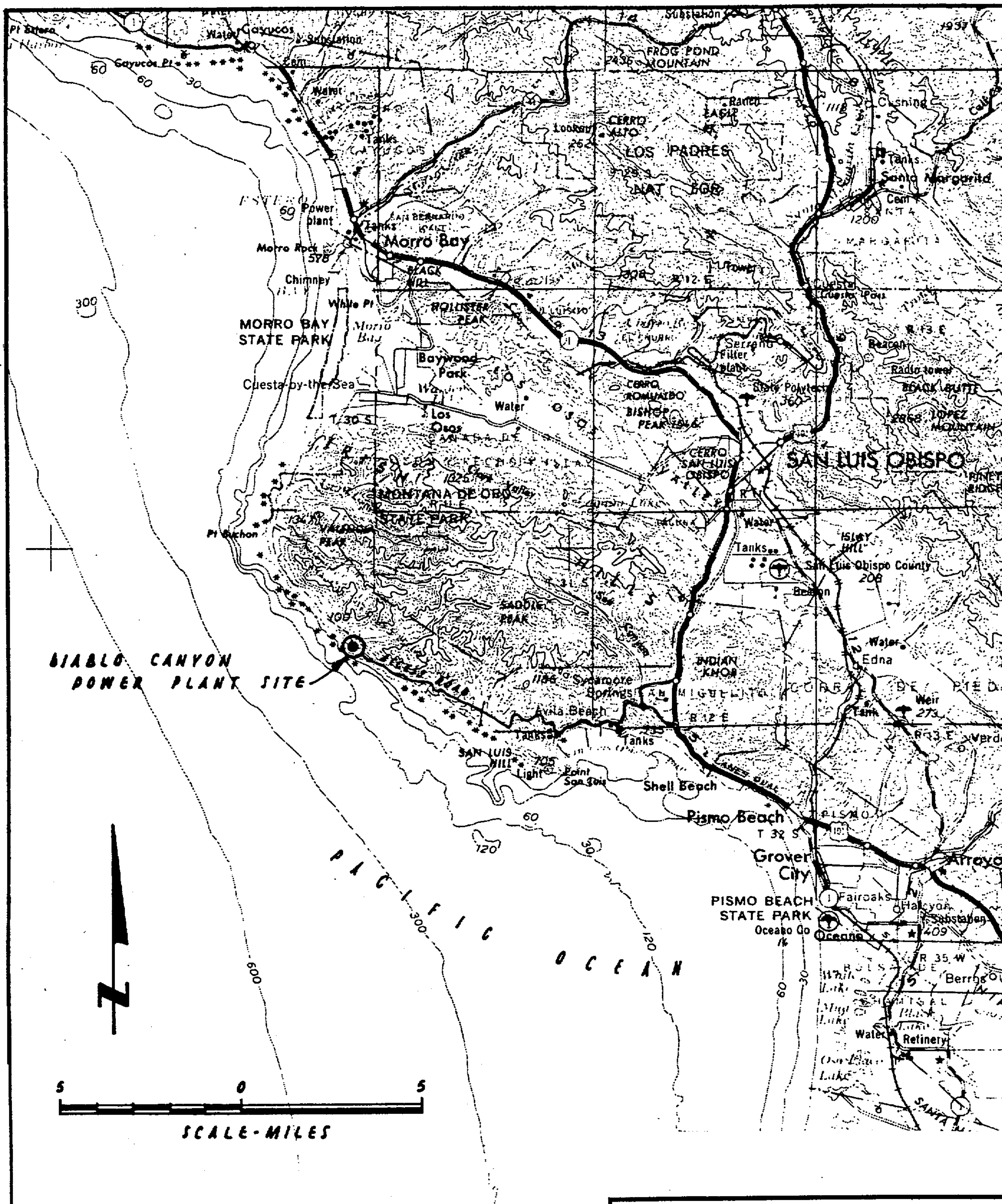
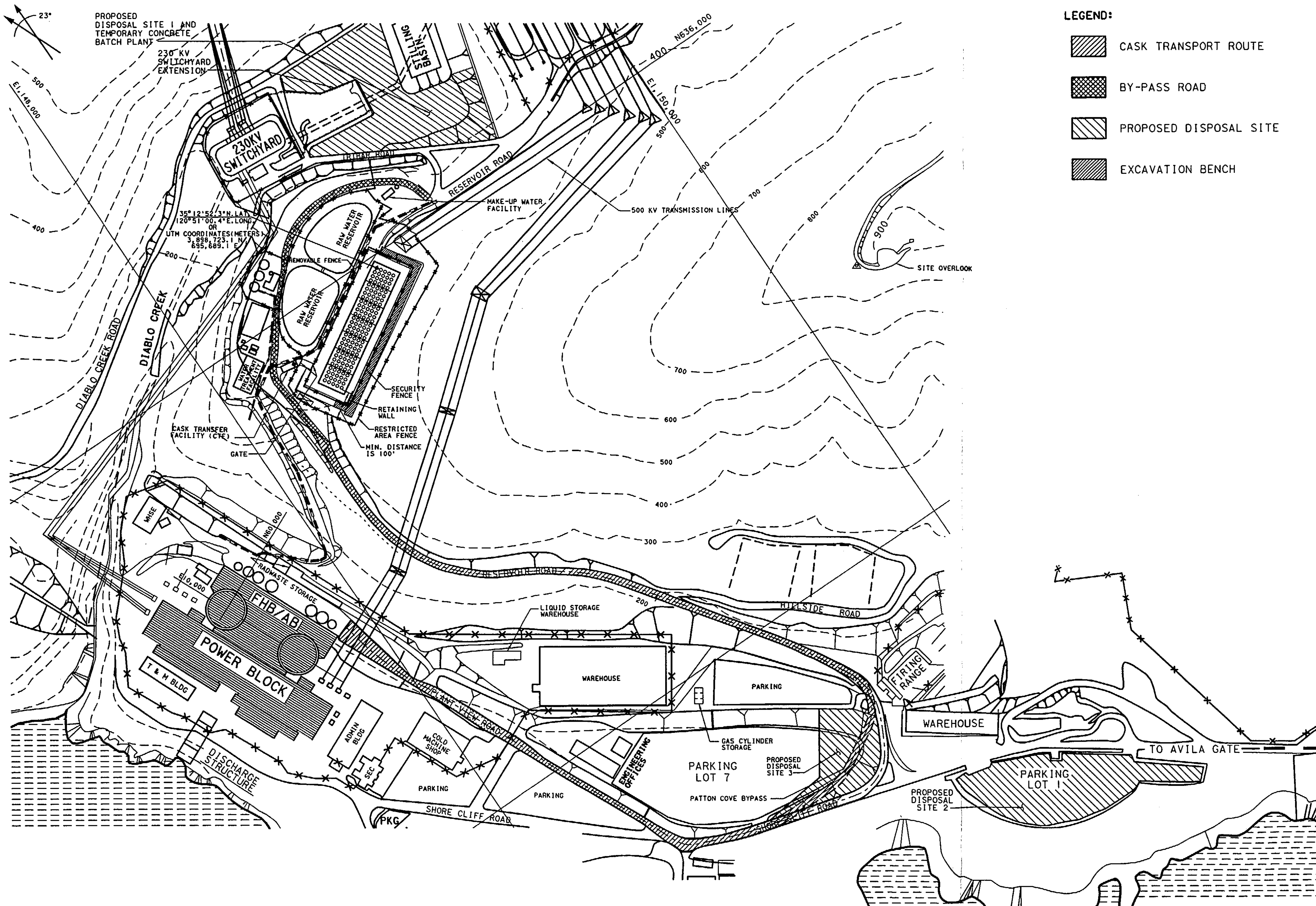


ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

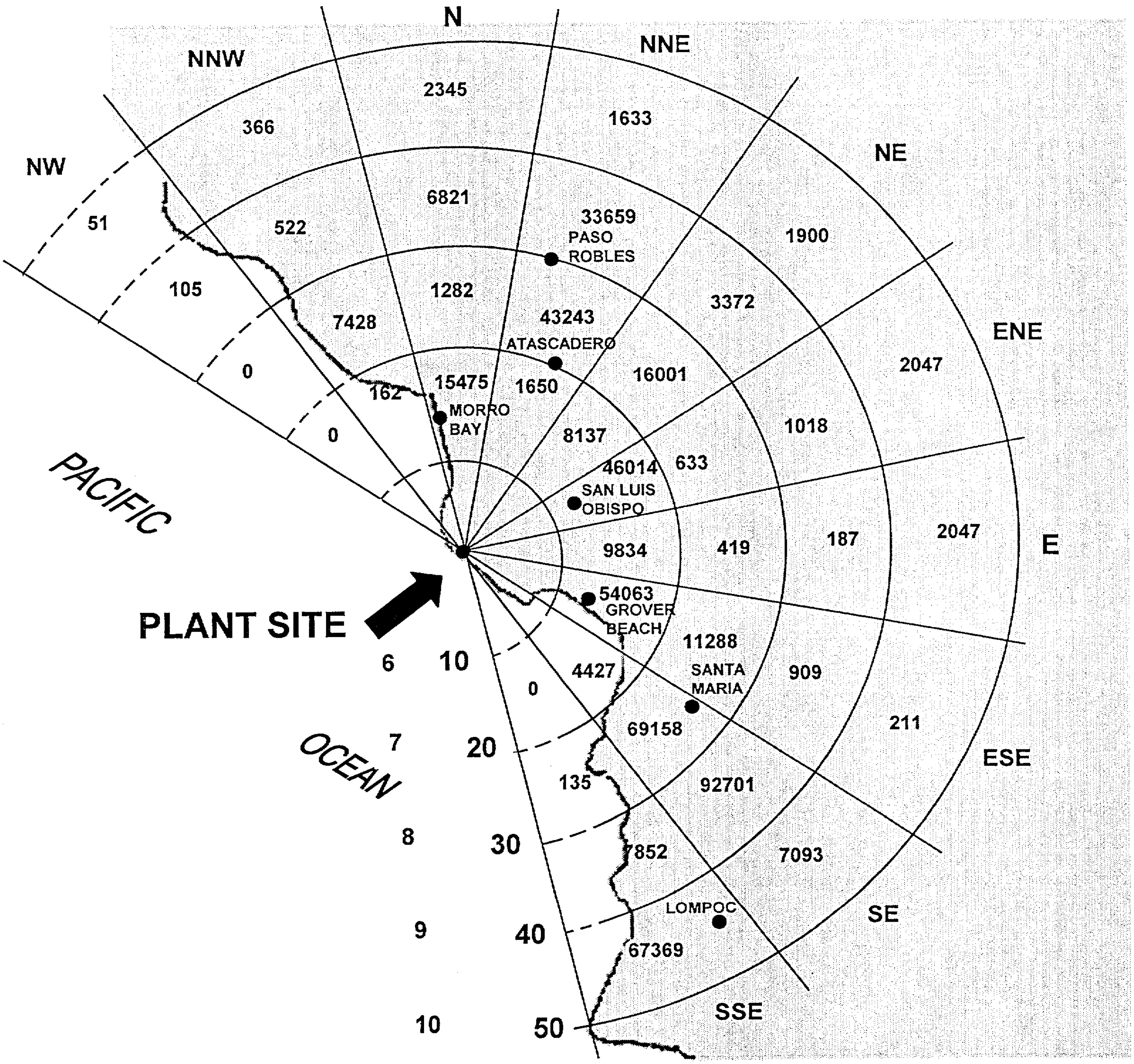
FIGURE 2.1-1
SITE LOCATION MAP



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

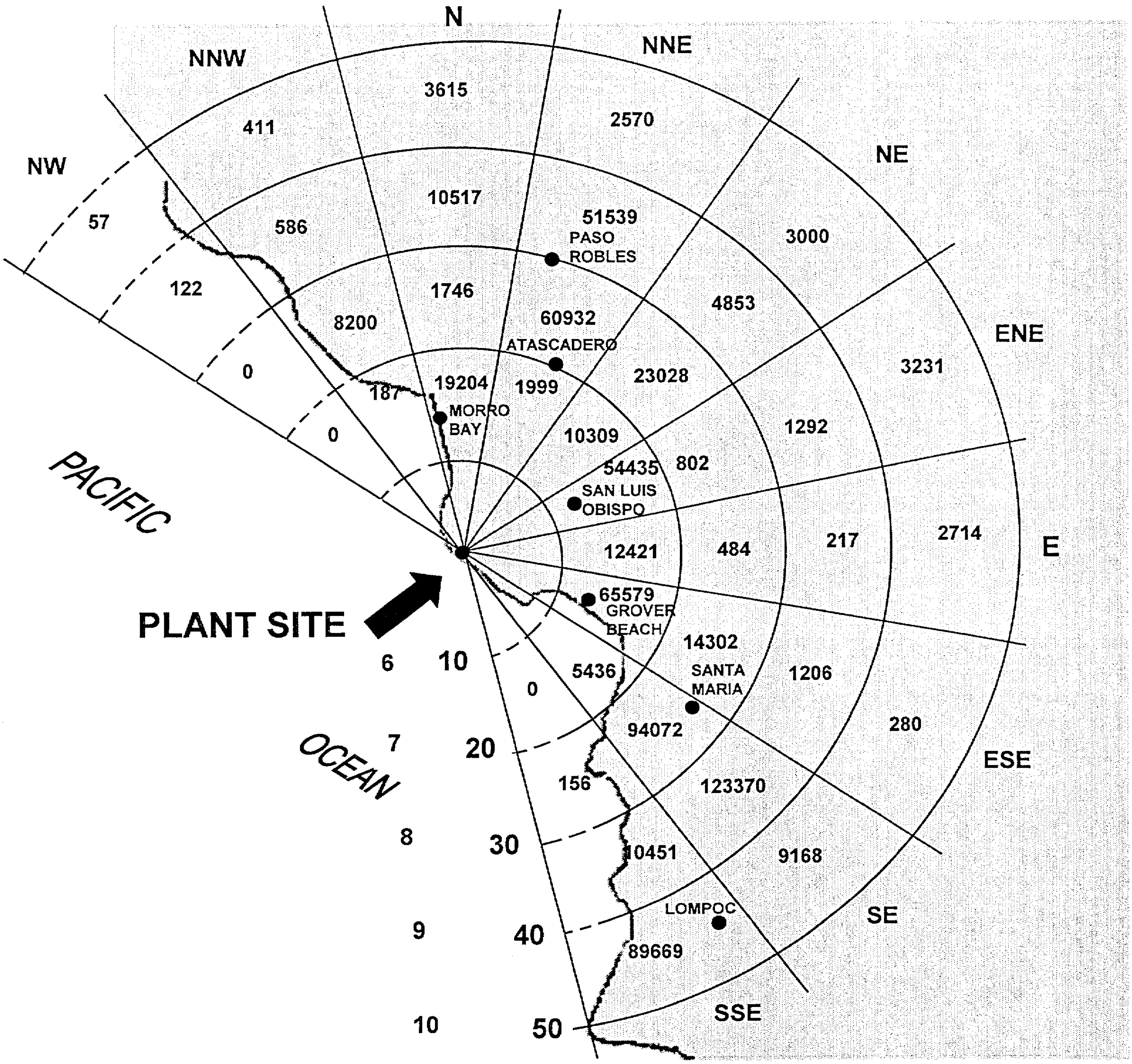
FIGURE 2.1-2
SITE PLAN



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

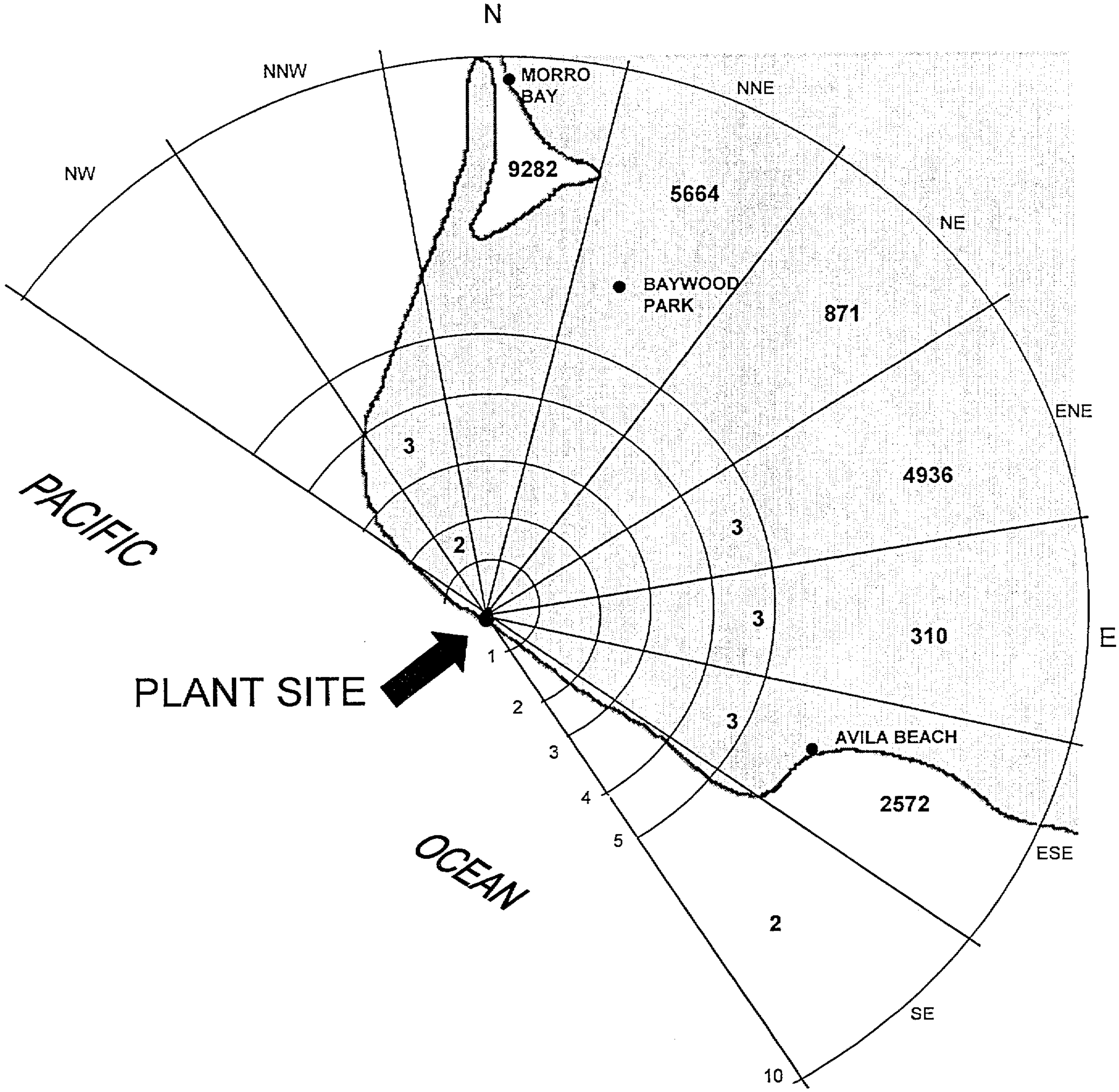
FIGURE 2.2-2
POPULATION DISTRIBUTION
10 TO 50 MILES
2010 PROJECTED



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

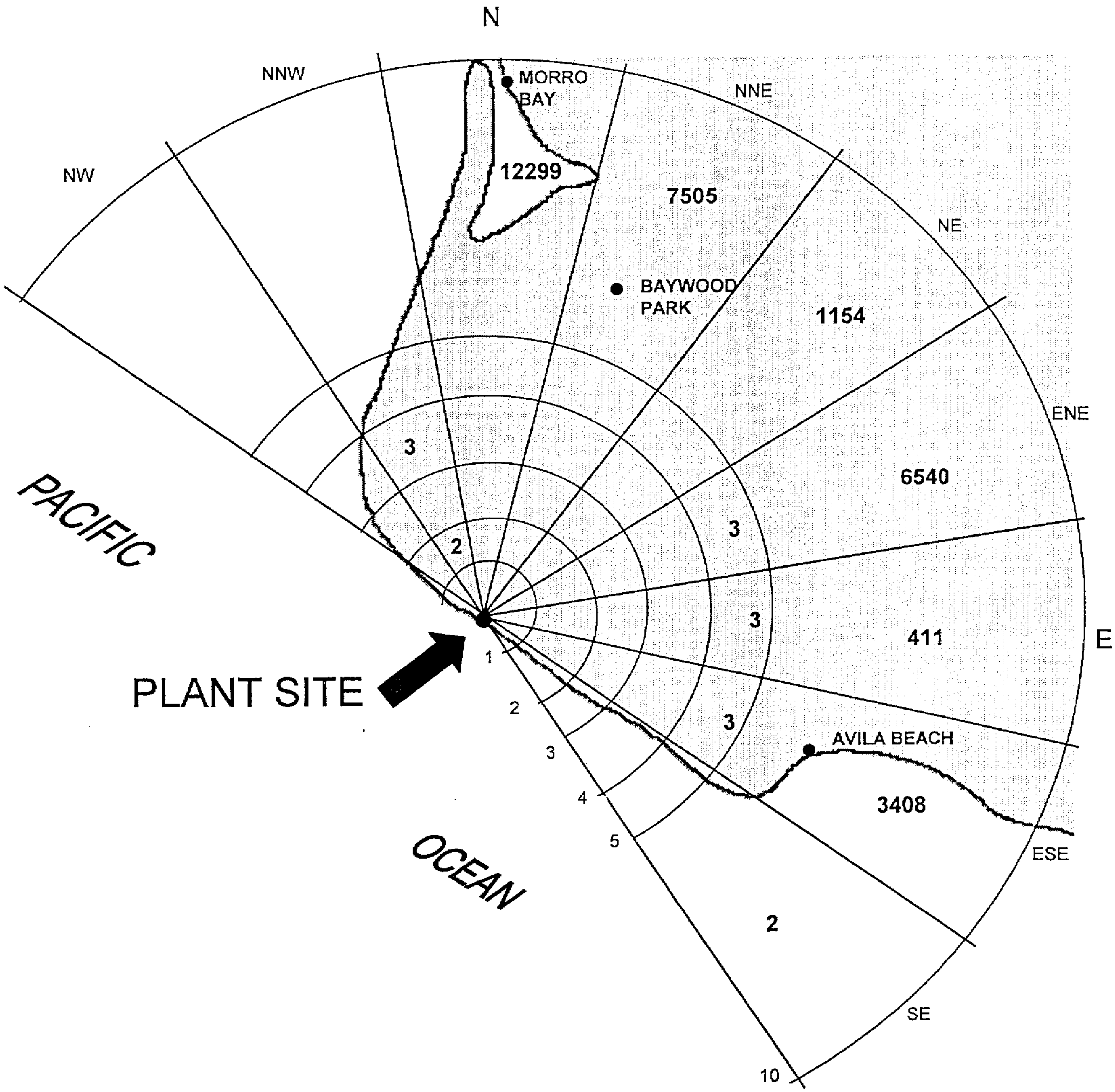
FIGURE 2.2-3
POPULATION DISTRIBUTION
10 TO 50 MILES
2025 PROJECTED



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

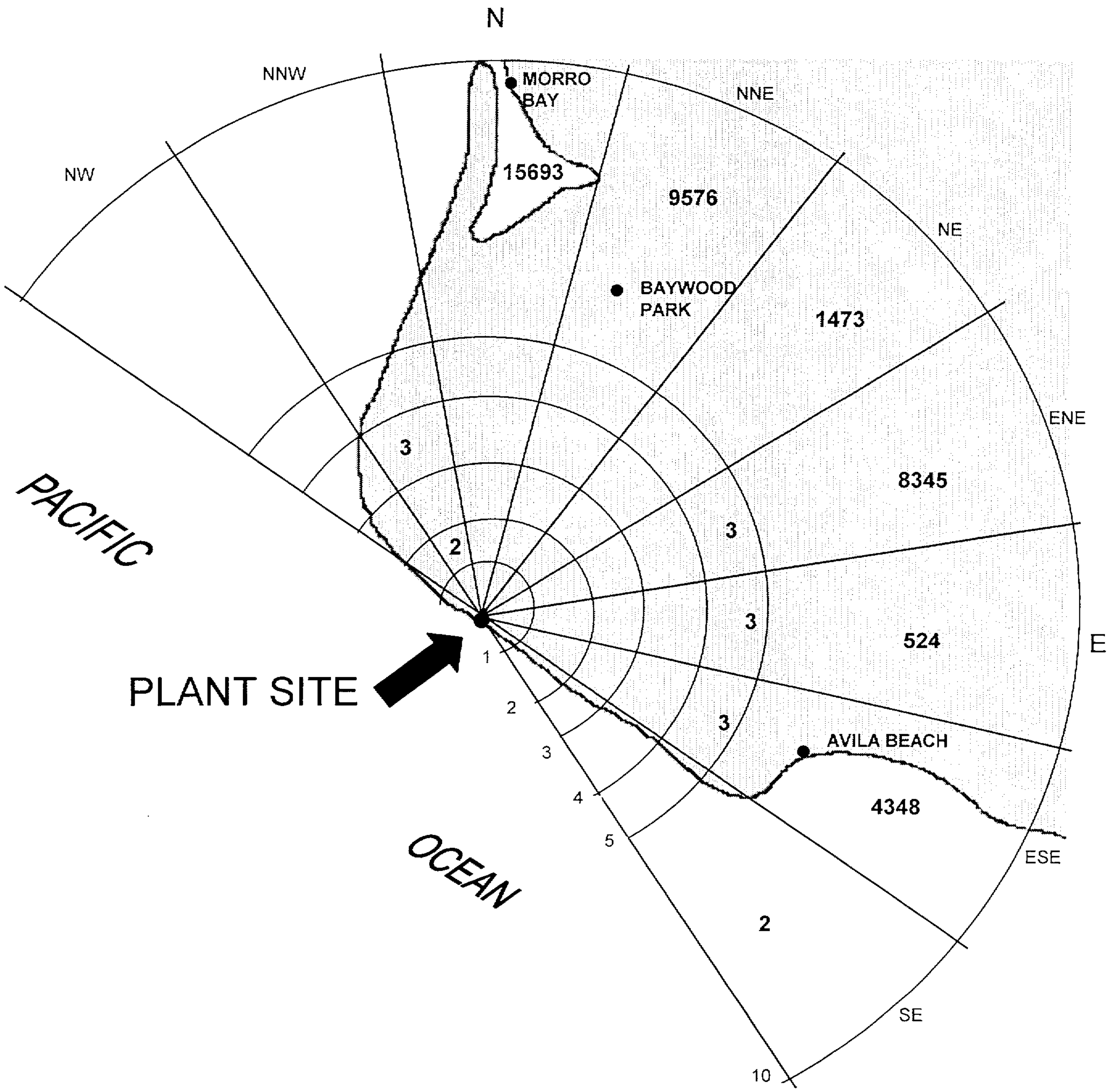
FIGURE 2.2-4
POPULATION DISTRIBUTION
0 TO 10 MILES
2000 CENSUS



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

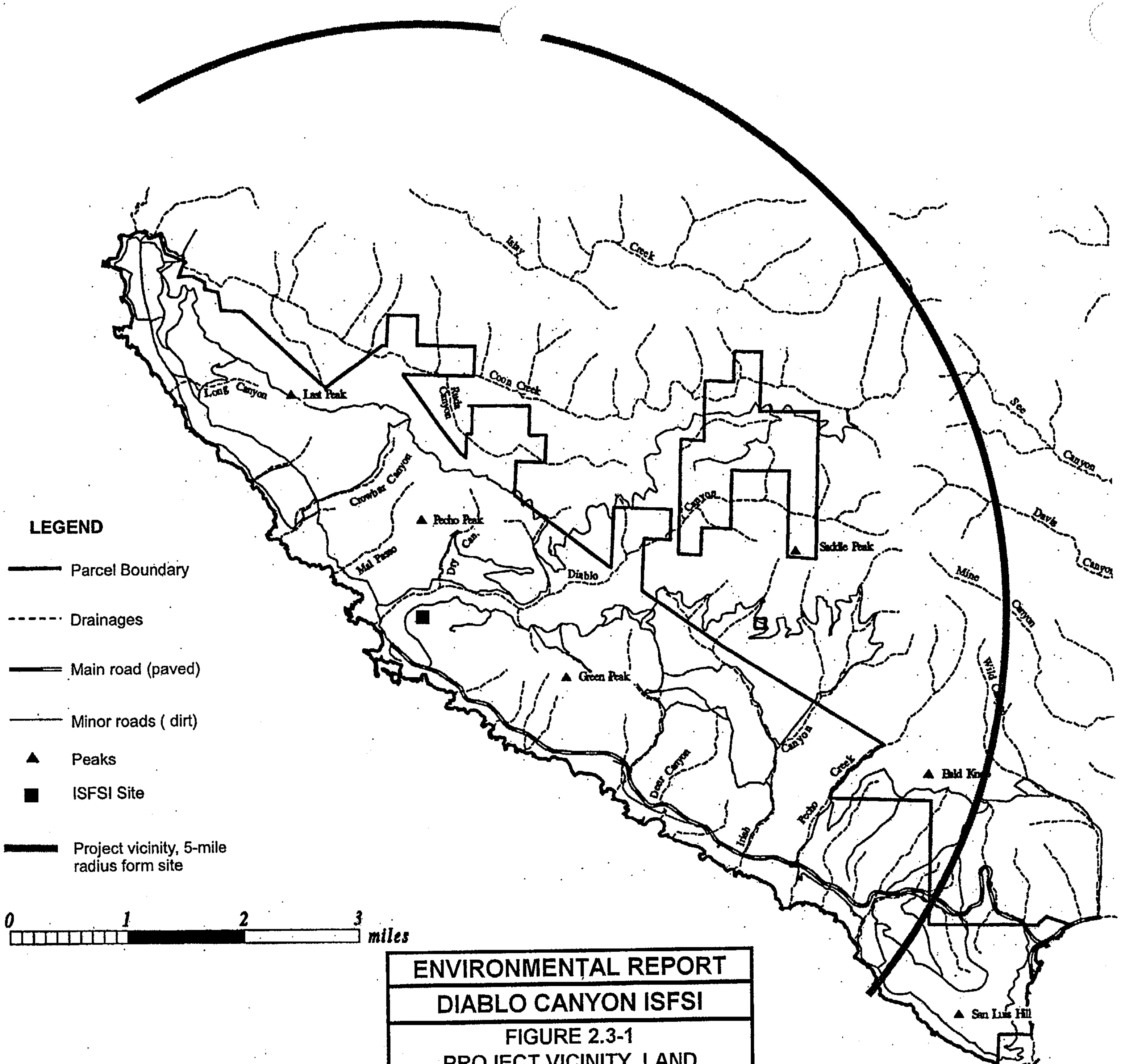
FIGURE 2.2-5
POPULATION DISTRIBUTION
0 TO 10 MILES
2010 PROJECTED



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

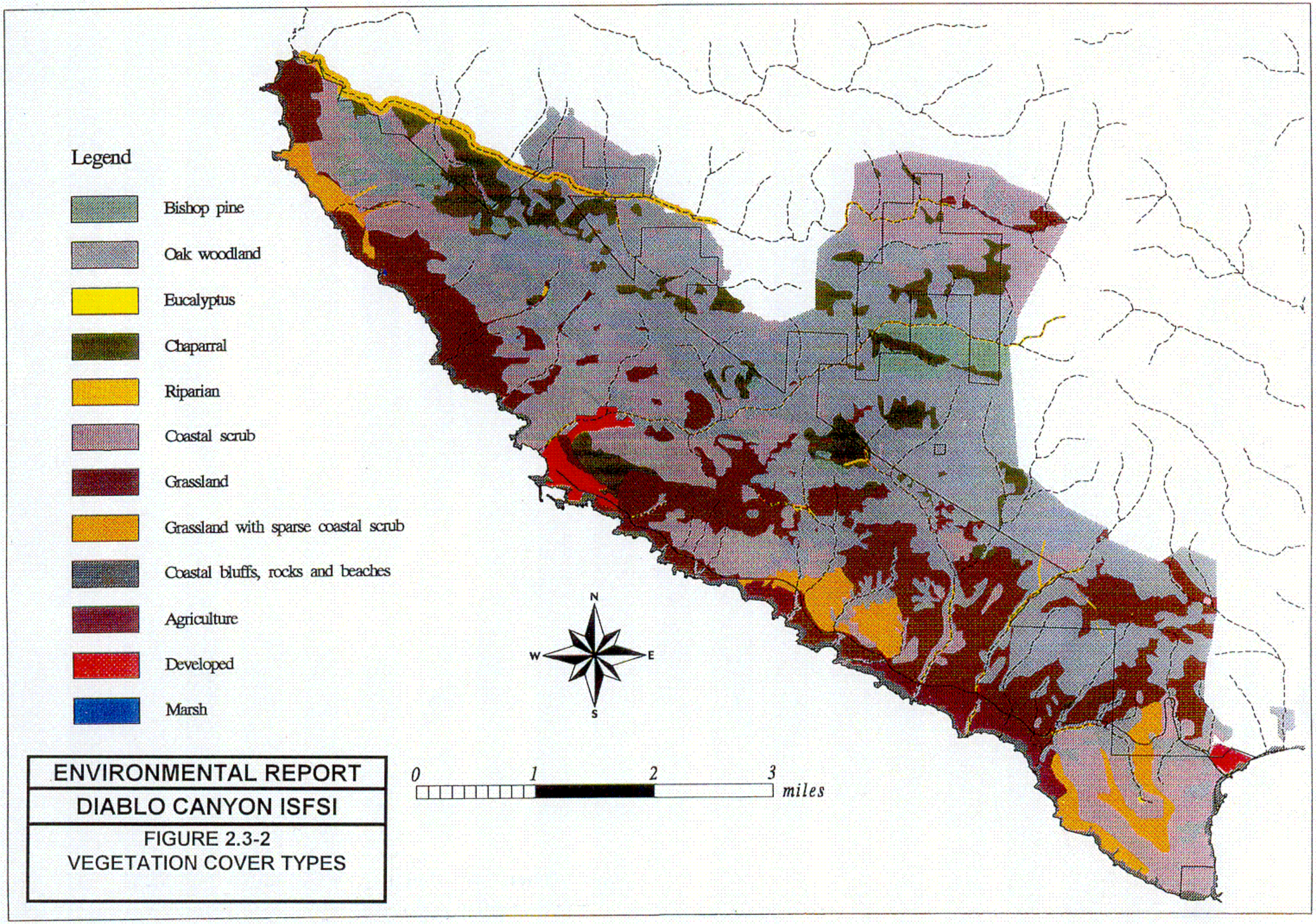
FIGURE 2.2-6
POPULATION DISTRIBUTION
0 TO 10 MILES
2000 CENSUS



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 2.3-1
PROJECT VICINITY, LAND FEATURES, AND HYDROLOGY

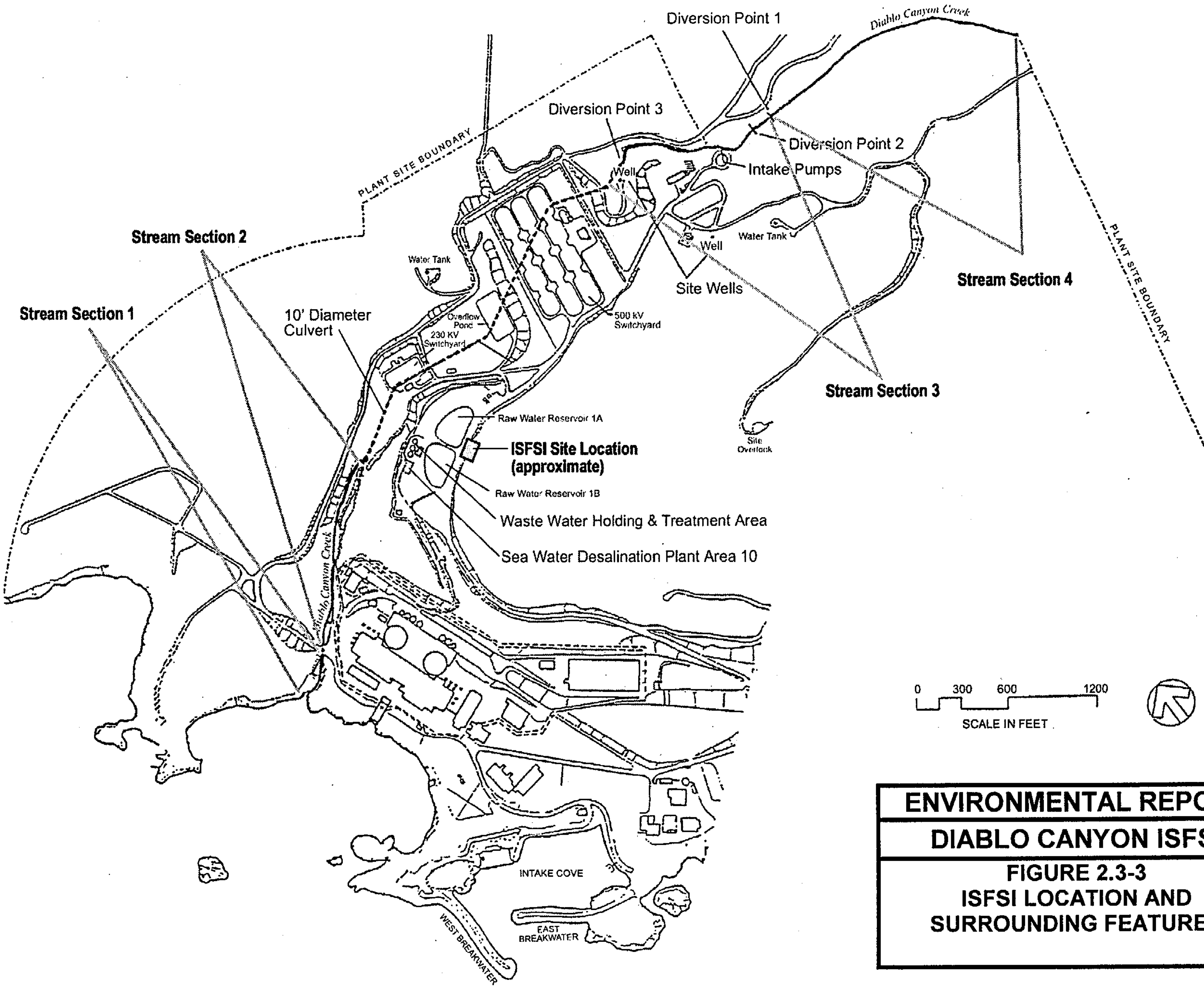


ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 2.3-2
VEGETATION COVER TYPES

