the DSC/cask annulus will be filled with demineralized water and sealed using an inflatable seal. This seal will minimize contamination of the DSC outer surface by the pool water.

Radiation Protection Procedures

Rancho Seco staff will use the radiation protection program in place at RSNGS, as appropriate, during operation of the Rancho Seco ISFSI.

Training

The objective of the District's training program for the ISFSI is to provide and maintain a qualified work force for safe and efficient ISFSI operations. The RSNGS training program will be used to provide this training and indoctrination and will be revised, as appropriate, to include information pertinent to the ISFSI. Individuals working in the fuel storage area will receive radiation training, and those individuals performing cask and fuel handling operations will be provided additional training, as required.

The training programs, in concert with other management systems, ensure that qualified individuals will be available to perform planned and unplanned tasks while protecting the health and safety of plant personnel and the public. The District will provide additional training to support the emergency plan, physical security plan, quality assurance plan, and other administrative requirements, as required.

Procedures

The District will prepare, review, and approve written procedures for normal operations, off-normal operations, maintenance, and testing at the ISFSI prior to its operation. These procedures will be reviewed and approved as specified in the 10 CFR 50 Technical Specifications.

Table 5-3

NUHOMS System Operations Overview

1. Clean and load the DSC into the multi-purpose cask.
2. Fill the DSC and cask with water and install the cask/DSC annulus seal.
3. Place the multi-purpose cask containing the DSC in the fuel pool.
4. Load the spent fuel assemblies into the DSC.
5. Place the top shield plug on the DSC.
6. Remove the loaded cask from the fuel pool and place it in the decontamination area.
7. Lower the water level in the DSC cavity below the shield plug.
8. Place and weld the inner top cover plate to the DSC shell and perform non-destructive examination (NDE).
9. Drain the water from the DSC.
10. Evacuate and dry the DSC.
11. Backfill the DSC with helium.
12. Perform a helium leak test on the seal weld.
13. Seal weld the siphon and vent port plugs and perform NDE.
14. Fit-up the outer top cover plate with the DSC shell.

Table 5-3 (Con't)

15. Weld the outer top cover plate to the DSC shell and perform NDE.
16. Drain the water from the cask/DSC annulus.
17. Install the multi-purpose cask top cover plate.
18. Lift and downend the multi-purpose cask onto the transport trailer.
19. Ready the HSM to receive the DSC.
20. Ready the cask for transport and tow the transport trailer to the HSM.
21. Position the multi-purpose cask with the HSM access opening.
22. Remove the multi-purpose cask top cover plate.
23. Align and secure the multi-purpose cask to the HSM.
24. Set-up and ready the hydraulic ram for DSC transfer.
25. Push the DSC into the HSM.
26. Retract the ram and disengage the multi-purpose cask from the HSM.
27. Install the HSM door and the DSC axial retainer.

5.4 MONITORING PROGRAM

5.4.1 Pre-operational Environmental Program

In general, the District's Radiological Environmental Monitoring Program (REMP) for RSNGS will be the pre-operational monitoring program for the ISFSI. The REMP, in conjunction with the RSNGS effluent control program, provides a comprehensive base for environmental impact evaluations and ensures compliance with 10 CFR 50, Appendix I.

The operation of the ISFSI will not involve any water/chemical discharges, nor will the ISFSI generate any chemical, sanitary, or solid radwastes, or release any radioactive materials in gaseous or liquid form. Therefore, the only monitoring program that is required to evaluate the environmental impact of the ISFSI is the REMP.

The existing REMP has been revised to provide approximately 2 years of preoperational TLD data for the ISFSI area.

5.4.2 Operational Monitoring Program

The REMP for RSNGS will also include the ISFSI. The REMP provides measurements of radiation and radioactive materials in those exposure pathways that have the highest potential exposure to the public from plant activities. The REMP, along with the RSNGS effluent monitoring program, verifies that measurable concentrations of radioactive materials and levels of radiation in the environs are not higher than expected.

The environmental and effluent monitoring programs will be conducted in accordance with the regulatory controls in 10 CFR 20, 10 CFR 50, 40 CFR 190, and other appropriate regulatory guidance. Releases and doses will be limited to those values specified in the regulations.

5.4.3 Related Environmental Measurement and Monitoring Programs

The California Department of Health Services conducts a parallel environmental monitoring program under contract from the NRC.

5.4.4 Pre-operational Environmental Radiological Monitoring Data

The results of the REMP for RSNGS are submitted to the NRC annually in the Annual Radiological Environmental Operating Report. This report contains summaries and statistical evaluation of the results of the radiological environmental surveillance activities for the previous calendar year.