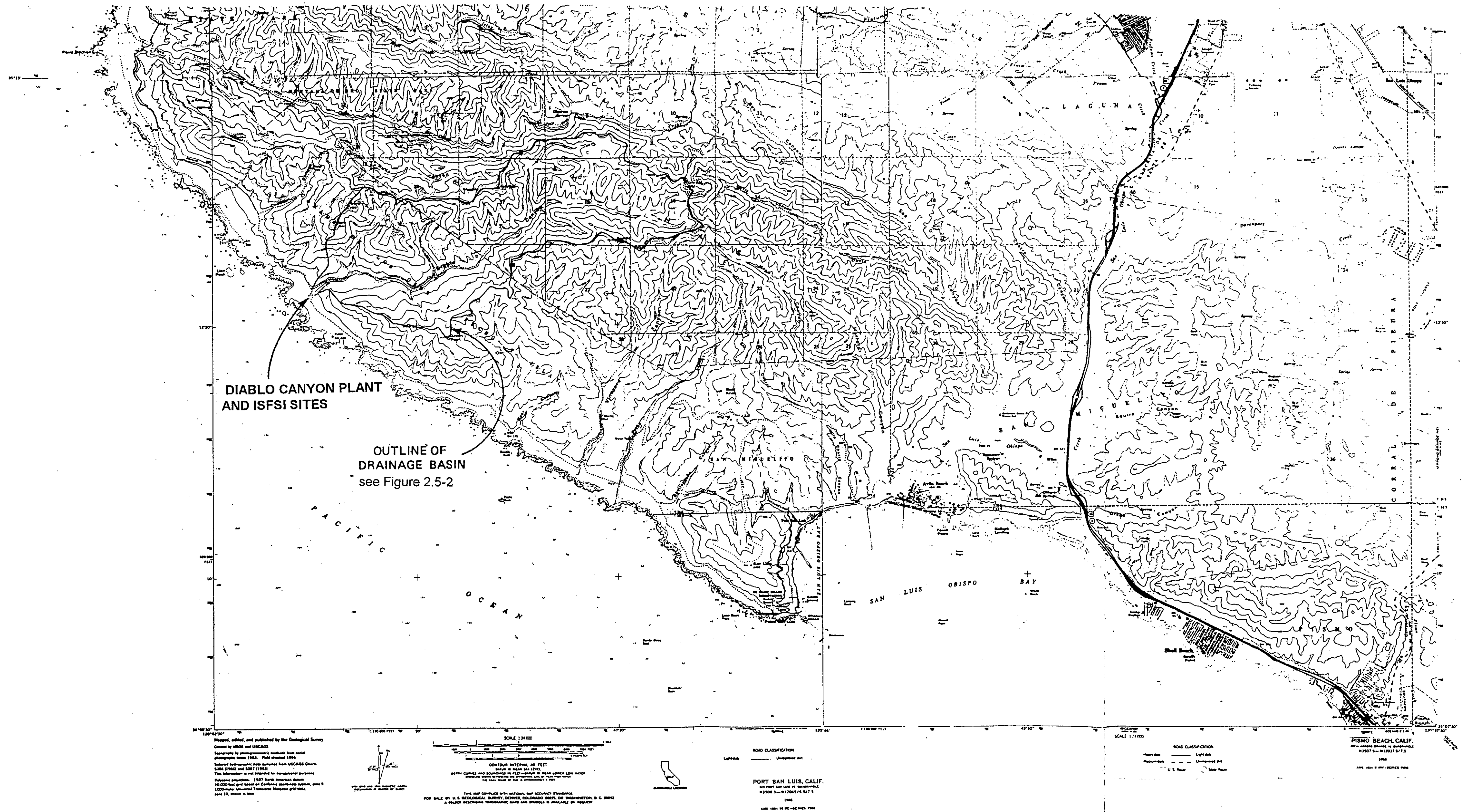
C01



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

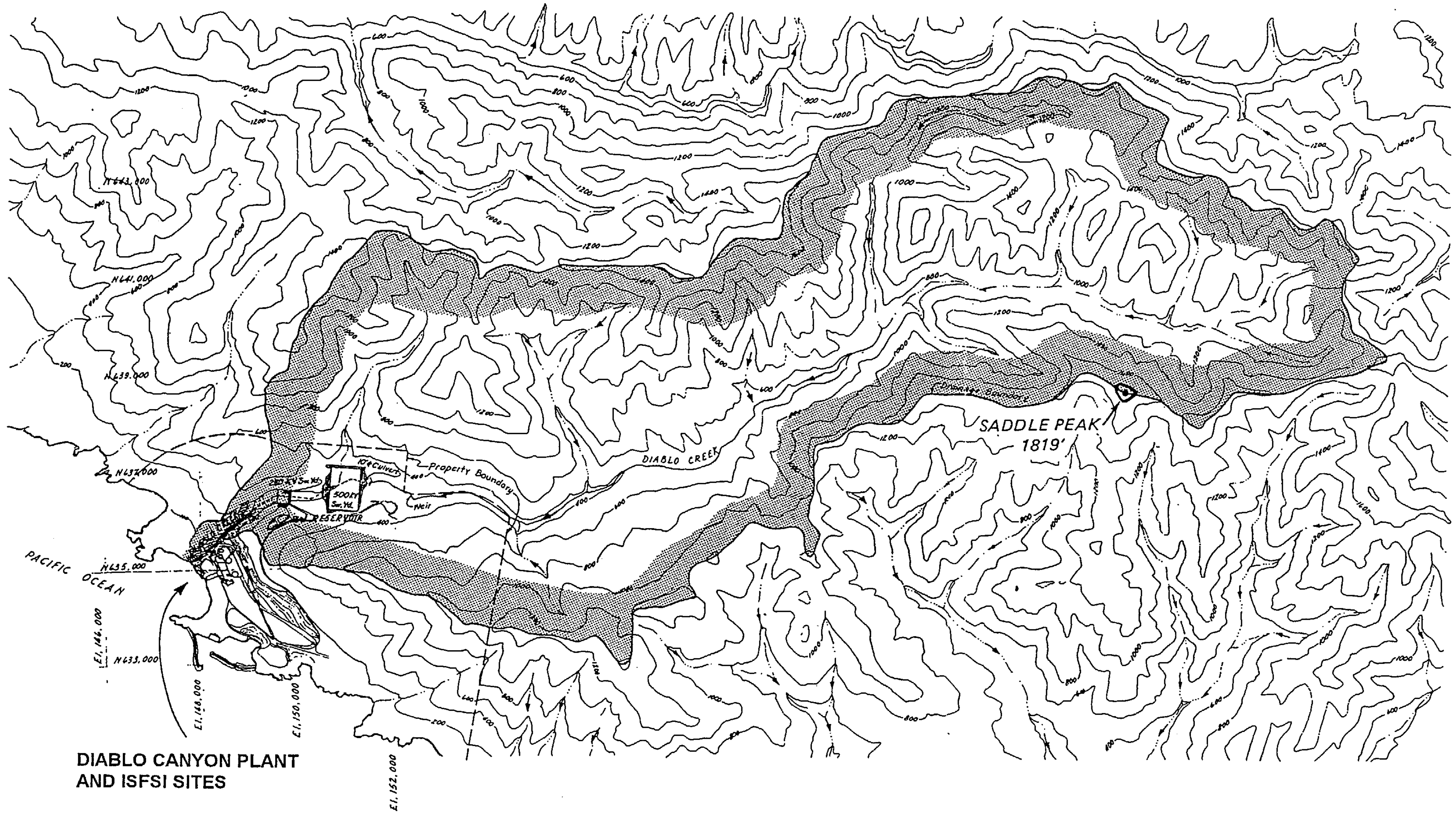
FIGURE 2.3-3
ISFSI LOCATION AND SURROUNDING FEATURES



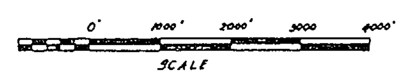
ENVIRONMENTAL REPORT

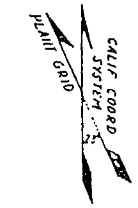
DIABLO CANYON ISFSI

FIGURE 2.5-1
PLANT SITE LOCATION
DRAINAGE AND TOPOGRAPHY



SURFACE DRAINAGE PLAN

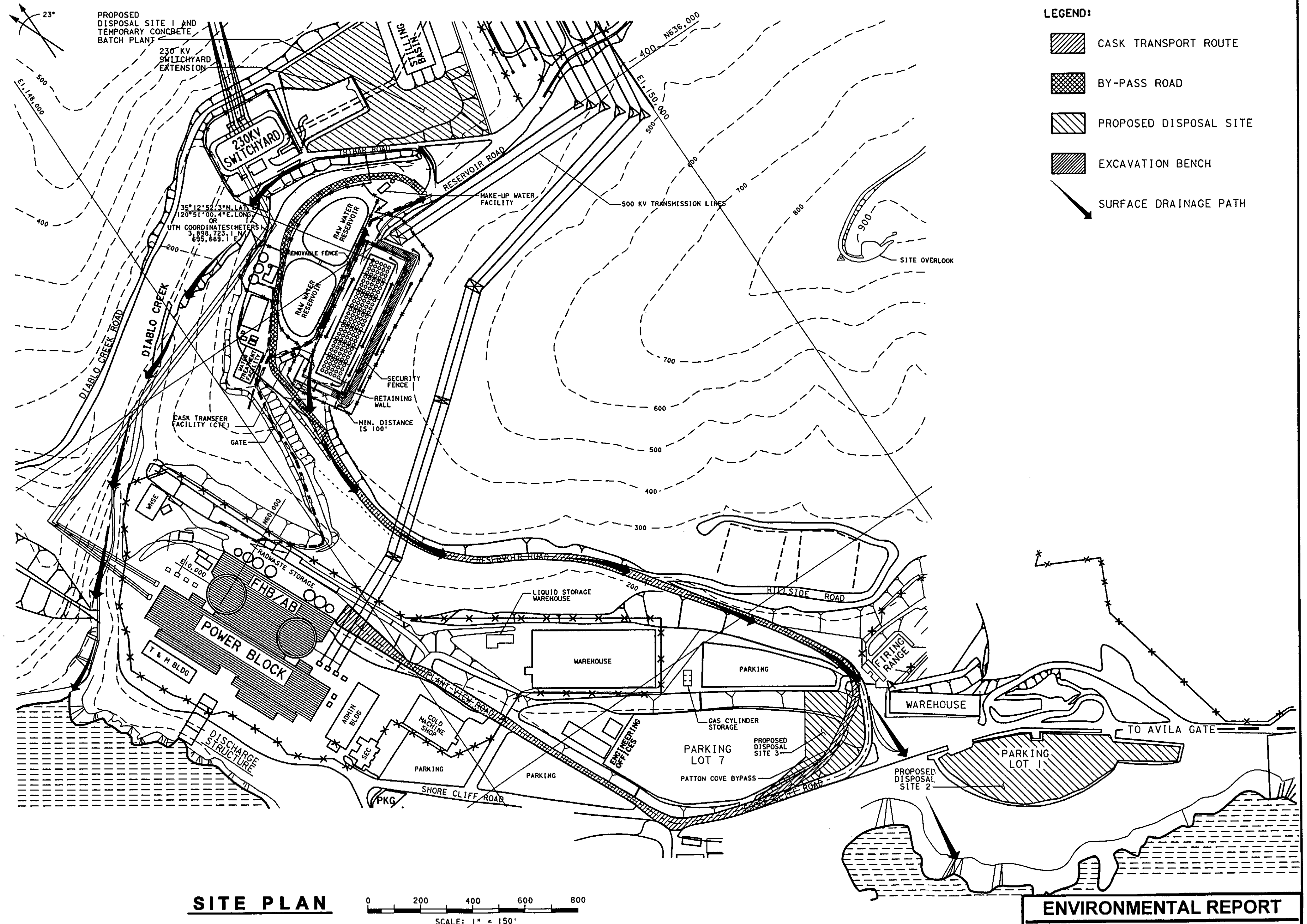




NOTES:

1. GRID COORDINATES SHOWN ARE BASED ON CALIF STATE COORDINATE SYSTEM.
2. DATUM FOR ELEVATIONS SHOWN IS MEAN SEA LEVEL EL 0.0'.
3. ARROW (⟵) INDICATES DIRECTION OF RUN OFF.
4. TOPOGRAPHY PHOTOGRAMMETRICALLY REPRODUCED FROM USGS PORT SAN LUIS 7.5 MINUTE QUADRANGLE, 1965.

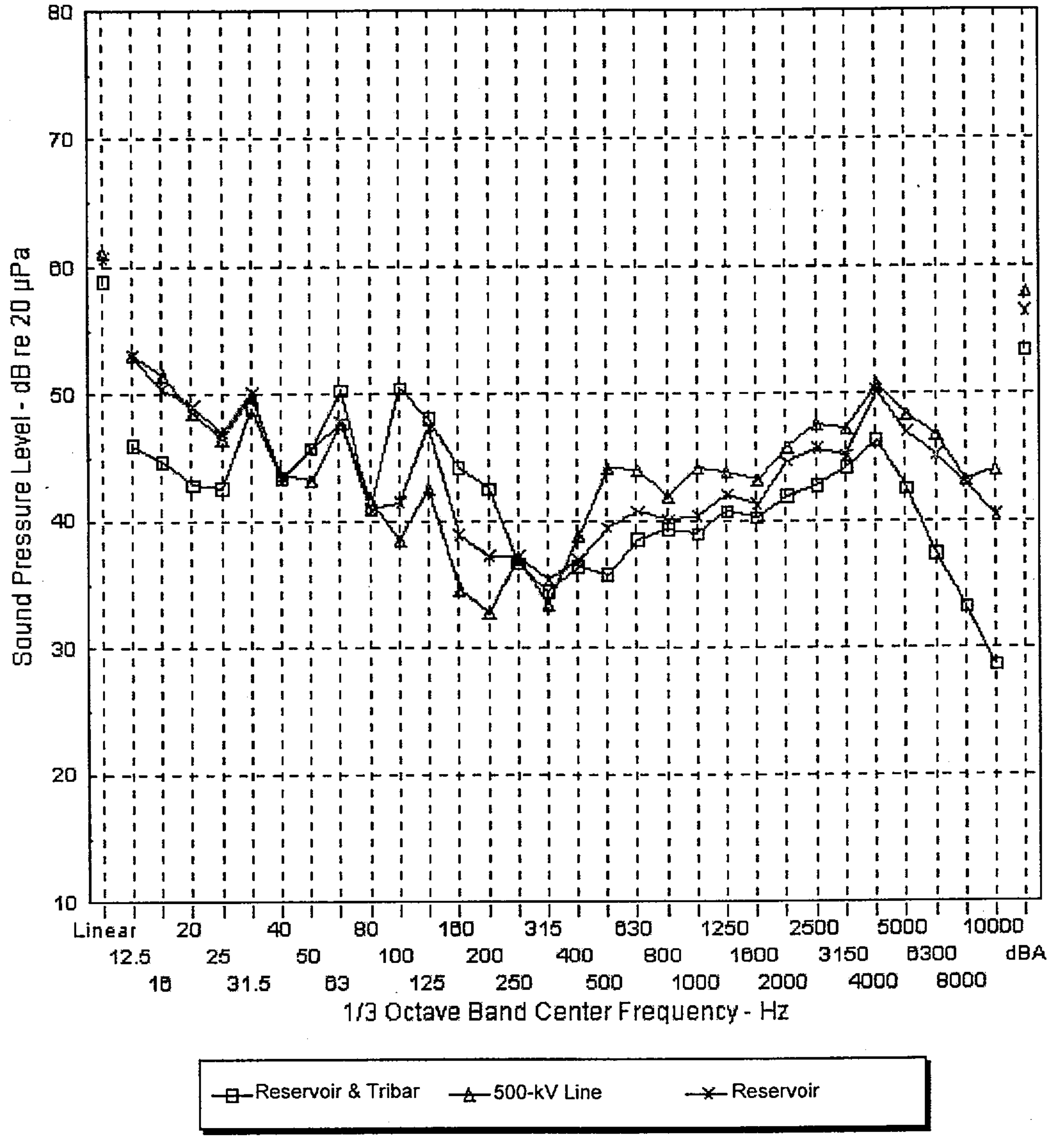
ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 2.5-2 SURFACE DRAINAGE PLAN



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

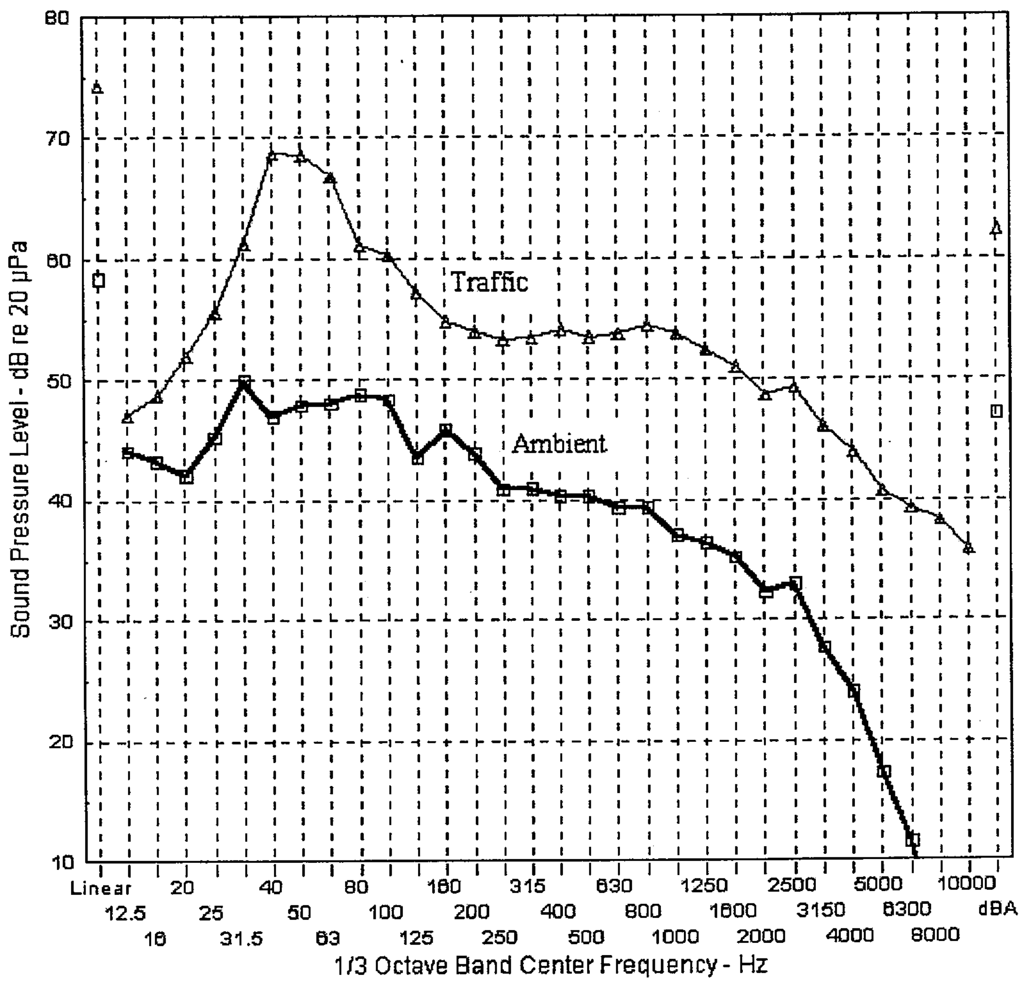
FIGURE 2.5-3
ISFSI SURFACE DRAINAGE



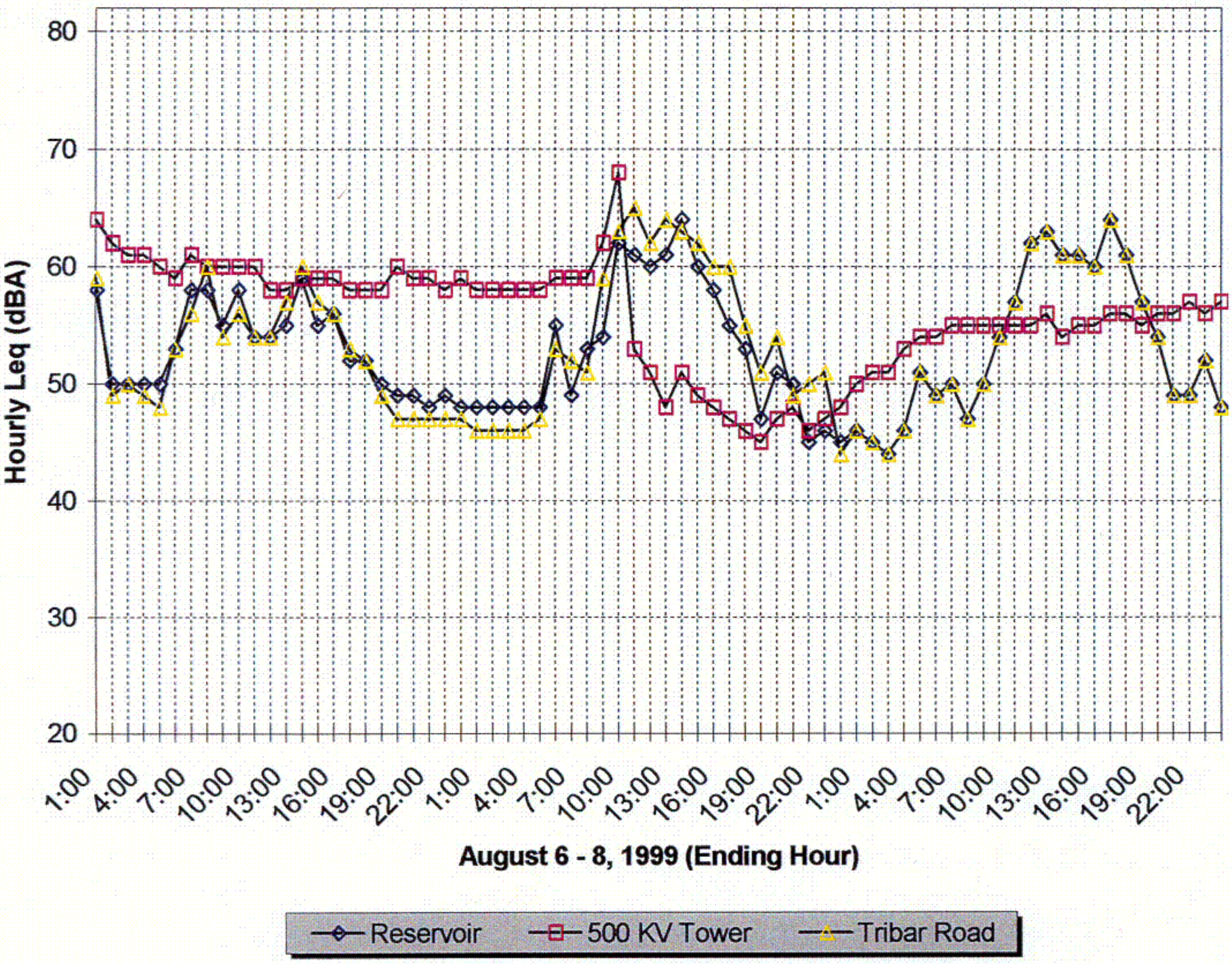
ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 2.8-1
EXISTING NOISE PROFILES (dBA)

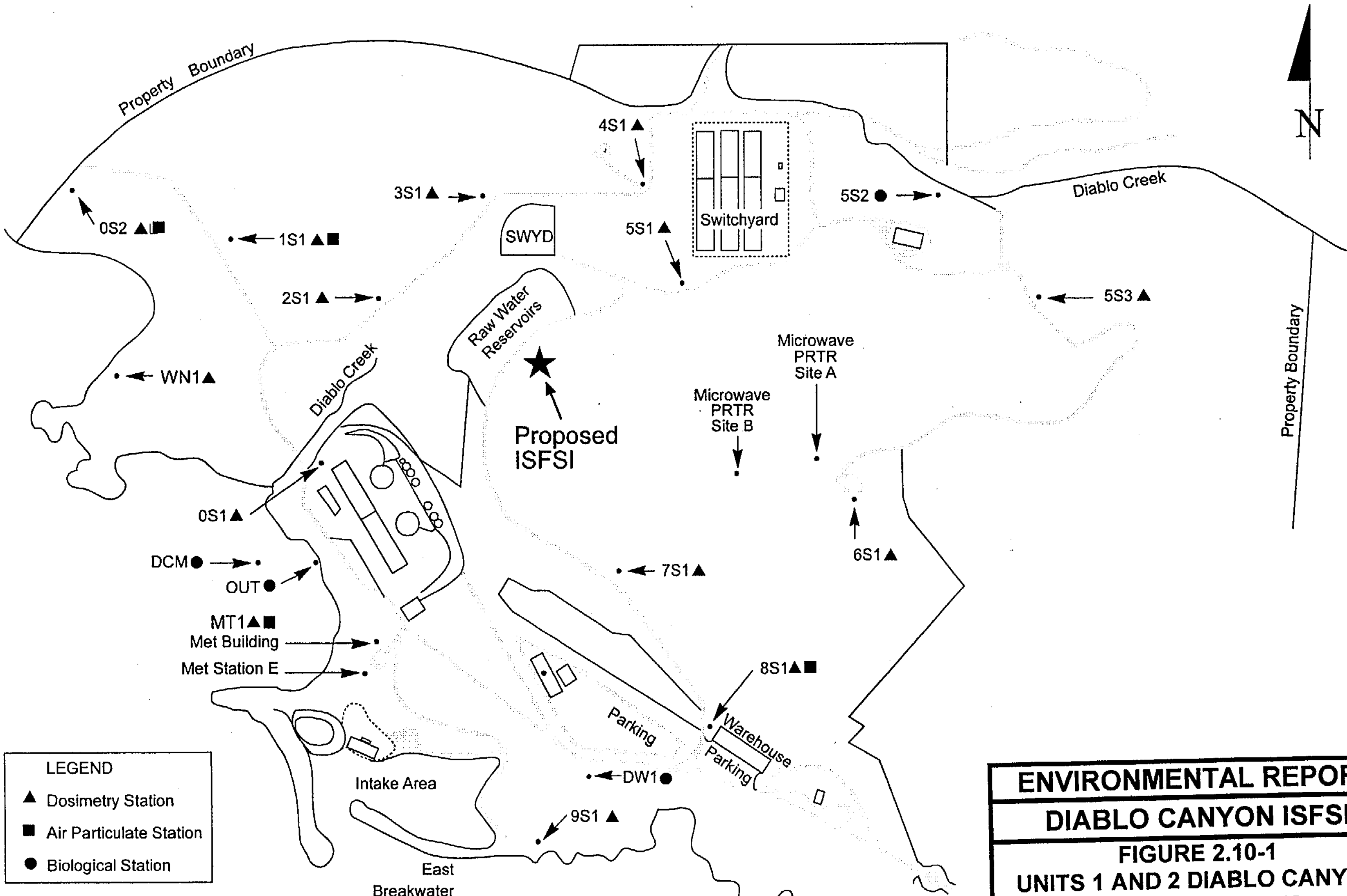


ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
Figure 2.8-2 AVILA GATE EXISTING NOISE PROFILES



ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
Figure 2.8-3 EXISTING NOISE LEVELS (dBA)

C02



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 2.10-1
UNITS 1 AND 2 DIABLO CANYON ONSITE STATIONS

CHAPTER 3

THE FACILITY

CONTENTS

CHAPTER 3

THE FACILITY

FIGURES

CHAPTER 3

THE FACILITY

3.1 EXTERNAL APPEARANCE

The major features of the Diablo Canyon ISFSI are the storage casks and pads, the cask transfer facility (CTF), security light poles, and fences surrounding the storage site and related staging areas. The ISFSI storage site, CTF, and transport route from the DCPP fuel handling building/auxiliary building (FHB/AB) are within the owner-controlled area as described in ER Section 2.1. Travel distance from the FHB/AB to the CTF and the ISFSI storage site is approximately 1.2 miles.

The storage casks are placed on a series of reinforced concrete pads, each built as needed, within a protected area separate from that of DCPP. Each pad is designed to accommodate up to 20 storage casks in a 4 by 5 array. Ultimately, seven such pads (containing up to 138 casks plus 2 spare locations) could be built to accommodate a full offload of DCPP Units 1 and 2 reactor cores and their spent fuel pools at the end of their existing operating licenses (2021 and 2025, respectively). Initially, two pads will be constructed followed by the remaining five pads on a schedule to meet DCPP operational requirements. Prior to construction of the remaining five pads, the area to be occupied by future pads will be filled with sand or aggregate. Figure 3.1-1 shows the fully developed storage pad with the seven 4 by 5 arrays end to end. Each loaded storage cask is approximately 11 ft in diameter, 20 ft high, and weighs about 360,000 pounds. There is approximately 6 ft surface-to-surface distance between casks. The series of seven storage pads will cover an area approximately 500 ft by 105 ft. An asphalt concrete paved corridor, 40 ft wide on 3 sides and 50 ft wide on the north side provides access around the concrete pads.

A security fence, with a locked gate, serves as the protected area boundary and surrounds the storage pads. There is approximately 50 ft between the storage casks and this security fence. There is a second fence, termed the restricted area fence, around the protected area, which forms the restricted area boundary. The restricted area fence is 100 ft from the nearest cask to ensure the dose rate at this boundary will be less than 2 mrem/hr in compliance with 10 CFR 20 requirements.

The CTF is located about 100 ft off the northwest corner of the western-most storage pad.

A detailed description of the storage site, the CTF, and the HI-STORM 100 System is provided in Chapter 4 of the ISFSI SAR.

3.2 FACILITY CONSTRUCTION

Construction activities for the Diablo Canyon ISFSI and associated facilities are similar to those required for construction of the foundation for a large commercial building or industrial facility. These types of activities occur routinely throughout the local region.

The major elements of the Diablo Canyon ISFSI that involve construction activities are: (a) the ISFSI storage pads, (b) the ISFSI CTF, and (c) installations and minor modifications inside the DCPP FHB/AB. Phase 1 construction will consist of: (a) clearing and grading of the ISFSI pad area and relocation of miscellaneous power plant facilities, such as the ISFSI access road and fencing, (b) installation of two of the seven ISFSI pad segments and construction of the CTF, and (c) installation of equipment in the FHB/AB for initial cask loading and handling activities and minor modifications to the FHB/AB crane. Phase 2 construction will involve installation of the remaining pad segments. Completion of Phase 2 will be scheduled as needed to meet DCPP fuel offload operational needs.

3.2.1 MINOR MODIFICATIONS INSIDE THE DCPP FHB/AB

Inside the DCPP FHB/AB, the following modifications will be made: (a) the installation of a removable seismic restraining device in the existing cask washdown area to protect the loaded HI-TRAC transfer cask during seismic and cask drop events, and (b) minor modifications to the DCPP FHB/AB crane.

3.2.2 CONSTRUCTION OF THE ISFSI PADS

Construction of the ISFSI storage pads will require the removal of vegetation, soil excavation and backfill, and relocation of miscellaneous facilities. The potential amount of native and introduced vegetation that may be disturbed during ISFSI construction is shown in Table 4.1-3. Excavation will be accomplished using large earthmoving equipment. It is not anticipated that blasting will be required. Excavated material is proposed to be disposed of at one or more of the three disposal sites shown in Figure 2.1-2. Concrete for the ISFSI pads will be obtained from an onsite temporary concrete batch plant. Lighting, communication equipment, security fences, drainage facilities, security system, and site paving/gravel will be installed as part of Phase 1 construction. The existing access road transecting the proposed pad footprint will be relocated to the north side of the raw water storage reservoir, as shown in Figure 2.1-2.

3.2.3 CONSTRUCTION OF THE CASK TRANSFER FACILITY (CTF)

Construction of the CTF will take place during Phase 1 of the ISFSI project. Construction activities will consist of excavation for the embedded lift system, pouring concrete for the lift system and approach ramps, and installation of mechanical equipment and miscellaneous facilities. Excavation for this facility will be performed using earthmoving equipment. It is not anticipated that blasting will be required. Excavated material is proposed to be disposed of at one or more of the three disposal sites shown in Figure 2.1-2. Power, communication facilities, and lighting will also be installed during Phase 1.

3.3 FACILITY OPERATION

The physical characteristics of the spent fuel assemblies to be stored are described in the Diablo Canyon ISFSI SAR, Section 3.1. The fuel rods in the assemblies consist of UO_2 pellets encapsulated in zirconium alloy tubing that is plugged and seal welded at the ends.

The HI-STORM 100S System will be used to load, transfer, and store DCPP spent nuclear fuel. The system consists of a multi-purpose canister (MPC), which contains the fuel; a HI-STORM 100SA storage overpack (overpack), which contains the MPC during storage; a HI-TRAC transfer cask (transfer cask), which contains the MPC during loading, handling, unloading, and transfer operations. A general description of these three components is provided in this section. A more detailed description is contained in SAR Section 4.2.

The MPC is a multi-celled basket designed for pressurized water reactor (PWR) spent fuel assemblies. The MPC, shown partially inserted into the storage overpack in Figure 3.3-1, is an integrally welded pressure vessel, which provides the confinement boundary for the stored fuel. The MPC baseplate, shell, lid, port covers, and closure ring provide a confinement boundary to prevent the release of radioactive material from the MPC. Figure 3.3-2 shows a cross section of the MPC-32, which can be used to store up to 32 intact fuel assemblies, and Figure 3.3-3 shows a cross section of the MPC-24, which can be used to store up to 24 intact fuel assemblies. Criticality control is maintained by the geometric spacing of the fuel assemblies and fixed borated neutron absorbing materials (Boral) incorporated into the fuel basket assembly. Within the MPC, heat is transferred between metal surfaces (for example, between neighboring fuel rod surfaces) via a combination of conduction through a gaseous medium (helium) and thermal radiation.

Figure 3.3-4 shows a cross section of the MPC-24E/24EF, which will be used to store up to four containers of damaged fuel or fuel debris (cells 9, 10, 15, 16) and 20 intact fuel assemblies.

The HI-TRAC transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the spent fuel pool to the storage overpack. The transfer cask is a multi-walled cylindrical vessel that uses a lead shield and a water-filled jacket for gamma radiation and neutron shielding. Heat is transported through the transfer cask wall by conduction and dissipated to the environment by natural convection and thermal radiation. Figure 3.3-5 shows a cross-sectional view of the HI-TRAC transfer cask.

The overpack provides the required physical protection, cooling, and radiation shielding. As shown in Figure 3.3-6, which depicts a cross section view of the HI-STORM 100S overpack with a loaded MPC, the overpack is a rugged, heavy-walled cylindrical vessel. The main structural function of the overpack is provided by carbon steel, and the main gamma and neutron radiation shielding function is provided by concrete. The concrete is enclosed by cylindrical steel shells, a thick steel baseplate, and a top plate. The overpack lid has appropriate concrete shielding to provide neutron and gamma attenuation in the vertical direction. Heat is dissipated from the outer surface of the overpack to the environment by natural convection and thermal radiation. Heat transport through the cylindrical wall of the overpack is solely by conduction. While stored in the overpack, heat is rejected from the surface of the MPC via the parallel action of thermal radiation to the inner shell of the overpack and convection to a buoyancy-driven airflow in the annular space between the outer surface of the MPC and the inner shell of the overpack. The overpack has air inlets and air outlets to allow for passive natural convection cooling of the contained MPC. Within the air inlets and outlets, an array of gamma shield cross plates are installed. These gamma shield cross plates are designed to scatter any photons traveling through ducts. The result of scattering the particles in the ducts is a significant decrease in the local dose rates around the air inlets and outlets.

The spent fuel storage process begins in the DCPP FHB/AB where a transfer cask, with an empty MPC inside, is lowered into the spent fuel pool. Preselected spent fuel assemblies are loaded into the MPC and a verification of the assembly identification is provided. While still underwater, a thick MPC lid is installed for shielding. When the transfer cask is removed from the spent fuel pool, the lift yoke, transfer cask, and top of the MPC are rinsed down. Once removed from the spent fuel pool, the top surfaces of the MPC lid and the upper flange of the transfer cask are decontaminated. Dose rates are measured at the MPC lid and around the mid-height circumference of the transfer cask to ensure that the dose rates are within expected values. The MPC lid is then seal-welded and all liquid water removed from the MPC. Following successful completion of a dryness test, the MPC is backfilled to a predetermined pressure of helium gas. The backfill ensures adequate heat transfer during storage, and provides an inert atmosphere for long-term fuel integrity. Cover plates are then installed and seal-welded over the MPC vent and drain ports. In order to provide redundant closure of the MPC lid and cover plates confinement closure welds, an MPC closure ring is placed on the MPC and seal-welded. The MPC lid and accessible areas of the top of the MPC shell are smeared, tested, or checked for removable contamination and the transfer cask dose rates are measured. After the transfer cask top lid is installed, the loaded transfer cask is downended and horizontally rigged to the onsite transporter. The transfer cask with loaded MPC is transferred to the cask transfer facility (CTF), near the ISFSI pads, using the onsite transporter.