5.5 ADDITIONAL ASPECTS OF THE RANCHO SECO ISFSI

5.5.1 Facility Water Use

The safety functions of the Rancho Seco ISFSI can be accomplished without the use of a water supply.

5.5.2 Heat Dissipation System

The NUHOMS dry storage system is designed to dissipate decay heat generated by the stored spent fuel by the mechanisms of convection, thermal radiation, and some small amount of conduction. The NUHOMS topical report describes the design characteristics used to ensure that fuel rod integrity is maintained throughout the fuel storage period.

5.5.3 Radwaste Systems and Source Terms

Operation of the Rancho Seco ISFSI does not result in the generation of gaseous, liquid, or solid radwastes. Decontamination of the multi-purpose cask will take place in the Fuel Storage Building prior to transferring the DSCs to the ISFSI. Liquid and solid wastes generated in the decontamination process will be processed and handled by the existing radwaste facilities in existence at RSNGS. A description of the decontamination process and waste treatment is provided in Chapter 11 of the RSNGS DSAR.

5.5.4 Chemical and Biocide Wastes

Herbicides may be used between the inner and outer security fence for weed control.

5.5.5 Sanitary and other Waste Systems

No sanitary or other waste systems are associated with the operation of the ISFSI.

5.5.6 Reporting of Radioactive Material Movement

No offsite cask transportation is required to place the spent fuel into dry storage at the ISFSI. However, two multi-purpose casks, licensed under 10 CFR 71, will be available to transport loaded DSCs offsite if required to recover from an off-normal event after the spent fuel pool has been abandoned.

6.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

6.1 SITE PREPARATION AND FACILITY CONSTRUCTION

6.1.1 Effects on Land Use

Construction of the ISFSI will affect approximately 2 acres of the 2,480-acre site area. The area is fenced as shown in Figure 1-2. The facility involves two back-to-back rows of 11 HSMs resting on a concrete slab approximately 170 ft. X 225 ft. The concrete slab will be formed using ready mixed concrete transported to the site by truck.

A spoil area, located near the ISFSI site, will be used for storage during construction. Explosives will not be used in any of the construction activities. The principal terrain alterations to the site area will come from excavating and grading the ISFSI site. The District estimates that 25,000 cubic yards of dirt will be excavated during ISFSI construction. The ISFSI site is undisturbed soil, there are no vernal pools in the area of the ISFSI, and slopes will be terraced, as required, to prevent erosion during ISFSI construction. Areas surrounding the ISFSI will be reseeded after construction is completed. The loss of biological production from the Rancho Seco site should be minimal.

6.1.2 Effects on Water Bodies

Construction of the ISFSI will not impact local water supplies. Concrete for the slab will arrive on the site ready mixed. Drinking water and water for cleaning operations and fugitive dust control (spraying) will come from the site well, Folsom South Canal, or be transported to the site by truck. Any portable rest rooms provided during construction will require no onsite source of water.

A drainage system will collect any runoff generated during site excavation. This system will be maintained to handle surface drainage through the construction period to minimize erosion.

The runoff will be directed to the site outfall at the southwest boundary of the Rancho Seco Industrial Area. Excavated material and/or fill will not be dumped into existing water bodies. No dewatering at the site during excavation is anticipated because the local water table is low.

Other activities such as construction of cooling ponds do not apply to the proposed action. Impact aesthetics should be negligible.

6.1.3 Impact of Work Force

The District anticipates a peak construction force of approximately 20 - 40 people, including all employees of contractors and their subcontractors working at the site. Since local construction forces will be used wherever possible, relocation of construction personnel and provisions for housing, transportation, and educational facilities for workers and their families are not anticipated.

6.1.4 Impact of Construction Generated Fugitive Dust

The fugitive dust emissions associated with the construction of the ISFSI would likely come from excavation, hauling of fill, traffic on unpaved roads, grading, and wind erosion of excavated materials. The annual incremental total suspended solids impact associated with the construction of the ISFSI is expected to be minor due to wind variability during the year, and the relatively small construction area involved.

6.1.5 Impact on Wildlife

Based on Section 2.9 of the Environmental Report for Rancho Seco Nuclear Generating Station Unit 2, no significant impact on the flora and fauna of the site or its surrounding area was anticipated as a result of construction of RSNGS. Accordingly, the impact on flora and fauna due to the construction of the ISFSI, which involves only approximately 2 acres of the site, is expected to be negligible.

6.1.6 Construction Noise

Construction activities associated with the ISFSI, in particular hauling of fill, compaction, and concrete pouring will generate noise. Noise produced during construction can potentially impact three groups:

- Construction workers

- The surrounding community
- The surrounding fauna

All such noises will conform to appropriate noise regulations.