At the CTF, the transporter upends the horizontally loaded transfer cask and lifts it vertically to a height sufficient to place it atop an empty overpack that has been previously placed in its designated location at the CTF. The transfer cask bottom lid is removed, the MPC is lowered from the transfer cask into the overpack, and the transfer cask is removed from atop the overpack. The overpack top lid is installed, the upper vent screens and gamma shield cross plates are installed, and the lid studs and nuts are torqued. The transporter is used to lift the overpack and transport it from the CTF to its designated storage location on the ISFSI pads, where it is anchored to a pad. No active components are needed to ensure safe storage of the spent fuel. Cooling is provided by natural convective flow of ambient air into the inlet air vents at the bottom of the overpack and out of the outlet vents at the top of the overpack. No utilities (that is, water, compressed air, electric power) are required during storage operations.

Adequate cooling air is ensured through periodic surveillance of the casks at the ISFSI pad as required by the Diablo Canyon ISFSI Technical Specifications.

SAR Sections 3.1 and 5.1 provide additional detail regarding storage system operation.

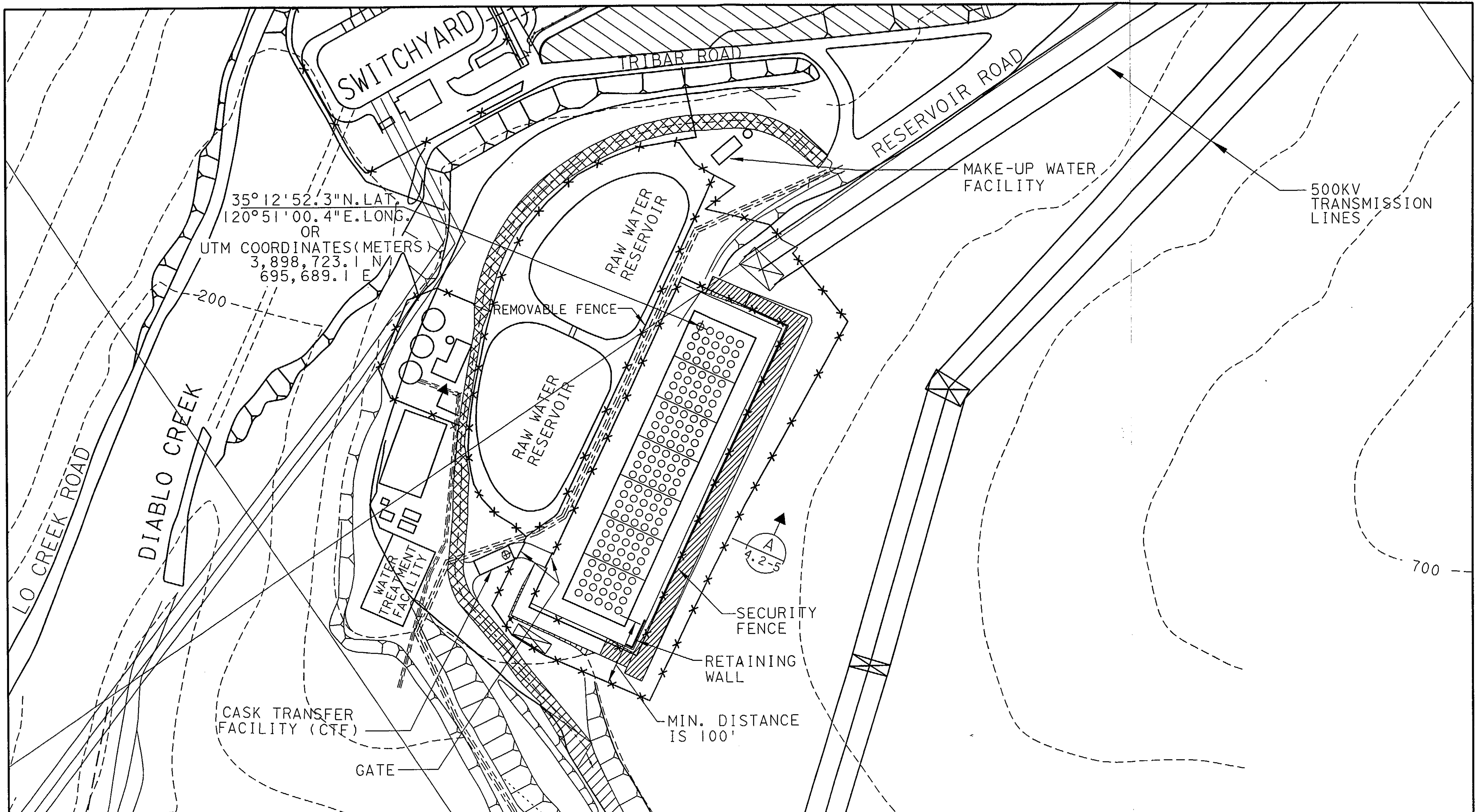
The major auxiliary systems required to support operation of the ISFSI include electrical distribution for security lighting and other security systems.

3.4 WASTE CONFINEMENT AND EFFLUENT CONTROL

There are no radioactive or nonradioactive effluents that result from MPC transfer or storage operations.

MPC loading and closure operations are performed inside the DCPP fuel handling building in a controlled and monitored environment. Radioactive effluent handling during MPC loading operations, which include MPC draining, helium backfilling, sealing, and closure operations, is in accordance with the DCPP 10 CFR 50 license and radioactive waste management procedures. During MPC closure operations, the lines used for venting or draining are routed to the spent fuel pool or radioactive waste processing systems. The procedures for MPC closure ensure that there will be no release of gaseous, liquid, or solid materials outside the FHB/AB or in the fuel handling area of the AB during transfer and storage.

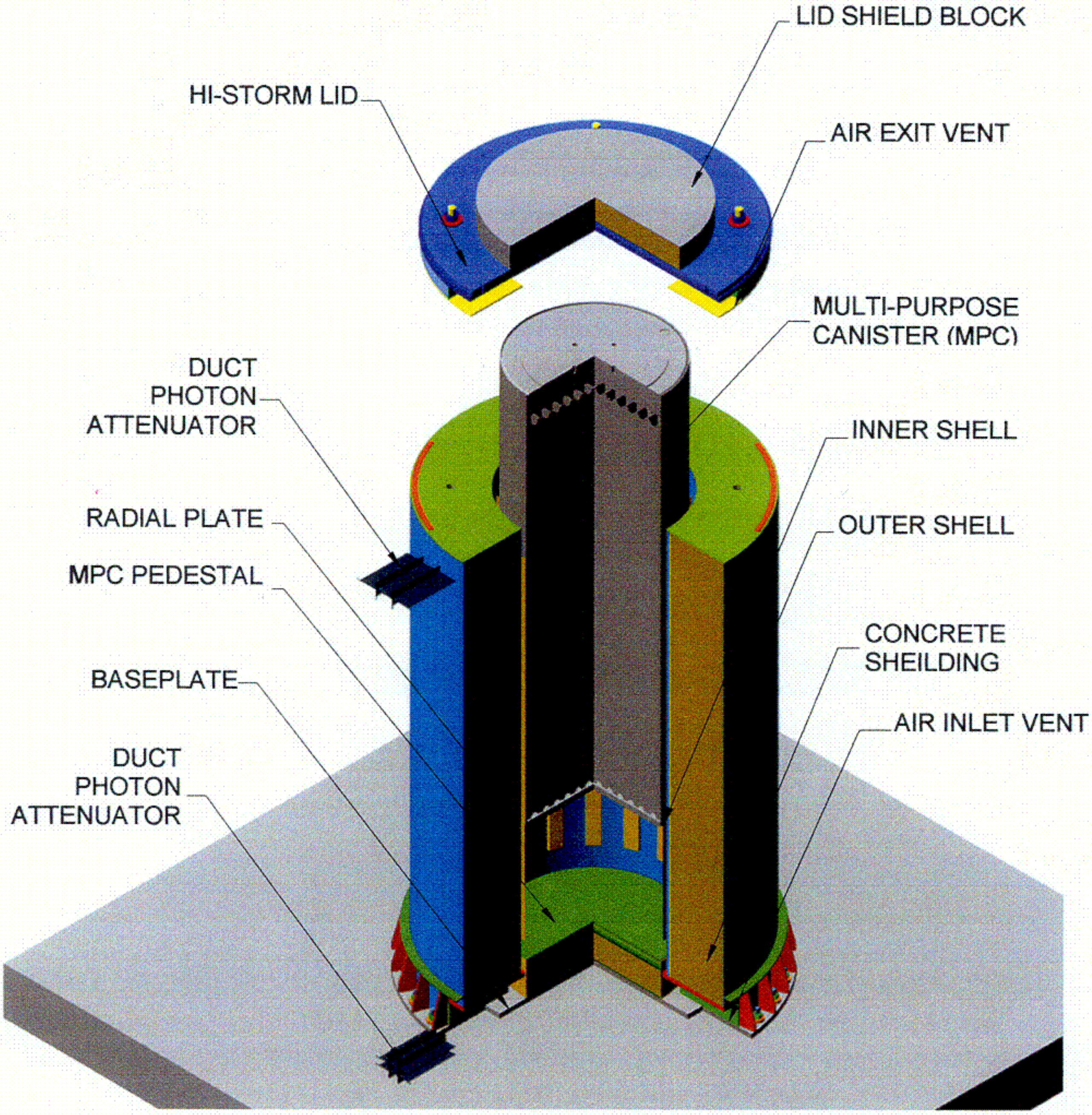
Although generation of solid radioactive waste is not expected outside of the FHB/AB, it is possible that a small quantity of dry low-level solid waste may be generated consisting of smears, disposable clothing, tape, blotter paper, rags, and related health physics material. This material will be disposed of in accordance with existing DCPP procedures.



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

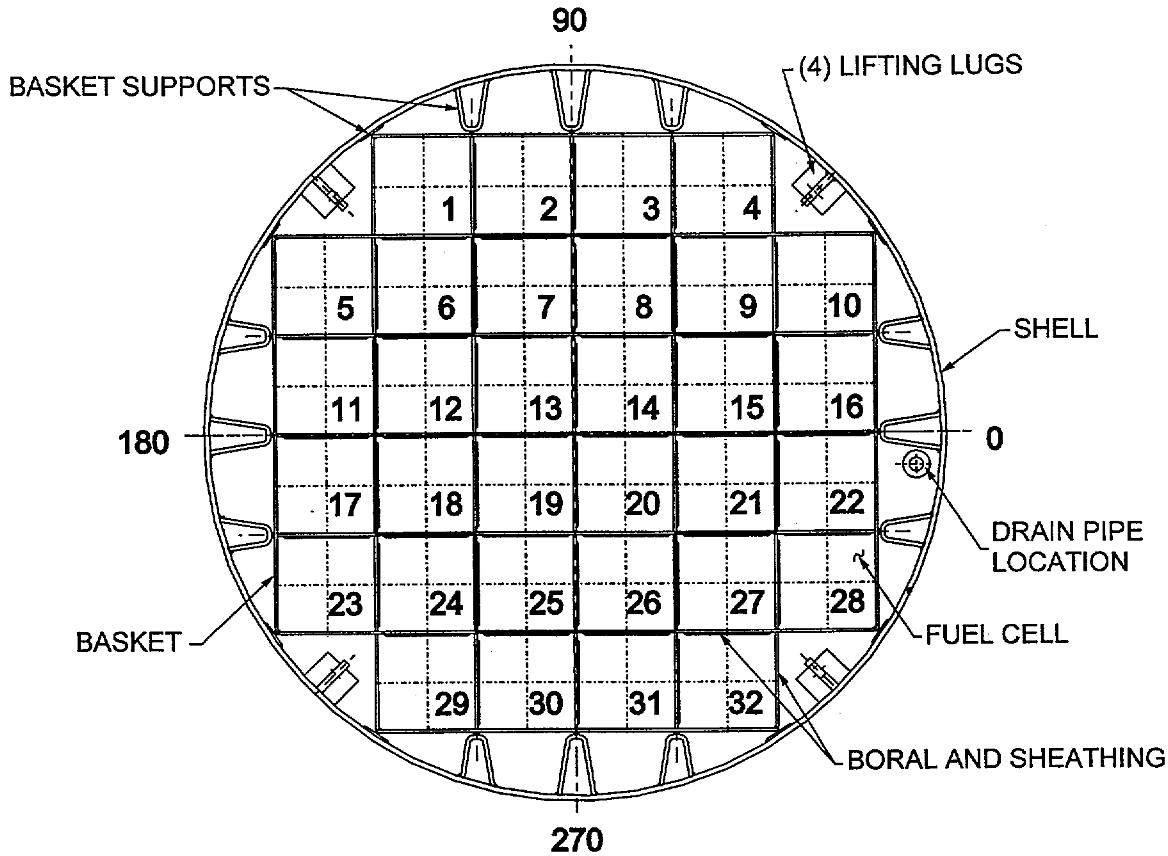
FIGURE 3.1-1
STORAGE LAYOUT



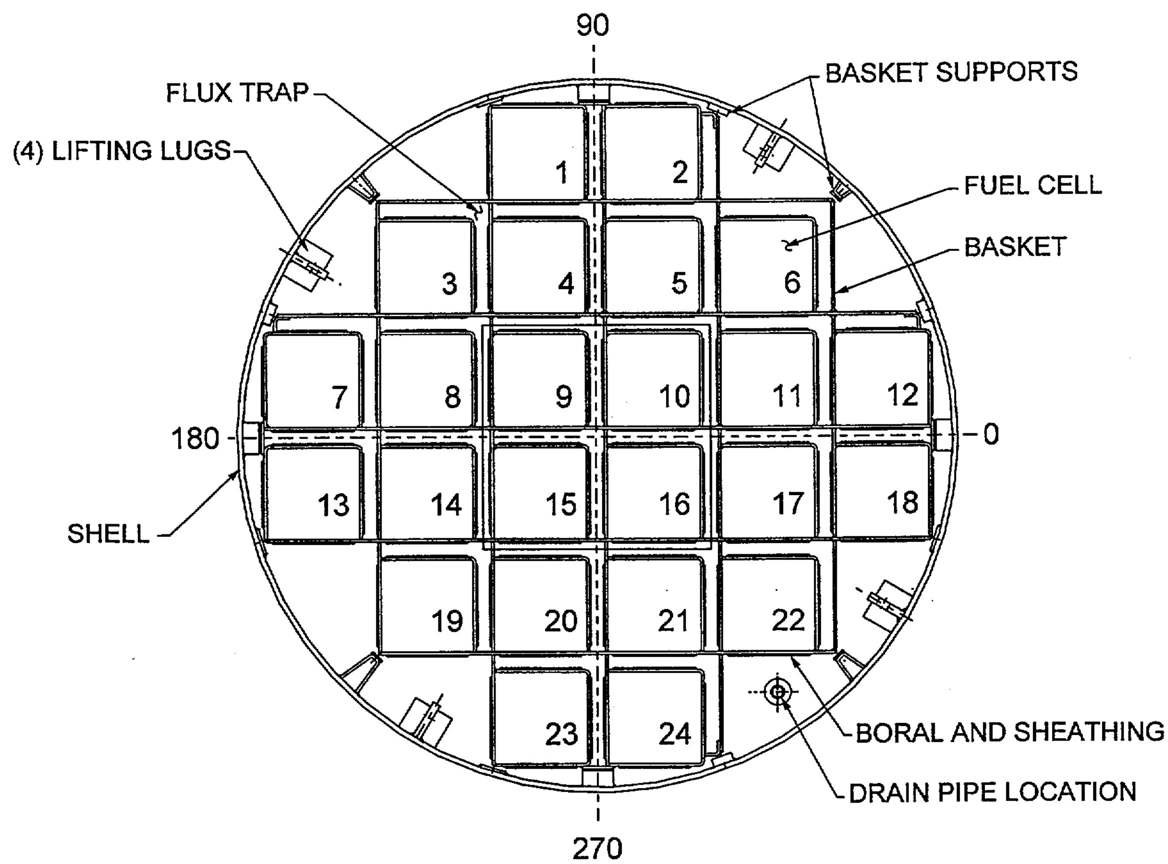
NOTE: For clarity, air exit vents are not shown rotated.

ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 3.3-1 HI-STORM 100SA OVERPACK WITH MPC PARTIALLY INSERTED

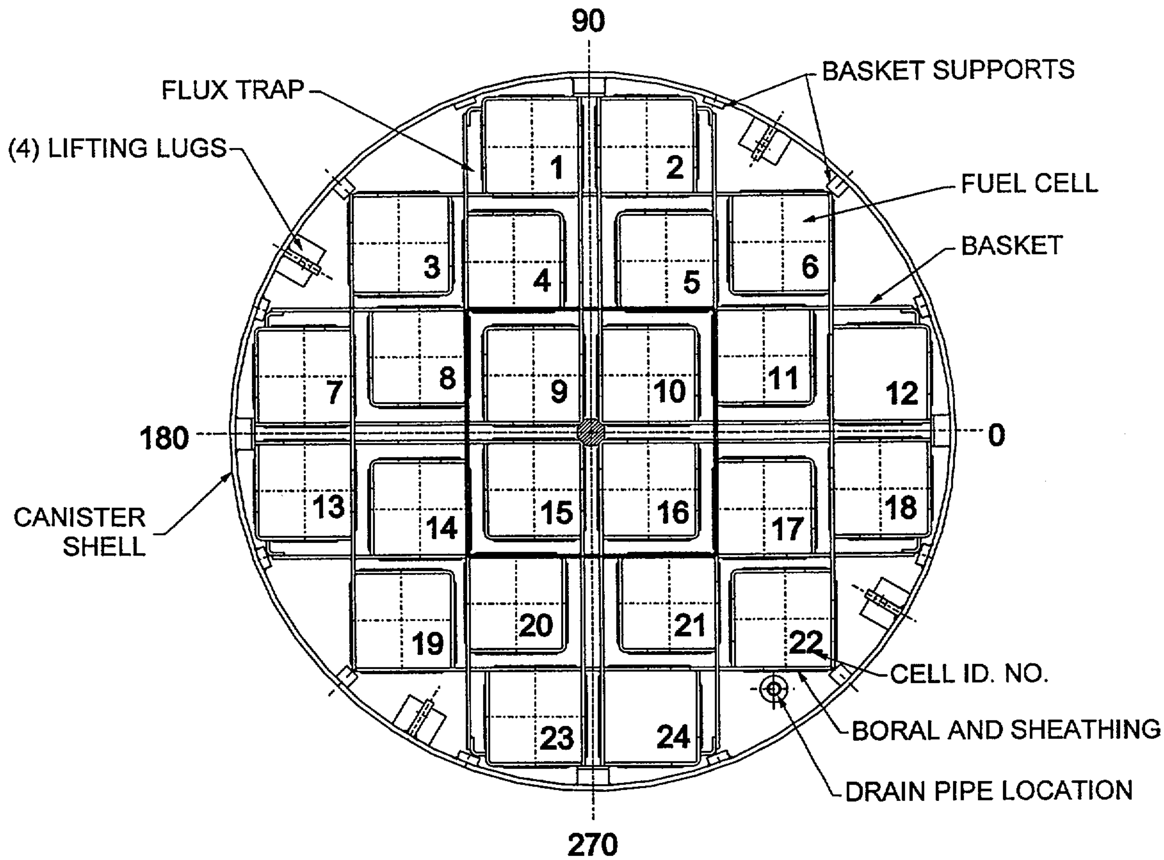
C03



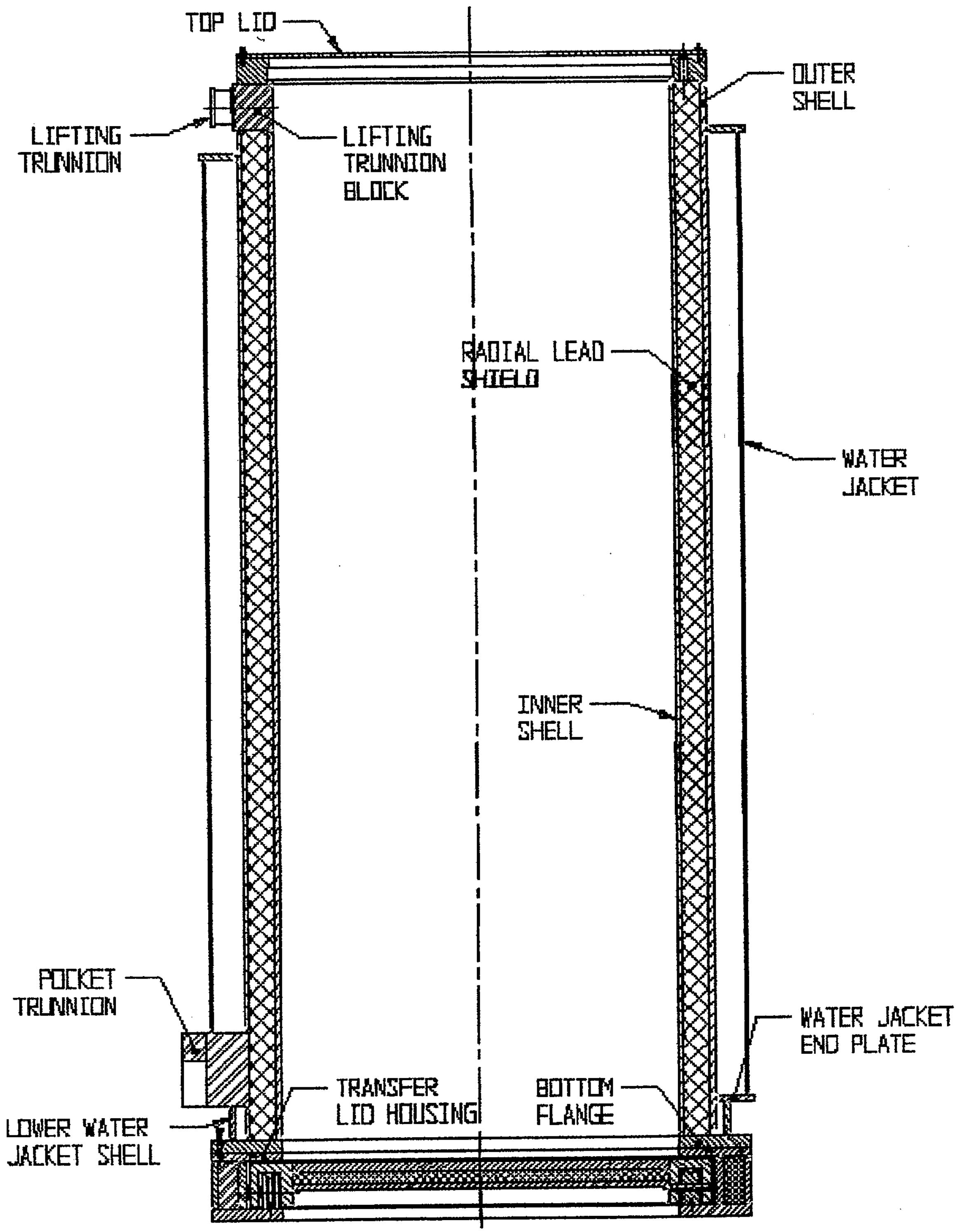
ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 3.3-2 MPC-32 CROSS SECTION



ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 3.3-3 MPC-24 CROSS SECTION



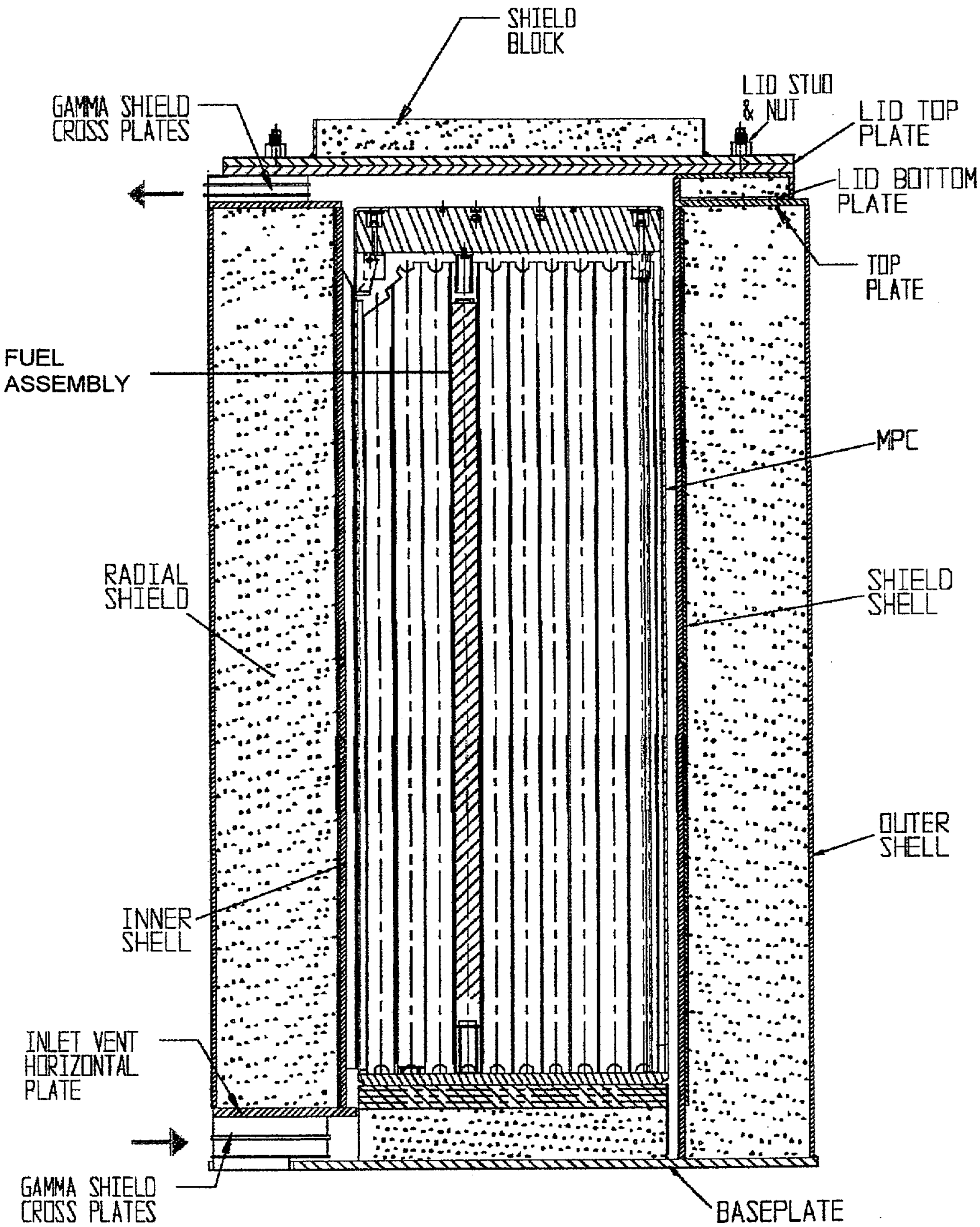
ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 3.3-4 MPC-24E/24EF CROSS SECTION



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 3.3-5
HI-TRAC TRANSFER CASK WITH TOP LID
CROSS SECTIONAL ELEVATION VIEW



ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 3.3-6
CROSS SECTION OF THE HI-STORM 100S OVERPACK WITH LOADED MPC

CHAPTER 4

ENVIRONMENTAL EFFECTS OF CONSTRUCTION AND OPERATION

CONTENTS

CHAPTER 4

ENVIRONMENTAL EFFECTS OF CONSTRUCTION AND OPERATION

CONTENTS

CHAPTER 4

ENVIRONMENTAL EFFECTS OF CONSTRUCTION AND OPERATION

TABLES

CHAPTER 4

ENVIRONMENTAL EFFECTS OF CONSTRUCTION AND OPERATION

FIGURES

CHAPTER 4

ENVIRONMENTAL EFFECTS OF CONSTRUCTION AND OPERATION

This chapter describes how the natural and human environment could be affected by the construction, operation and decommissioning of the Diablo Canyon ISFSI and associated facilities. This chapter presents or references relevant data, describes the approach and methods used to predict future environmental impacts, and assesses potential environmental impacts. Each section describes, as appropriate, any potential impacts to specific categories of environmental resources. Each section also contains a concluding statement as to the significance of the potential impacts. A standard of significance has been established by the Nuclear Regulatory Commission (Reference 1) for assessing environmental impacts. Using the regulatory standards of the Council on Environmental Quality as a basis, each impact is to be assigned to one of the following three significance levels:

Small: The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

Moderate: The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

Large: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

As a part of the original licensing at DCPP, PG&E prepared and submitted an environmental report to the NRC (Reference 2) addressing the potential impact of the construction and operation of DCPP on the surrounding environment. The NRC reviewed this environmental report and issued a final environmental statement in 1993 (Reference 3). Both the environmental report and final environmental statement concluded that construction and operation of DCPP would have no significant adverse environmental effects on the areas surrounding DCPP. As discussed in this chapter, construction and operation of the ISFSI would represent a small additional environmental effect on the surrounding areas.

4.1 EFFECTS OF SITE PREPARATION AND FACILITY CONSTRUCTION

Construction activities for the Diablo Canyon ISFSI and associated facilities are similar to those required for construction of the foundation of a large commercial building or industrial facility. These activities are described in ER Section 3.2.

Concrete for the ISFSI pads and cask transfer facility (CTF) will be obtained from a temporary onsite concrete batch plant located near the ISFSI (Figure 2.1-2). Water requirements for dust control and equipment cleaning will be approximately 0.5 acre-ft during construction and will come from the raw water reservoir. Water is provided to the raw water reservoir from a combination of onsite sources. Table 4.1-1 shows the DCPP water supplies and demands. The temporary concrete batch plant will require an additional 0.5 acre-ft of water per pad.

Applicable Best Management Practices (BMPs) (for example, control of dust, siltation, and erosion protection) will be applied during construction activities. BMPs are defined in both federal and state regulations. The Environmental Protection Agency (EPA) defines BMPs in 40 CFR 122.2, which contains regulations that address the management of practices that could create water pollution. The EPA definition is as follows:

> **Best management practices (BMPs):** BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BMPs proposed to be used during construction activities for the Diablo Canyon ISFSI and related facilities are listed in Table 4.1-2.

4.1.1 EFFECTS ON GEOGRAPHY, LAND USE, AND DEMOGRAPHY

The ISFSI and associated facilities will be located within the existing DCPP owner-controlled area, approximately 0.22 miles northeast of the Unit 1 containment.

Construction activities will be limited to the immediate vicinity of the ISFSI. Construction materials will be provided from offsite sources. Manufacturing of components for the HI-STORM 100 System will also be performed offsite, although some onsite welding work will be performed. Filling of the storage cask overpacks with concrete will be performed onsite, near the ISFSI, just prior to storage on the ISFSI pads, using concrete from offsite sources.

Excavation and grading of a hillside area will be required to develop a site for the ISFSI. Construction activities for the ISFSI pad, CTF, and associated facilities will consist of excavation of the site and stabilization of the slopes, pouring and anchoring of concrete slabs and installation of cask anchorage systems, installation of buried structures, installation of mechanical equipment, demolition and relocation of existing paved areas and roads, fences and utilities, grounding, construction of miscellaneous facilities, and control of dust and runoff. The affected areas were previously disturbed during the original construction of DCPP. Approximately 120,000 cubic yards of material will need to be disposed of as a result of excavations for the ISFSI pad, CTF, and road relocation. Three candidate disposal sites, as shown in Figure 2.1-2, have been selected because they were disturbed during previous plant construction activities. The potential amount of native and introduced vegetation that may be disturbed during ISFSI construction is shown in Table 4.1-3.

Fill placed in the disposal sites will be graded to acceptable slopes to minimize potential erosion problems. A revegetation program, which includes temporary seeding and mulching, will be developed and implemented. Until the vegetation is established, maintenance will be performed to correct any localized areas of excessive erosion. The drainage from the disposal sites during and after construction will be designed to follow natural drainage patterns. Construction activities will occur at the ISFSI site, with support activity such as shipment of various construction materials to the ISFSI location via public roadways and the Diablo Canyon access road. It is expected that heavy construction equipment will be transported to the ISFSI site initially and will remain there until completion of construction work, so that there will be minimal movement of such equipment to and from the ISFSI or on offsite roadways. Materials transported during construction will primarily involve truck shipments from offsite locations of bulk quantities of gravel, asphalt, concrete, and reinforcing and structural steel for the concrete pads and CTF. Estimated construction material requirements are provided in Table 4.3-1. Material requirements are a very small fraction of available supplies in San Luis Obispo County. The majority of vehicle traffic that will occur during construction will involve construction personnel commute traffic and trucks transporting concrete or raw materials for the onsite concrete batch plant, if used. Construction material traffic will comply with applicable county regulatory timeframe traffic restrictions in the Avila Beach area.

ISFSI construction is planned in two phases. Phase 1 construction will consist of (a) clearing and grading of the ISFSI pad area and relocation of miscellaneous facilities, such as Reservoir Road around the raw water reservoir, ISFSI access road, fencing, and utilities, (b) installation of two of the seven ISFSI pad segments and construction of the CTF, and (c) installation of equipment in the fuel handling building/auxiliary building (FHB/AB) for initial cask loading and handling activities and modifications to the FHB/AB crane. Phase 2 construction will involve installation of the remaining pad segments as required to meet DCPP fuel offload operational needs.

During the initial Phase 1 construction, an estimated average of 20 to 25 construction workers will be needed. Construction manpower for Phase 2 is expected be to less than for Phase 1. The construction work force during the initial and subsequent construction activities is expected to be primarily drawn from the existing population of San Luis Obispo and surrounding communities, including onsite DCPP support personnel. Construction activities will be reinitiated as needed to build additional pad segments for storage space to support DCPP operational needs.

Since the ISFSI will be located within the owner-controlled area and construction activities are limited to the immediate vicinity of the ISFSI site and nearby disposal areas, there is no need for any offsite construction facility and there will be no alterations to public property surrounding the ISFSI. Transportation of materials, equipment, and personnel to support construction activities will be via existing roadways; no modifications to existing public routes will be required. No rezoning of public lands will be needed to allow construction of the

ISFSI. There will be no effect on the geography of San Luis Obispo County from the construction of the ISFSI.

Constructing the ISFSI will alter the landscape in its immediate vicinity and at selected disposal sites. The affected land area is a small fraction of the total land space within the region of the DCPP site (that is, less than 1 percent) and is not expected to impact use of land areas elsewhere within the owner-controlled boundary.

Similarly, construction of the ISFSI is not expected to have any significant effect on the local demography. As discussed above, the required construction force will largely be drawn from the local work force in San Luis Obispo and surrounding communities, and will be small compared with the overall population in the area. It is expected that the construction workers will be residents of the surrounding communities, and will commute daily to the ISFSI site for the duration of the project. Construction of the ISFSI should therefore not induce any immigration of families with school-age children, and should have minimal impact on housing availability, levels of local government service, infrastructure, and other demographic variables in the area. The increase in employment will contribute to the local economy to a slight extent.

The impact of construction of the Diablo Canyon ISFSI and associated facilities on geography, land use, and demography is considered to be small.

4.1.2 EFFECTS ON ECOLOGICAL RESOURCES

All of the construction activities will occur in areas that were previously disturbed during the original construction of DCPP. The majority of the area involved in the ISFSI site layout consists of existing developed surfaces and structures (for example, asphalt roads, graveled areas, electric transmission facilities, water treatment facilities, and storage facilities). Disturbance of naturally occurring vegetated surfaces at the ISFSI pad location will be limited to an area located on the south side of the facility, near the toe of a slope above the site access road. Excavation of material from this previously disturbed area will impact both native and introduced plant species dominated by several species of annual grasses and the perennial shrubs, knap weed, and coyote bush. Of the three designated disposal sites, only Disposal Site 3 will involve impacts to areas of significant natural vegetation, where existing coastal scrub vegetation on the slopes surrounding the present parking area will be affected. Materials disposed of at Site 3 will be placed in an engineered fill and subject to BMP construction practices for the control of storm water runoff, erosion control, and revegetation, as appropriate. This disposal site would only be used if further evaluation determined that the transfer route road near Patton Cove is unstable and in need of relocation (SAR Section 2.6). The potential amount of vegetation disturbed during ISFSI construction is shown in Table 4.1-3.

These disposal areas provide some habitat value for common wildlife species including black-tailed deer, several species of small mammals, and certain landbird species that favor open shrub-grass habitats and coastal shrub habitats with moderately dense canopy closure. Wildlife habitat values are generally low, however, because of past construction disturbance, ongoing maintenance of the existing transmission line rights-of-way and towers, and routine vegetation management activities. Noise disturbance and increased human activity during the construction period will temporarily further reduce the value of this area for these common wildlife species. No jurisdictional wetlands have been identified within the immediate area of the ISFSI project, and no impacts to wetlands will occur from the proposed project.

Surveys performed for the project identified no state or federally listed threatened, endangered, or sensitive plant species; unique botanical resources; or threatened or endangered terrestrial wildlife species in areas subject to potential impact from the project. Therefore, no impact to these resources will occur.

The ISFSI Site Vicinity is not known to support populations of any state or federally listed threatened or endangered marine algae or invertebrate species.