6.1.6.1 Expected Effects of Noise on Construction Workers

By complying with all applicable OSHA noise regulations, the District expects to limit the impact of noise on the construction workers.

6.1.6.2 Expected Effects of Construction Noise on the Surrounding Community

The closest residence is over 0.5 mile from the ISFSI, and construction noise impact on the community is expected to be negligible.

6.1.6.3 Expected Effects of Construction Noise on the Surrounding Fauna

Displacement of resident fauna near the ISFSI may occur due to construction activities that produce noise; however, the construction noise impact is expected to be minimal.

6.1.7 Resources Committed

No major irreversible or irretrievable commitments of resources are expected to be associated with the construction of the ISFSI. Those resources that will be committed to this facility, whether irreversibly or for the life of the facility, represent small portions of the total amount of such resources available for use in any particular category.

6.1.7.1 Land

The ISFSI will require approximately 2 acres of the existing 2,480 acre site area.

6.1.7.2 Water

There will be no irretrievable or irreversible commitments of water or waterways for construction of the ISFSI.

6.1.7.3 Air

No local or site air resources will be irretrievably committed to the proposed ISFSI.

6.1.7.4 Biota

The are no vernal pools in the area of the ISFSI, and the disturbed area surrounding the ISFSI will be reseeded after ISFSI construction. Consequently, flora loss during construction of the ISFSI should be minimal.

Construction effects on fauna will be minimal since the construction area is relatively small. Accordingly, it is unlikely that construction of the dry storage facility will affect local fauna.

6.1.7.5 Materials

Concrete, steel, and other materials will be needed for construction of the proposed facility. Some of the steel and other materials may ultimately be recoverable, but the concrete pad will be committed irretrievably.

6.1.7.6 Summary of Resources Committed

From the previous sections, it is apparent that relatively small quantities of each resource are required for the construction of the ISFSI. As a result, it is evident that the ISFSI will not unduly alter the existing resource mix either locally or regionally.

6.1.8 Radioactivity

No credible mechanisms exist for the release of radioactive effluent from the DSCs while at the ISFSI. However, the HSMs are sources of direct gamma and neutron radiation. The estimated onsite and offsite collective dose assessment is discussed in Section 6.2.

6.1.9 Construction Impact Control Program

During the construction of the ISFSI, the District will take reasonable steps to mitigate the environmental impacts identified.

6.1.9.1 Construction Traffic Control

Areas where construction traffic may cause damage, such as undisturbed open spaces, will be avoided by construction vehicular traffic. Vehicular traffic will remain within the roadway, access corridor, or utility rights-of-way.

6.1.9.2 Dust and Particulate Emission Control

Dry weather wetting and/or paving (graveling) of the heavily traveled construction roads will be performed to reduce dust generated by vehicular traffic, when necessary.

6.1.9.3 Noise Control

The District intends to minimize noise impact by providing trucks and other equipment with standard noise control devices, and limiting construction activities to normal working hours.

6.1.9.4 Chemical Waste Management

During construction, any chemical liquid wastes will be deposited or discharged into tanks for salvage or subsequent removal to appropriate offsite locations. Adequate care will be taken to avoid handling or storing liquids in close proximity to major drainage areas, thereby avoiding damaging spills to site outfall.

6.1.9.5 Solid Waste Management

Construction scrap and debris will be collected in designated areas for salvage, incineration, or burial.

6.1.9.6 Site Clearing

The land within the ISFSI fence will be cleared. Erosion in the construction area will be controlled by providing drainage, intercept and berm ditches, controlling slope angle, and use of mats and straw, as appropriate.

6.1.9.7 Excavation and Soil Deposition

The construction site will be stabilized during construction. The drainage from any spoil areas during and after construction will be designed to follow natural drainage patterns.

6.2 OPERATIONAL IMPACTS

6.2.1 Radiological Impacts from Routine Operations

The primary pathway by which site workers and nearby residents could be exposed to radiation due to the operation of the Rancho Seco ISFSI is by external exposure to direct and scattered radiation. The Rancho Seco site dose calculation provides the gamma and neutron doses and dose rates around the Rancho Seco ISFSI. This calculation uses the monte carlo computer code MCNP to calculate the dose rates at various locations resulting from 22 standard HSMs and two NUHOMS MP-187 multi-purpose casks.

Dose rate calculations were performed for locations inside the owner controlled area, as well as the surrounding area. These areas include the ISFSI fence, nearby buildings, the owner controlled area boundary, Rancho Seco Park, and the nearest plant neighbor. The dose rate calculations demonstrate compliance with the appropriate radiological requirements of 10 CFR 20, 10 CFR 72, and 40 CFR 190.

Because the proposed ISFSI involves dry storage of the fuel in seal-welded canisters, there will be no gaseous or liquid effluent releases associated with normal storage operations. Activities associated with cask loading and decontamination may result in some gaseous and liquid effluents; however, these operations will be conducted under the 10 CFR 50 license, and the radiological impacts resulting from those effluents will fall within the scope of impacts previously evaluated under the 10 CFR 50 license.

6.2.1.1 Offsite Dose

ISFSI operations will result in a small additional dose to members of the public from direct radiation exposure. 10 CFR 72.104(a) requires that dose equivalents from normal operations and anticipated occurrences to any real individual who is located beyond the ISFSI controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ as the result of exposure to planned effluent releases, direct radiation from ISFSI operations, and any other radiation from uranium fuel cycle operations within the region.

The maximally exposed member of the public is assumed to have continuous occupancy at the nearest residence to the ISFSI, which is located approximately 4900 feet south of the facility. At that location, the dose rate from the ISFSI, filled to capacity with design basis fuel, would be approximately 1.01E-1 mrem/yr. Since RSNGS shut down permanently in June 1989, the radiation dose to members of the public has decreased significantly. The potential dose commitment to the maximally exposed group, from other fuel cycle operations at Rancho Seco, is less that 0.34 mrem/yr from the liquid effluent pathway,[8] and 0.4 mrem/yr from tritium.[9] Therefore, the radiation exposure due to all fuel cycle operations at the Rancho Seco site will not exceed the regulatory requirements of 25 mrem/yr in 10 CFR 72.104 and 40 CFR 190.

10 CFR 20.1301 requires that the total effective dose equivalent to individual members of the public from licensed operations does not exceed 100 mrem/yr, and that the dose in any unrestricted area from external sources does not exceed 2 mrem/hr. With the ISFSI filled to capacity with design basis fuel, the maximum dose rate at the ISFSI security fence is 1.13 mrem/hr. Existing environmental TLDs at the ISFSI location show that the direct radiation level from operations at RSNGS are not distinguishable from background.[9] Therefore, the dose rate in any unrestricted area from external sources does not exceed 2 mrem/hr.

The ISFSI restricted area fence will be approximately 350 feet from the edge of the ISFSI pad. The dose rate at this distance will be approximately 0.1 mrem/hr. Assuming a conservative occupancy factor of 500 hr/yr, the annual dose to an individual member of the public would be 50 mrem/yr. This dose is below the regulatory limit of 100 mrem/yr in 10 CFR 20.1301.

The nearest owner controlled area boundary is located approximately 1200 feet west of the ISFSI. The total annual exposure, assuming 100% occupancy at the site boundary, is 20.7 mrem. This predicted dose is less than the bounding 10 CFR 72.104 and 40 CFR 40.190

annual dose equivalent limit of 25 mrem. Note that the use of a 100% occupancy factor for this location is extremely conservative. Moreover, the berm surrounding the ISFSI, and the hilly terrain between the ISFSI and the site boundary, will result in actual dose rates being much lower than those predicted by calculation.

10 CFR 50, Appendix I sets forth design objective dose commitment guides for liquid and gaseous effluents released from nuclear power reactors. For each reactor, the maximum annual dose commitment to an individual in an unrestricted area is 3 mrem/yr due to liquid effluents and 5 mrem/yr due to gaseous effluents. As stated above, current dose levels as the result of the release of radioactivity in effluents are well below the 10 CFR 50, Appendix I design objectives. Since no liquid or airborne effluents are postulated to emanate from the ISFSI, the direct and scattered radiation discussed above will be the total radiation exposure to the public. No estimation of dose equivalents is necessary to demonstrate compliance with 10 CFR 20.

There are 77 permanent residents located within a 2-mile radius of the Rancho Seco site, with the nearest resident living approximately 4900 feet south of the ISFSI. Based on the dose rates at the location of the nearest resident, and the conservative assumption that all of the residents within 2 miles are located at the same distance from the ISFSI as the nearest resident, the total collective annual dose for the 77 residents inside the 2-mile radius, due to ISFSI operations would be 0.0078 person-rem.

6.2.1.2 Collective Occupational Dose

Storing fuel at the Rancho Seco ISFSI will result in a small increase in the total occupational dose at the Rancho Seco site. These doses will result from activities including:

1. Placing the DSC into the multi-purpose cask.
2. Loading fuel into the DSCs.
3. Moving the multi-purpose cask to the ISFSI.
4. Inserting the DSC into the HSM.
5. Sealing the HSM.

6. Conducting routine security checks and operational surveillances.

Engineered features of the storage system, and the application of administrative controls are designed to ensure that all exposures are maintained ALARA. All ISFSI operations will be conducted under procedures that are approved in accordance with Technical Specification requirements. Occupational doses will be maintained within the limits of 10 CFR 20.