Among those marine mammals that frequent near-shore areas within the ISFSI Site Vicinity, the southern sea otter is listed as threatened under the Federal Endangered Species Act, and the northern elephant seal, California sea lion, and Pacific harbor seal are protected under the Federal Marine Mammal Protection Act. One marine reptile, the green sea turtle, which is known to occasionally frequent near-shore areas within the ISFSI Site Vicinity, is listed as threatened under the Federal Endangered Species Act. Since the proposed project does not involve any activities that will result in discharges to the marine environment or that might reasonably be expected to result in direct or indirect effects on marine resources, no significant impacts to these species will occur.

Two species of fish, the south/central California coast steelhead and the tidewater goby potentially occur in fresh water habitats in the ISFSI Site Vicinity. The steelhead is currently listed as threatened under the Federal Endangered Species Act. Populations of the tidewater goby north of Orange County were proposed for delisting in June 1999, but currently remain listed as endangered under the Federal Endangered Species Act. Neither species has been positively documented in surveys conducted within the ISFSI Site Vicinity at Diablo Creek or Coon Creek, but some suitable habitat is present. Use of appropriate construction period BMPs should ensure that there will be no ISFSI-related discharges to these fresh water environments. Therefore, no significant impacts to these species will occur. Some specific mitigation measures (BMPs) to protect water quality and the aquatic environment are discussed in Table 4.1-2. A site-specific erosion control and revegetation plan addressing the site layout and disposal areas will be developed.

The ISFSI facility development may represent a small irreversible commitment of biological resources. The amount of these resources, as shown in Table 4.1-3, includes no locally or regionally significant species or habitats.

Based on these considerations, the environmental impact on ecological resources from construction activities for the Diablo Canyon ISFSI and associated facilities is considered to be small.

4.1.3 EFFECTS ON AIR QUALITY

Air quality-related impacts associated with construction of the Diablo Canyon ISFSI and associated facilities will be comprised mainly of gaseous pollutant emissions from diesel-powered construction equipment and fugitive dust emissions from excavation activities and construction equipment traveling on paved and unpaved roads. There will also be pollutant emissions from private vehicles driven by the construction workers. These types of impacts will have only very localized impacts.

The San Luis Obispo County Air Pollution Control District (APCD) has permit authority under the California Clean Air Act over direct emissions sources in the Diablo Canyon ISFSI area. The permit authority enables the APCD to determine if emissions from the project exceed the California thresholds for significant air quality impacts from land use projects, and if mitigations are required by Section 23.06.082a.1 of the Coastal Zone Land Use Ordinance (CZLUO). Since the Diablo Canyon ISFSI emissions sources will be construction equipment brought onsite temporarily, the APCD may require a permit for these sources of emissions. If the APCD determines that the proposed construction activities require permitting, PG&E will submit an "Application for Authority to Construct," which serves as a permit application. PG&E may elect to contractually require vendors supplying, or contractors operating, the equipment to obtain any necessary permits from the APCD.

The generation of fugitive dust during construction will be minimal. Construction traffic will use existing paved roadways. The construction area surrounding the site is currently paved or graveled. The primary source of dust will be from wind transport of dust from excavation, fill operations, and the temporary concrete batch plant, if used. Dust control techniques may include watering and/or chemical stabilization of potential dust sources and will comply with State and local APCD regulations. Other techniques that may be used to control fugitive dust emissions include covering materials being hauled from the site by truck and by routine washing of trucks. Gaseous emissions from construction equipment will be mitigated typically by requiring regular maintenance of equipment.

In summary, the impact of construction activities on air quality at the Diablo Canyon ISFSI and associated facilities is considered to be small.

4.1.4 EFFECTS ON HYDROLOGICAL RESOURCES

There is no natural surface water in the immediate vicinity of the ISFSI location. The nearest stream is Diablo Creek, which is located approximately 1,000 ft north of the ISFSI site at its nearest approach. The ISFSI area is located on the northern slope of a hillside in Diablo Canyon. The ISFSI is located near a high point on the access road along which storm runoff can flow west to the ocean or east, and then west, toward Diablo Creek. A small amount of runoff from the hill is expected to drain through the ISFSI site area. Drainage through the ISFSI site area will be channeled into an existing drainage ditch along side the existing access road. Drainage from the area surrounding the CTF will follow existing drainage paths and flow into Diablo Creek. Any flow of surface water from the ISFSI to Diablo Creek would consequently be limited, except during periods of heavy precipitation when some runoff through the ISFSI area may overflow the local terrain and drain toward Diablo Creek. Drainage flowpaths from the ISFSI and CTF areas are shown in Figure 2.5-3.

The potential environmental impacts on Diablo Creek of loose soil and rock due to earthwork and the occasional discharge of minor quantities of process waste from construction equipment and machinery will be mitigated by the use of the BMP practices listed in Table 4.1-2. Because of runoff and drainage patterns in the area and the distance between the ISFSI site and the ocean, the flow of runoff carrying construction pollutants will not directly enter coastal ocean waters.

The ISFSI is located at elevation 310 ft above mean sea level (MSL). Groundwater level in this area is well below the ISFSI facility, near the level of Diablo Creek. There are no open wells in the vicinity of the ISFSI.

The water sources and usage requirements for the Diablo Canyon ISFSI and associated facilities construction activities are listed in Table 4.1-1. This water will be supplied primarily from the raw water reservoir and potable water system and tanks that are located adjacent to the ISFSI. Table 4.1-1 shows that construction water requirements are very small and that construction activities will not significantly impact these water sources.

In summary, the impact on hydrological resources of construction activities for the Diablo Canyon ISFSI and associated facilities is considered to be small.

4.1.5 EFFECTS ON MINERAL RESOURCES

There are no known mineral resources at the ISFSI or DCPP sites, and no further mineral exploration in the vicinity of Diablo Canyon is ongoing or planned. The land removed from any potential future exploration for the duration of the ISFSI license is minimal compared with the overall owner-controlled land area. The presence of the ISFSI will not preclude mineral exploration of the majority of the owner-controlled land area outside the ISFSI location.

Therefore, any potential impact from any unforeseen future use of mineral resources in the vicinity of the ISFSI is negligible, if any.

Consumption of construction materials is expected to be minor compared with available resources. The required quantities are well within the capabilities of local vendors and are not expected to create a significant impact on the overall availability of such resource materials for any other use in the surrounding communities.

In summary, the impact of constructing the Diablo Canyon ISFSI and associated facilities on mineral resources is considered to be small.

4.1.6 EFFECTS ON SOCIOECONOMICS

Personnel needed to construct the Diablo Canyon ISFSI and associated facilities is expected to average 20 to 25 during the period of peak construction demand. The period involving the most extensive construction activity is expected to occur during the Phase 1 construction of the facility. This period of extensive construction activity is expected to continue for several months, but no more than 1 year. Construction activity to build additional ISFSI pads during Phase 2 will occur intermittently as needed to expand the ISFSI storage capacity. This later work is expected to involve lower construction activity and staffing levels since there will be lesser amounts of construction involved.

Personnel in various construction disciplines will be needed for construction of the facility. Such personnel will be drawn from the existing work force in the communities around the ISFSI site and from elsewhere in PG&E, as appropriate. Additional temporary construction personnel may be acquired from other locations if needed to provide a sufficient temporary work force. Use of such additional personnel is expected to be minimal since resources from PG&E and San Luis Obispo County are expected to be sufficient to meet the demands of ISFSI construction. To the extent possible, existing expertise from DCPP staff will be used to augment the construction personnel needed for ISFSI construction.

Construction personnel are expected to reside primarily in the San Luis Obispo County area and commute daily to the ISFSI site during the period of facility construction. Since the maximum number of staff needed for ISFSI construction in any phase is expected to be small relative to the overall work force in the community, and since the demand on the work force will be of a relatively short duration, there will likely be minimal impact on the local population and social activities in the county. Should it be necessary to acquire personnel from outside San Luis Obispo County, this additional work force will produce a slight demand on local resources, such as housing and utilities. Any such demand is expected to be negligible due to the small number of personnel involved and the short duration of the construction effort.

Construction of the ISFSI will create a short-term demand for local construction resources and personnel, and will produce a temporary benefit to the local economy by providing additional opportunities in the job market. While the long-term effect of such a benefit to the local community may not be significant, it is expected to offset any burden placed on the local infrastructure by the temporary work force. The demand on local resources is not expected to be a significant burden to the existing economy, educational facilities, social services, medical institutions, government agencies, or public utilities. The existing socioeconomic system of San Luis Obispo County is expected to be adequate to manage any minor and short-term demands related to ISFSI construction.

In summary, the impact of construction of the Diablo Canyon ISFSI and associated facilities on socioeconomics is considered to be small.

4.1.7 EFFECTS OF NOISE AND TRAFFIC

This section addresses the predicted effects of noise on local residences and other sensitive receptors during construction of the ISFSI and associated facilities. Changes in traffic as a result of construction of the ISFSI and associated facilities are also evaluated.

Construction activities associated with the Diablo Canyon ISFSI and associated facilities will generate noise at the construction site and along county roads to the DCPP site. Noise reduced during construction can potentially impact three groups: (a) construction workers, (b) the surrounding communities, and (c) surrounding fauna.

The specific number of vehicles or staff personnel needed to support ISFSI construction has not been determined. However, traffic to and from the plant by staff supporting ISFSI construction will be via existing paved roads and highways using primarily private automobiles. This traffic is expected to be small in comparison with the routine traffic that occurs currently in support of reactor operation of DCPP Units 1 and 2.

The impact of Diablo Canyon ISFSI and associated facilities construction noise is considered to be small as discussed below.

4.1.7.1 Significance Criteria

Local agencies typically do not set noise level limits for construction activities occurring during allowed hours (usually between 7:00 a.m. and 6:00 p.m.). They emphasize that construction operations should use available noise suppression devices and techniques to minimize disturbance to nearby businesses and residences.

In general, because of the temporary nature of noise generated from construction activities, significance criteria for construction-related noise have not been established. This does not mean that construction noise may not be disruptive, however. The following are extracted from construction noise specifications often used for civil projects.

4.1.7.1.1 Continuous Noise

In residential areas, construction noise from stationary noise sources that generates repetitive or long-term noise lasting more than 3 hours would be significant if the equivalent noise level, L_{eq}, measured over any 30-minute period, exceeds 65 dBA at a distance of 200 ft or at the nearest sensitive receptor. In commercial areas, such sources should not exceed 70 dBA at a distance of 200 ft or at the nearest sensitive receptor (Reference 4).

4.1.7.1.2 Vibrations

Most local agencies have not established specific criteria for the evaluation of vibration impacts. Table 4.1-4 recommends vibration criteria for different vibration-sensitive uses. The human annoyance criteria are primarily intended for construction projects that continue several days in one location. Table 4.1-4 indicates the levels at which a significant vibration impact will occur for humans and buildings.

4.1.7.2 Noise Levels During Construction

Typical noise levels at 50 ft for construction equipment are listed in Table 4.1-5.

Two types of noise are associated with construction activities: intermittent and continuous. The maximum intermittent construction noise levels would range from 80 to 88 dBA at 50 ft for supporting structure assembly operations and 84 to 90 dBA during tamping operations.

The continuous noise levels from construction activities at 50 ft would range from approximately 69 to 90 dBA. At 100 ft, the continuous noise levels would be 63 to 84 dBA. At 200 ft, the noise levels would be 57 to 78 dBA. A generally used rule-of-thumb is that noise levels drop 6 dBA per each doubling of distance.

Complying with all applicable OSHA noise regulations will ensure that the impact on construction workers is similar to many other construction projects that routinely take place in San Luis Obispo County and is considered to be small.

The closest residence is 1.5 miles from the Diablo Canyon ISFSI and associated facilities construction site. Construction noise will not be audible at this location. Noise levels will increase during the period of construction from the existing sound level of 62 dBA to approximately 65 dBA at a distance of 50 ft. These noise levels are minor and less than that currently experienced during refueling outages at DCPP.

4.1.8 EFFECTS ON REGIONAL HISTORICAL, CULTURAL, SCENIC, AND NATURAL RESOURCES

As discussed above in Section 4.1.1 of this ER, the areas that will be disturbed during construction of the Diablo Canyon ISFSI and associated facilities have been previously disturbed during the original construction of DCPP. The industrial facility impact on cultural resources was evaluated during operating license reviews for DCPP. As mitigation to address DCPP construction and operation impacts on cultural resources, an archaeological resources management plan to protect cultural resources was developed and implemented in the early 1980's.

In the greater region of San Luis Obispo County and other nearby areas, there are many cultural, natural, and scenic resources as well as historical landmarks. These sites include, for example, several beach and resort areas along the central California coast; public parks such as Montana de Oro State Park to the northwest of the ISFSI site; San Luis Bay, immediately adjacent to the entrance to the owner-controlled area; and the Hearst Castle in San Simeon north of the ISFSI site. However, construction of the ISFSI facility is not expected to have an effect on any of these resources because of the localized nature of ISFSI construction, which is limited to the immediate Diablo Canyon area and the relatively short duration. No significant effluents or gaseous releases will occur due to ISFSI construction activities and construction vehicle traffic will not be of an extent that is capable of affecting the nature or quality of, or otherwise adversely impact, any of these regional resources.

There are no archaeological resources eligible for or in the National Register of Historic Places (NRHP) within those areas to be impacted by the proposed ISFSI. Local Chumash Indians, however, have expressed concern about this general area, which is of spiritual importance to them. They have also expressed general concern for anything occurring at Diablo Canyon to more specific concerns on potential harm to the environment from the construction of the proposed facility. Additional consultation with the Chumash will be conducted regarding the proposed ISFSI.

4.1.9 RADIATION DOSES TO CONSTRUCTION WORKERS

As discussed in ER Section 3.2, the Diablo Canyon ISFSI will be constructed in two phases to meet the anticipated long-term schedule for offloading DCPP spent fuel. This approach will allow PG&E to begin ISFSI operations in a timely manner and to more uniformly spread construction activities and costs over time.

Construction work in Phase 2 will be planned so as to ensure that dose rates are maintained as low as is reasonably achievable (ALARA). The estimated collective dose to construction workers during construction of the last storage pad (pad seven of seven) was calculated to be

43.5 rem/yr (2.9 rem/worker) with the first six pads completely filled with loaded storage casks (SAR Section 7.4 and Table 7.4-3). Assumptions included:

- 15 constructions workers involved
- Dose field of 6.0 mrem/hr
- Construction takes 3 months at 40 hr/week
- No temporary shielding measures used during construction

The calculated exposure for construction of the seventh pad does not consider ALARA practices that are required at DCPP. The exposure will be managed ALARA by the use of measures such as temporary shielding and construction before the previous pad is completely filled.

Therefore, the overall radiological impact on construction workers in Phase 2 will be small.

4.1.10 REFERENCES

1. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, May 1996.

2. Environmental Report, Units 1 and 2, Diablo Canyon Site, PG&E, July 1971, and supplements No. 1, November 1971, No. 2, July 1972, and No. 3, August 1972.

3. Final Environmental Statement Related to the Nuclear Generating Station, Diablo Canyon Units 1 and 2, USAEC, May 1973.

4. J. T. Nelson, et al., Handbook of Urban Rail Noise and Vibration Control, US Department of Transportation, 1982.

4.2 EFFECTS OF FACILITY OPERATION

4.2.1 EFFECTS ON GEOGRAPHY, LAND USE, AND DEMOGRAPHY

Once the ISFSI becomes operational, a portion of the spent fuel from the spent fuel storage pools of DCPP Units 1 and 2 will be removed and placed into the storage casks. Thereafter, spent fuel generated from operation of each unit will be periodically discharged for storage.

Additional storage casks will be obtained, as needed, to accommodate the spent fuel being discharged from plant operation. It is expected that the spent fuel pools in each unit will not be allowed to fill until the end of its operating life. The casks will remain at the ISFSI to store spent fuel from the pools until the spent fuel can be shipped offsite.

The ISFSI will be located within the existing owner-controlled area, 0.22 miles northeast of the Unit 1 containment. The fenced owner-controlled area will not be altered by the operation of the ISFSI, except for restrictions on the acreage and access used for the ISFSI. Only occasional use of public roadways will be required for delivery of storage casks. These uses will not impact the local geography.

Since the ISFSI will be located in an area with existing public access restrictions, and ISFSI operations are confined to the owner-controlled area, there will be no effect on public land use in the vicinity due to ISFSI operations. In addition, since ISFSI operational activities are insignificant compared with the power operation of Units 1 and 2, any additional demand on local human resources due to concurrent operation of the ISFSI with DCPP Units 1 and 2 is expected to be minimal. Consequently, there will be no adverse impact on the demography in the area around the ISFSI.

Should Unit 1 or Unit 2 operations be terminated before spent fuel in the casks can be shipped offsite, the continued storage of spent fuel in the casks at the Diablo Canyon ISFSI will require that restrictions on land use at the ISFSI remain in effect. However, these continued restrictions for the ISFSI are not expected to have any impact on future public land use in the vicinity of the site since ISFSI operation will remain within the owner-controlled area. In accordance with an agreement in principle reached in 2000 with the Central Coast Regional Water Quality Control Board, land north of DCPP, consisting of 2,013 acres of watersheds draining to approximately 5.7 miles of coastline, will be preserved forever by a conservation easement for ecological purposes. The primary goal is protection of marine resources from Fields Cove to Coon Creek through watershed and habitat protection of all lands draining to that coastline. In addition, PG&E will protect 547 acres draining to Coon Creek through BMPs for as long as PG&E operates the plant or holds the property, whichever is longer. Limitations on land use will remain in effect even in the absence of an ISFSI, in that continued pool storage of spent fuel at the reactors would then be necessary.

Similarly, any potential impact on the local demography will be minimal should continued ISFSI operation be necessary following shutdown of DCPP Unit 1 or Unit 2. Shutdown of the DCPP units would eventually result in the release of most of the plant work force. The potential negative impact of such a release on local human resources can be offset to some small extent with the work force that will be needed to continue operation of the ISFSI.

In summary, the impact of operating the Diablo Canyon ISFSI and associated facilities on geography, land use, and demography is considered to be small.

4.2.2 EFFECTS ON ECOLOGICAL RESOURCES

During ISFSI operation, spent fuel from the Unit 1 and Unit 2 pools will be periodically placed into a transfer cask and transported to the ISFSI. The loaded casks will remain at the ISFSI until the spent fuel can be shipped offsite. ISFSI operation will primarily consist of receipt of empty cask components, fuel placement into the casks, and movement of loaded casks from the FHB/AB of each unit to the ISFSI via the CTF, where the casks will remain in a static condition until the spent fuel can be shipped offsite. These operational activities thus will be minimal and limited to the ISFSI and the DCPP FHB/AB.