The construction of the ISFSI, and placement of the 22 HSMs will be completed before fuel is transferred to the ISFSI. Therefore, there will be no occupational dose to workers during construction of the ISFSI.

The Rancho Seco occupational exposure calculation presents the estimated dose rates at locations occupied during DSC loading and transfer operations, and estimates the total occupational exposure received per fuel load transfer. The occupational exposure calculation uses the "fuel with control component" DSC for the source term, since this type of DSC provides the most bounding neutron and gamma source.

The estimated total occupational exposure per fuel transfer operation is approximately 1400 person-mrem. The District will conduct a fuel transfer campaign to transfer 21 loaded DSCs from the spent fuel pool to ISFSI. Therefore, the exposure for the entire fuel transfer campaign will be approximately 29.4 person-rem. Table 6.1 shows the estimated contribution of the major activities required per fuel transfer operation. Table 6.2 provides an estimate of the annual collective dose to Rancho Seco workers not directly involved with ISFSI operations.

Additional occupational exposures include:

Routine surveillance	0.025 person-rem/yr(****)
Preventative maintenance at ISFSI electrical shack	0.016 person-rem/yr

(****) This assumes that one inspector takes 10 minutes to inspect the HSM air inlets, twice per week.

TABLE 6.1

CONTRIBUTION OF MAJOR FUEL TRANSFER
OPERATIONS TO OCCUPATIONAL EXPOSURE

Operation	Person-mrem (per fuel transfer)
Fuel Loading	194.1
Primary Seal Weld	232.0
Drain and Dry DSC	56.0
Secondary Seal Weld	454.8
Transport to ISFSI	228.5
Align and Transfer DSC	235.2
Total	1,400

TABLE 6.2

ESTIMATED COLLECTIVE DOSE TO RANCHO SECO WORKERS
NOT DIRECTLY INVOLVED WITH ISFSI OPERATIONS

Location	Number of Individuals	Dose Rate (mrem/hr)	Occupancy Factor (hr/yr)	Annual Dose (person-mrem/yr)
Machine Shop (Maintenance)	17	2.36E-3	2080	83.45
Fab Shop	16	2.07E-3	2080	68.89
Switchyard Control(*****)		3.34E-3		9.34
Training and Records Building	68	4.45E-4	2080	62.94
PAP Building (Security)	29	2.81E-4	1040	8.47
Machine Shop (Security)	29	2.36E-3	1040	71.18
Total(******)				304.27

(*****) The switchyard control room is subject to various calibrations and preventative maintenance activities. The estimated occupancy is 2,797 person-hours/year.

(******) This collective annual dose is based on the estimated staffing levels at Rancho Seco at the beginning of the fuel transfer campaign. After the spent fuel is in dry storage at the ISFSI, RSNGS will be placed into Hardened-SAFSTOR, and the staffing level will be reduced by approximately 75%.

6.2.2 Radiological Impacts from Accidents

Section 8.2 of Reference 1 discusses the design basis accident events specified in ANSI/ANS 57.9-1984, and other credible accidents postulated to affect the normal, safe operation of the standardized NUHOMS system. The postulated accident conditions addressed in Reference 1 include:

1. Reduced HSM air inlet and outlet shielding.
2. Tornado winds and tornado generated missiles.
3. Design basis earthquake.
4. Design basis flood.
5. Accidental transfer cask drop with loss of neutron shield.
6. Lightning effects.
7. Debris blockage of HSM air inlet and outlet opening.
8. Postulated DSC leakage.
9. Pressurization due to fuel cladding failure within the DSC.

Of the accident conditions postulated, only reduced HSM air inlet and outlet shielding, and DSC leakage have the potential for offsite radiological consequences. Of these, DSC leakage is the bounding case.

In order to demonstrate compliance with the regulatory exposure limits for a DSC leakage accident at the Rancho Seco ISFSI, Pacific Nuclear Corporation calculated the maximum dose an individual at the Rancho Seco ISFSI controlled area boundary would receive during a hypothetical DSC breach accident. Although previous analyses of normal, off-normal, and accident conditions have shown that no credible conditions can breach the DSC shell or fail the double seal welds at either end of the DSC, this calculation postulates a complete, total, and

instantaneous leak of a DSC, and evaluates the radiological consequences of the resultant fission gas release.

The calculation assumes that one DSC and all of its fuel rods rupture instantaneously, and uses a Rancho Seco specific design basis fuel assembly to determine the fission gas inventory available for release from a design basis DSC. The fraction of fission gases released from the fuel matrix are determined using appropriate references, and the average ground level concentrations, for the nuclides of interest, are calculated using an appropriate atmospheric dispersion factor. The total body dose from a semi-infinite cloud is calculated using the methodology in Regulatory Guide 1.109.

The resultant dose at a distance of 383 feet from the edge of the nearest HSM is as follows:

Dose Type	X/Q (sec/m^3)	Dose (rem)
Whole Body	4.24E-2	0.375

The calculated whole body dose of 0.375 rem at 383 feet from the edge of the nearest HSM is below the 10 CFR 72.106(b) accident limit of 5 rem.

6.2.3 Nonradiological Impacts

6.2.3.1 Effects of Operation of Heat Dissipation System

The operation of the ISFSI requires no active heat dissipation system. Heat is dissipated passively by convection, conduction, and thermal radiation to the environment in the immediate vicinity of the ISFSI.

6.2.3.2 Effects of Chemical and Biocide Discharges

Herbicides may be used between the inner and outer security fence for weed control.

6.2.3.4 Effects of Sanitary Waste Discharges

No solid or liquid waste materials are anticipated to be produced during facility operation. Therefore, no sanitary waste discharges are anticipated.

6.2.3.5 Other Effects

Noise Impact

The only operational noise associated with the proposed action will result from the transfer of spent fuel from the Fuel Storage Building to the ISFSI. The noise associated with this operation is expected to be minimal, and no adverse impacts are expected.

Climatological Impact

The installation of the ISFSI is not expected to affect the climate of the region. The elevated cask surface temperature may cause the air temperature in the immediate vicinity of the HSMs to be higher than the ambient temperature. However, the air temperature is expected to return to normal at a short distance from the storage site. Thus, the affected area is relatively small and localized. During rainy days, precipitation may vaporize at the HSM surface because of the elevated HSM surface temperature.

The creation or enhancement of fog formation beyond the Rancho Seco owner controlled area boundary is expected to be negligible. Any fog that would be formed in the vicinity of the ISFSI would not carry radioactive materials.

Impact on Local Wildlife

ISFSI operations will have a minimal impact on the local wildlife. Birds are not expected to roost directly on the HSMs due to their elevated surface temperature.

Fences are provided to prevent access to the storage site.

Impact from Operational Runoff

Rainfall runoff at the ISFSI will not be contaminated since the exterior of the casks will be decontaminated to below administrative limits prior to their transfer to the ISFSI.

6.3.2.5 Resources Committed

The only irreversible and irretrievable commitment of resources associated with facility operation is the concrete mat upon which the HSMs will rest while in the ISFSI. This commitment is not expected to impact the local population or biota.

6.3.2.6 Decommissioning and Dismantlement

The ISFSI design concept is intended to preclude the need for the District to decommission the DSCs and HSMs. At the end of the storage period, when DOE is ready to accept the fuel, the entire storage system may be transported, along with the spent fuel, to the DOE waste storage facility. After DOE has accepted the fuel, the casks and HSMs may be made available to DOE or another utility for reuse.

Due to the zero-leakage design of the storage system, no residual contamination is expected on the concrete base pad. The base pad, fence, and peripheral utility structures are de facto decommissioned when the last DSC and HSM are removed.

ISFSI decommissioning is discussed further in Section 8.0.

7.0 SAFEGUARDS FOR SPENT FUEL

The Rancho Seco Long Term Defueled Condition (LTDC) Physical Security Plan describes the overall security policies and outlines the specific criteria to be followed by all individuals entering the Industrial and Protected Areas of Rancho Seco. The Contingency Plan is included in the Security Plan as Addendum C. The ISFSI will constitute a new Protected Area designed and maintained in accordance with an approved revision to the Security Plan.

The design basis for the Rancho Seco LTDC Physical Security Plan recognizes that radioactive materials and equipment remaining onsite must be isolated from the public by physical barriers or other means to prevent inadvertent access to these materials. The District further recognizes that surveillance is necessary to assure long term integrity of established barriers, and that security personnel are essential to control access to the Rancho Seco Industrial Area and the ISFSI secured area.(*******)

Radiological sabotage as defined in 10 CFR 73.2 is not a credible event. Moreover, the potential for theft or diversion of spent fuel from the ISFSI with the intent of using the special nuclear material (SNM) for nuclear explosives is not credible due to:

1. the inherent protection afforded by the massive reinforced concrete storage module and the steel storage canister,

2. the unattractive form of the SNM, which is not readily separable from the radioactive fission products, and

3. the immediate personnel hazard posed by high radiation levels.

Accordingly, storing spent fuel at the Rancho Seco ISFSI will not constitute an unreasonable risk to public health and safety from acts of radiological sabotage or diversion of SNM.

The security measures described in the LTDC Physical Security Plan reflect a security system designed to protect against inadvertent public access, industrial sabotage, or other potential

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(*******) The District will expand the existing Rancho Seco Industrial Area fence to encompass the ISFSI secured area.

threats that apply to businesses and industries in general. The District will conduct periodic audits and/or inspections to verify compliance with the Physical Security Plan.

The District anticipates having to maintain both a wet and dry fuel storage area for approximately 1-2 years during the fuel transfer campaign and the proposed DOE joint demonstration program. After all of the fuel is removed from the spent fuel pool, the District will revise the Physical Security Plan to address the ISFSI only.

Unescorted access to the Industrial Area will be limited to District or Contractor employees who have a business need to be onsite and have met the training requirements. Visitors must be escorted while onsite. Access to the ISFSI area will be limited to authorized individuals.

Security Staffing/Equipment

The normal staffing levels are discussed in the Security Plan.

Contingencies

The Contingency Plan of the Physical Security Plan addresses specific actions to be taken in the event of:

- Threats (Bomb/Attack)
- Civil Disturbance
- Actual or Attempted Sabotage
- Fire Explosion or catastrophe
- Attempted Theft (Theft of Nuclear Material)
- Security Emergencies

8.0 DECOMMISSIONING

On May 20, 1991, the District submitted its Proposed Decommissioning Plan for RSNGS. The Proposed Decommissioning Plan outlines the District's three phased approach to decommissioning RSNGS:

- Custodial-SAFSTOR, where the spent fuel is stored onsite in the spent fuel pool until approximately 1998.
- Hardened-SAFSTOR, which will be implemented after the fuel has been moved into dry storage at the ISFSI.
- Deferred-DECON, which involves decontamination and dismantlement of the facility, after 2008.

As part of its decommissioning strategy for RSNGS, the District has addressed the issue of how to safely and economically store the spent nuclear fuel onsite until acceptance by DOE. The District has decided that dry storage of the spent fuel in a transportable storage system best suits the District's needs regarding long-term storage of the fuel.

Accordingly, the District has contracted with Pacific Nuclear to purchase a transportable storage system to provide for the long-term storage, and subsequent transport, of Rancho Seco's spent nuclear fuel. Moreover, the District is pursuing a demonstration project with DOE to provide information to the nuclear utility industry regarding the use of this system.

Using this system will allow the District to abandon the spent fuel pool, so that RSNGS can enter into the Hardened-SAFSTOR phase of plant decommissioning. Regarding decommissioning the ISFSI, at the end of the storage period, when DOE is ready to accept Rancho Seco's spent fuel, the loaded DSCs will be transported intact to a DOE waste storage facility. The HSMs can also be transported intact to a DOE waste facility, or another utility, if needed. After DOE has accepted the fuel, they may reuse the multi-purpose casks, and ultimately decommission them.

Due to the zero-leakage design of the DSCs, no residual contamination is expected on the concrete base pad. Therefore, the only decommissioning activity foreseen for the Rancho Seco

ISFSI is the removal of the spent fuel from the site. No other decommissioning activities are envisioned because of the absence of contaminated sources. The base pad, fence, and peripheral utility structures will be de facto decommissioned when the last DSC and HSM are removed. The cost of this activity will be a small portion of the costs required to decommission RSNGS and complete site restoration.

The spent fuel pool at RSNGS will remain functional until all of the fuel has been stored at the ISFSI.

As part of the Proposed Decommissioning Plan for RSNGS, the District submitted its financial assurance plan and decommissioning cost study for decommissioning RSNGS. The decommissioning cost study includes provisions for the construction of the ISFSI, procurement of the storage system, and ongoing ISFSI support. The District will collect funds required for ISFSI decommissioning as part of the ongoing funding program.

9.0 SUMMARY AND CONCLUSIONS

9.1 COST BENEFIT ANALYSIS

The DOE has reported that the proposed Federal Geologic Repository for the storage of nuclear spent fuel will not be available until at least 2010. However, DOE has also indicated that a Monitored Retrievable Storage (MRS) facility may be available to accept spent fuel in 1998. The District has addressed the issue of how to safely and economically store RSNGS spent fuel assemblies onsite until acceptance by DOE.

The proposed Decommissioning Plan for RSNGS calls for a period of SAFSTOR, with decontamination and dismantlement activities to begin after 2008. Since the long-term cost of maintaining the spent fuel stored wet in the Fuel Storage Building is higher than dry storage, the District has concluded that the fuel should be placed in dry storage as soon as possible.

The District has further determined that dry storage of the spent fuel in a transportable storage system will provide the most prudent approach, and will produce the following benefits:

1. Reduce operating and maintenance costs associated with fuel storage.

2. Eliminate reliance on active decay heat removal systems.

3. Reduce fire protection requirements due to reduced fire hazards and simplified (passive) cooling techniques.

4. Improve radiological and occupational safety associated with the storage and handling of spent nuclear fuel.

9.2 SUMMARY OF ENVIRONMENTAL IMPACTS

Issuing a license under 10 CFR 72 authorizing the dry storage of spent nuclear fuel at the Rancho Seco ISFSI will not significantly affect the quality of the human environment.

As discussed in Section 6.1, the impacts of ISFSI construction will not be significant, and the activities will affect only a small fraction of the total land area of the Rancho Seco site. By using good construction practices, the potential for fugitive dust, erosion, and noise impacts can be controlled to insignificant levels. The only resources committed irretrievably will be the steel, concrete, and other construction materials used in the casks, canisters, storage modules, base pad, and other ISFSI components.

The primary exposure pathway associated with ISFSI operation is direct radiation exposure to site workers and nearby residents. As discussed in Section 6.2.1, there will be no gaseous or liquid effluent releases associated with normal storage operations. Activities associated with cask loading and decontamination may result in some gaseous and liquid effluents; however, these operations will be conducted under the 10 CFR 50 operating license, and the radiological impacts resulting from those effluents will fall within the scope of impacts previously evaluated under the 10 CFR 50 license.

The dose to the nearest resident from ISFSI operations is estimated to be approximately 0.1 mrem/yr, and when added to the dose resulting from RSNGS, is much less than the 25 mrem/yr limit in 10 CFR 72.104. The collective annual dose to the 77 permanent residents within 2 miles of the ISFSI is estimated to be 0.0078 person-rem. The occupational dose to workers for transferring 21 loaded DSCs from wet storage at the spent fuel pool to dry storage at the ISFSI is approximately 29.4 person-rem. Individual doses will be controlled to be within the limits in 10 CFR 20.

The upperbound offsite radiological impact due to an accident at the Rancho Seco ISFSI is approximately 0.375 rem to the whole-body of an individual located 383 feet from the edge of the nearest HSM. This dose is a small fraction of the limits in 10 CFR 72.106(b) or the EPA Protective Action Guides.

As discussed in Section 6.2.3, there are no significant nonradiological impacts expected during the operation of the ISFSI. The only environmental interface associated with ISFSI operation, is the passive heat dissipation to the air surrounding the storage modules. The climatological effects in the immediate vicinity of the ISFSI will be insignificant to public health and safety.

10.0 ENVIRONMENTAL APPROVALS AND CONSULTATION

10.1 PERMITS AND LICENSES

In addition to approval from the NRC, the permits, licenses, and notices listed below are required for the Rancho Seco ISFSI. As discussed in Chapter 3, water quality certification and waste water discharge permits are not applicable to the ISFSI. A permit for grading may be required by the Army Corp of Engineers.

10.1.1 Local and County

Since Rancho Seco is licensed by the NRC, it is exempt from any local or county building permit requirements.

10.1.2 State of California

Discretionary projects undertaken in the state of California are required to comply with the California Environmental Quality Act (CEQA). The District has completed an initial study, and a supplemental study, as required by CEQA, and has prepared a Negative Declaration[10] which states that the ISFSI will not have a significant impact on the environment.

No other approvals or permits are known to be required.

11.0 REFERENCES

1. Pacific Nuclear Fuel Services, "Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel," Revision 2, May 1992.

2. Sacramento Municipal Utility District, "Rancho Seco Facility Defueled Safety Analysis Report," Docket Number 50-312.

3. Sacramento Municipal Utility District, "Rancho Seco Nuclear Generating Station Proposed Decommissioning Plan," May 20, 1991.

4. Sacramento Municipal Utility District, Rancho Seco Nuclear Generating Station, "Supplement to Applicant's Environmental Report - Post Operating License Stage," October 21, 1991.

5. Final Environmental Statement Related to the Operation of Rancho Seco Nuclear Generating Station Unit 1, Sacramento Municipal Utility District, Docket No. 50-312, dated March 1973.

6. Sacramento Municipal Utility District, Rancho Seco Nuclear Generating Station, Unit 1, Environmental Report, June 1971.

7. HMM Associates, Inc., Evacuation Time Estimate for the Rancho Seco Plume Exposure Pathway Emergency Planning Zone, December 1989.

8. Rancho Seco Nuclear Generating Station, "Annual Radiological Environmental Operating Report for 1992," May 1993.

9. Rancho Seco Nuclear Generating Station, "Semiannual Radioactive Effluent Release Report," July - December 1992, February 1993.

10. Sacramento Municipal Utility District, "Initial Study and Proposed Negative Declaration: Rancho Seco Nuclear Generating Station Proposed Decommissioning Plan," October 3, 1991.