Human activity and vehicular traffic is expected to increase somewhat above current levels; however, the effect on local wildlife is anticipated to be small. The ISFSI structure, including casks, perimeter fencing, and rock cut faces will restrict current patterns of grazing by deer and livestock, burrowing by certain species of small mammals, and potential nesting by certain species of ground nesting birds within a very small area (roughly 4 acres in size). The ISFSI structure will also create additional opportunities for perching by various species of common passerine land birds that may be attracted to the site for this purpose. In colder weather, heat emitted from the casks could increase the ambient air temperature slightly in the immediate vicinity of the casks. It is expected that this effect would attenuate in a very short distance (for example, a few meters) away from the casks. The extent to which increased ambient temperatures might affect animal behavior in and around the ISFSI structure is unknown; however, since the facility is located largely within an area of significant previous development (that is, structures, paved surfaces, roads, artificial lighting, etc.) overall habitat values for wildlife are low, favoring few species and those commonly associated with areas of high human activity. ISFSI operation effects on animal behavior are expected to be highly localized and small.

As discussed in Section 4.1.2, there are no state or federally listed threatened or endangered plant or wildlife species present in the immediate area of the proposed ISFSI site, and therefore, no direct operational impacts to such species will occur.

Runoff from precipitation at the ISFSI site will follow existing drainage patterns. The existing drainage is either into the Diablo Canyon drainage system or sheeting flow into Diablo Creek. Under normal conditions, radioactive materials associated with the spent fuel are contained within the sealed containers inside the storage overpacks and are not exposed to precipitation.

Therefore, any surface runoff from the ISFSI is uncontaminated and will not adversely affect vegetation or wildlife. Minor alteration in drainage patterns may occur in the immediate area of the ISFSI as a result of the structure of the facility and associated access roads. However, there are no discharge pollutants as defined under the National Pollutant Discharge Elimination System (NPDES), and no adverse impact to local vegetation from discharge is expected. The proposed project will have no significant effect on aquatic habitats associated with Diablo Creek and potential offsite impact is small.

During Diablo Canyon ISFSI operations, measurable radiation will be present in and around the immediate cask storage area. The NRC previously evaluated the radiation effects on wildlife for Private Fuel Storage (Reference 1), and concluded that the impacts to wildlife exposed to radiation from the top surface of the casks were small. Additionally, Reference 1 concluded that the radiation effects to animals that may be using the light poles in the vicinity of the cask storage facility were also small. The conclusions reached in the previous study are applicable because they were based on similar casks and fuel types, and considered substantially greater numbers of casks than will be stored at the Diablo Canyon ISFSI.

In summary, the impact of operating the Diablo Canyon ISFSI and associated facilities on ecological resources is considered to be small.

4.2.3 EFFECTS ON AIR QUALITY

There are no air pollution sources directly associated with the operation of the ISFSI since the storage system is comprised of dry storage casks cooled by natural convection. There are no gaseous effluents from the ISFSI since the storage casks are a passive system with no motorized components and no direct ventilation of the fuel. The power needed to support operational activities relating to the ISFSI, such as those for security, is provided by power sources that are used to maintain or operate the other facilities at DCPP.

During the operating life of Unit 1 and Unit 2, power necessary to support normal ISFSI operation is provided by the reactors, which have no gaseous pollutants. Once the plant is shutdown, power will be furnished from offsite sources in the PG&E transmission system. The power requirement for ISFSI support is negligible compared with other activities at the Diablo Canyon site associated with reactor operation, and is minimal compared with that needed for continued pool storage of spent fuel. Therefore, any air pollution due to electricity generation used to support fuel storage in dry casks at the ISFSI is not expected to have significant adverse impacts on air quality.

The ISFSI operation is not expected to have any measurable impact on the local ambient atmosphere or meteorology. The heat dissipated from the storage casks will have a negligible effect on the temperature of the air in the immediate vicinity of the casks and will have no discernible offsite environmental impact.

Vehicle emissions from traffic associated with staff supporting the ISFSI operation will occur for the duration until the facility is decommissioned. However, the emission levels will be substantially less after decommissioning than existing levels due to reactor operation, and are not expected to be any greater than those that might occur to support continued fuel storage in the spent fuel pools. (Additional discussion on personnel traffic levels during ISFSI operation is provided below in Section 4.2.7.)

While some emissions from trucking and crane activities related to the ISFSI during reactor operation, such as cask delivery and fuel transport, will slightly increase the level of air pollutants in the immediate vicinity of the ISFSI and the reactor buildings, this increase is expected to be minor and occasional. Any potential accumulation of air pollutants in the area due to cask handling or movement will have negligible adverse effect since such emissions are minimal and are expected to quickly dissipate, given typical atmospheric conditions in the area. No significant trucking or crane activities will occur after termination of reactor operation and offloading of the spent fuel pools, so that no further air emissions will occur due to such activities.

In summary, the impact of the Diablo Canyon ISFSI and associated facilities operation on air quality is considered to be small.

4.2.4 EFFECTS ON HYDROLOGICAL RESOURCES

There is no direct impact on surface or ground water from operation of the ISFSI since dry casks are used to store the spent fuel. The storage casks are cooled by natural convection of air. No cooling water is necessary. No water is consumed from, or discharged into, the Pacific Ocean, Diablo Creek, or to the adjacent area as a direct result of the ISFSI operation other than normal stormwater discharges.

Surface runoff from the ISFSI has no radioactive contamination and will not contaminate the surrounding ecosystem. Minor alteration in drainage patterns may occur in the immediate area of the ISFSI. However, such changes in drainage patterns or any accumulation of standing water that may be caused by the structure of the facility are not expected to be significant and will not adversely impact existing hydrological resources or the adjacent areas.

Potable water that is needed to support ISFSI operation will be provided from existing water supplies at Diablo Canyon. Potable water used to support ISFSI operation is not expected to be significant and will be minimal compared with the usage of demineralized water to support continued pool storage of spent fuel. The requirement for potable water will gradually decrease as the number of operating personnel is reduced. Therefore, there will be no adverse impact on hydrological resources from consumption of potable water at the ISFSI.

During transfer of spent fuel from the pools for placement into transfer casks, surfaces of transfer casks, removable supports, and other fuel moving equipment will need to be decontaminated. Water used in decontamination operations will be discharged into the plant radwaste drainage system. Therefore, some occasional increases in water usage during fuel movement are expected. However, any such increase is expected to be temporary and minimal. The potential impact from such increased water use is expected to be negligible compared with the long term requirements associated with continued use of the spent fuel pools. Requirements for water will eventually decrease when pool operations are terminated.

In summary, the impact of operating the Diablo Canyon ISFSI and associated facilities on hydrological resources is considered to be small.

4.2.5 EFFECTS ON MINERAL RESOURCES

There are no known mineral resources at the ISFSI site or in the Diablo Canyon owner-controlled area in general, and no further mineral exploration in the vicinity of this area is ongoing or planned. Therefore, impact on any mineral resources is considered to be small.

4.2.6 EFFECTS ON SOCIOECONOMICS

About 11 staff positions are expected to be required to support ISFSI operation, which is much less than the existing staff needed to support reactor operation at DCPP. It is possible that there will be a slight temporary increase in the overall number of operating staff at DCPP to support concurrent ISFSI operation in addition to operating Units 1 and 2. However, PG&E plans to assign ISFSI work to existing personnel at DCPP, so that any need for increases in staff will be minimized. Should ISFSI operation continue beyond the operating duration of Units 1 and 2, the level of staff at DCPP will be greatly reduced to only that which is needed to support the ISFSI. In the long term, it is expected that there will be a net decrease in the number of operating support staff for spent fuel storage with the ISFSI in comparison with continued pool storage at DCPP, since the scope of activities associated with the ISFSI is less extensive.

The employees needed to support ISFSI operation will be drawn from the existing work force at DCPP and, if necessary, from elsewhere in PG&E or other labor pools available in the area. These employees are expected to reside primarily in the San Luis Obispo County area and commute daily to the ISFSI facility. Some of the ISFSI personnel may be shared staff that also provide support for Units 1 and 2 during their operating life, or for other site activities following termination of their operation. Since the number of staff needed to support ISFSI operation is expected to be small in any event, there will likely be virtually no disturbance to the local population and related social activities in the area. In contrast, it is expected that permanent shutdown of either unit will create a more significant impact to the local population and socioeconomics.

Similarly, operation of the ISFSI and its demand on labor resources are not expected to create any significant burden to the local economy, educational facilities, social services, medical institutions, government agencies, or public utilities. The minimal staff supporting the ISFSI is expected to be or become an integral part of the existing socioeconomic system of San Luis

Obispo County. This system is expected to be adequate to manage any demands that may result from the minor changes in the local work force that may occur on occasion during ISFSI operation.

PG&E owns the DCPP and ISFSI sites and makes applicable property tax payments to San Luis Obispo County. These tax payments are expected to continue for the duration of ISFSI operation along with the continued operation of Units 1 and 2. The current tax revenues represent a substantial contribution to the local economy and are expected to continue to benefit the local population by helping to fund the local government and support necessary improvements to the infrastructure.

In summary, the impact of operating the Diablo Canyon ISFSI and associated facilities on socioeconomics is considered to be small.

4.2.7 EFFECTS OF NOISE AND TRAFFIC

This section addresses the predicted effects of noise on local residences and other sensitive receptors during operation of the ISFSI. Changes in traffic as a result of operations of the ISFSI are also evaluated. Noise significance criteria are discussed in ER Section 4.1.7.

Once the spent fuel has been placed into the storage casks, they will remain at the ISFSI until fuel can be shipped offsite. The storage of fuel using dry casks at the ISFSI is a passive process and does not involve any noise generation. The cooling for the storage casks is by natural air convection and does not use fans or other types of active cooling equipment. Little or no perceivable noise will result for the operation of the ISFSI facility after installation of the casks. During the periodic installation of new casks for spent fuel storage, operation of forklifts, tractors, and heavy trucks are anticipated. Noise generated by that equipment would range from 76 to 94 dBA (Table 4.1-5). No discernable increase in noise is predicted at sensitive receptors. The facility operation will be consistent with the County of San Luis Obispo General Plan Noise Element because the noise level will not exceed the noise threshold at any property line.

There will be slight levels of noise due to commute traffic of staff personnel traveling to and from the ISFSI site. However, these levels of noise are expected to be minor and will not cause any adverse impact to the surroundings.

The specific number of vehicles or staff personnel needed to support ISFSI operation has not been determined, and may be minimized by sharing staff from reactor operation. However, traffic to and from the plant by staff supporting ISFSI operation will be via existing paved roads and highways using primarily private automobiles. This traffic is expected to be small in comparison with the routine traffic that occurs currently in support of reactor operation of DCPP Units 1 and 2.

Should the same staff be used to concurrently support reactor operation and ISFSI operation, any slight deviations in schedule or routing necessary to support the ISFSI will not have a significant effect on the existing traffic and noise conditions that currently exist. Any additional traffic or noise impacts due to possible temporary minor increases in staffing for ISFSI operation are also expected to be minimal. Again, should ISFSI operation continue after permanent shutdown of Units 1 and 2, overall traffic and noise levels are expected to greatly decrease and are expected to be no greater than that due to continued pool storage of spent fuel, since there will be a decrease in support activities and resource demands associated with cask storage compared with pool storage.

Thus, the primary sources of increased noise and traffic associated with ISFSI operation will occur during the brief periods of cask delivery and placement, and fuel movement and transfer from the spent fuel pools. The nature of the traffic will be primarily truck activity needed to transfer casks and fuel, and the noise will be generated by the trucks as well as cranes and other equipment used during fuel transfer. These activities can generate noticeable levels of noise and traffic, particularly in the immediate areas of the ISFSI. However, they are much less significant than those during construction of the facility, and are similar to those due to routine activities supporting reactor operation at the site. Further, any such increase in noise and traffic levels will occur only temporarily, on the order of days, and will not be continuous. Therefore, any impact of noise and traffic from these short phases of ISFSI operation is considered to be small.

4.2.8 EFFECTS ON REGIONAL HISTORICAL, CULTURAL, SCENIC, AND NATURAL RESOURCES

In the greater region of San Luis Obispo County and other nearby areas, there are many cultural, natural, and scenic resources as well as historical landmarks. These sites include, for example, several beach and resort areas along the central California coast; public parks such as Montana de Oro State Park to the northwest of the ISFSI site; San Luis Bay, immediately adjacent to the entrance to the owner-controlled area; and the Hearst Castle in San Simeon north of the ISFSI site. However, operation of the ISFSI is not expected to have an effect on any of these resources because of the localized nature of ISFSI operation, which is limited to the immediate Diablo Canyon area. No operational effluents or gaseous releases will be generated by the ISFSI, and normal support activities during ISFSI operation, such as truck traffic and fuel movement, will not be of an extent that is capable of affecting the nature or quality of, or otherwise adversely impact, any of these regional resources.

Within the owner-controlled area, along the coastal plain in the vicinity of Units 1 and 2, but outside the DCPP restricted area fence and the exclusion area of the ISFSI site, one archaeological site that is listed on the NRHP (CA-SLO-2) is located near the proposed ISFSI. Seven other sites (CA-SLO-61, -584, -1159, -1160, -1161, -1162, and -1163) are located within the area immediately surrounding DCPP. The Diablo Canyon area is considered by the local Chumash to be an area of spiritual importance. Two Chumash individuals have expressed concerns, which range from a general concern for anything occurring at Diablo

Canyon to more specific concerns on potential harm to the environment from the proposed operation of the ISFSI. PG&E has previously agreed with the Chumash tribe to preclude conducting any power plant activity that may cause disturbance to the areas of the archaeological sites. Additional consultation with the Chumash will be conducted regarding the proposed ISFSI.

The ISFSI pad will be located in an area that currently contains several large tanks, metal buildings, a water reservoir, and large storage containers. The height of the casks will allow them to be seen among the local scenery within the hillside areas of Diablo Cove. At the DCPP site, the coastal scenery is dominated by the reactor buildings and support structures. Since the ISFSI site is located inland from the coast on higher elevation between hilltops, the ISFSI structure will not intrude on any scenic outlook along the coastal areas adjacent to the DCPP site. Figures 4.2-1, 4.2-2, and 4.2-3 depict the view of the ISFSI site from Diablo Cove, north of the plant, and north of the ISFSI, respectively. PG&E will remove storage containers and other materials in the vicinity of the ISFSI to improve the aesthetics of the area. The ISFSI is therefore expected to be in conformance with the requirements of the California Coastal Act of 1976.

4.2.9 RADIOLOGICAL EFFECTS

Operation of the Diablo Canyon ISFSI will result in exposing operating personnel and the general public to ionizing radiation. Normal operations will bring workers into areas where they will receive radiation exposures. These include the personnel that inspect and service the casks, the security personnel, and the personnel who handle and move the casks to their storage locations. Radiological health impacts from the Diablo Canyon ISFSI routine operations are discussed in detail in the Diablo Canyon ISFSI SAR Sections 7.4 and 7.5. The radiological impacts are considered to be small. The following is a summary of the information provided in SAR Sections 7.4 and 7.5. Potential effects of radioactive material releases from the Diablo Canyon ISFSI during postulated off-normal and accident conditions are discussed in ER Section 5.1.

4.2.9.1 Estimated Dose to the General Public

The annual offsite dose rate is calculated for both direct radiation (neutrons and gammas) and from radionuclide releases from the MPC. Since the MPC is seal welded, there will not be any release of radionuclides during normal operation. Nonetheless, an analysis of the offsite dose consequences from a nonmechanistic confinement boundary leak from the ISFSI was calculated for normal and off-normal conditions. The direct radiation dose rate from the ISFSI is the same for normal and off-normal conditions.

Since the loading of the MPC into the HI-STORM overpack occurs at the CTF, outside the 10 CFR 50 structure at the FHB/AB, the offsite dose due to loading operations was also calculated.

The controlled area boundary is located 1,400 ft (427 m) from the ISFSI. However, the nearest resident is located 1.5 miles (7,920 ft or 2,414 m) from the ISFSI. Therefore, consistent with ISG-13 (Reference 2), the occupancy time at the controlled area boundary for the direct radiation calculation was assumed to be 2,080 hours based on a 40-hour work week and 52 weeks a year while the occupancy time at the nearest resident was assumed to be 8,760 hours (24 hours a day, 365 days a year). Conservatively, the occupancy time used for the dose calculation at the site boundary from effluent release was assumed to be 8,760 hours. ER Section 5.1.3.2 provides a more detailed description of the dose calculations performed.

4.2.9.1.1 Direct Radiation Dose Rates

ER Table 5.1-1 presents the dose rate at the site boundary and the nearest resident from direct radiation.

4.2.9.1.2 Dose Rates From Effluent Releases

The annual dose equivalents for the whole body, thyroid, and other critical organs to an individual at the Diablo Canyon site boundary as a result of an effluent release were calculated for an ISFSI containing 140 HI-STORM 100SA overpacks loaded with MPC-32s. Diablo Canyon ISFSI ER Table 5.1-1 summarizes the results of these calculations. As can be concluded from ER Table 5.1-1, the estimated doses are within of the limits specified in 10 CFR 72.104(a).

4.2.9.1.3 Offsite Dose Rate From HI-STORM Loading Operations

The transfer of the MPC from the HI-TRAC transfer cask to the HI-STORM overpack will occur outside the FHB/AB at the CTF. As a result, the impact of this operation on the offsite dose rate must be considered. There are only two conditions that need to be considered in this analysis. The first is the condition of the MPC inside the HI-TRAC transfer cask. The second condition is the MPC inside the HI-STORM overpack with the HI-TRAC transfer cask no longer positioned above the HI-STORM overpack and the lid on the overpack not installed. Diablo Canyon ISFSI SAR Table 7.5-3 presents the results of these analyses.

4.2.9.1.4 Total Offsite Collective Dose

Diablo Canyon ISFSI SAR Tables 7.5-4 and 7.5-5 present the annual dose rate at the site boundary and the nearest resident from the combined dose rates from direct radiation and effluent release from ISFSI operations. In these tables it is conservatively assumed that the dose rates from the effluent release and loading operations are the same at the nearest resident and the site boundary. The dose rate from other uranium fuel cycle operations (that is, DCPP) is also shown in this table to demonstrate compliance with 10 CFR 72.104.

4.2.9.2 Estimated Dose to Occupational Personnel

Workers at the Diablo Canyon ISFSI will perform the following occupational tasks that can expose them to ionizing radiation: (a) handling (that is, receiving, transferring, and moving) of the spent nuclear fuel, (b) security, (c) inspection, and (d) maintenance activities.

The results presented in this section are based on the analysis of the HI-STORM 100S overpack and the 125-ton HI-TRAC transfer cask using design basis fuel including burnable poison rod assemblies. It was assumed that the HI-STORM 100S was loaded with an MPC-32 containing fuel with a design basis burnup of 32,500 MWD/MTU and 5-year cooling time. For the HI-TRAC transfer cask, it was assumed that it was loaded with an MPC-24 containing fuel with a design basis burnup of 55,000 MWD/MTU and 12-year cooling time.

Diablo Canyon ISFSI SAR Table 7.4-2 provides the estimated occupational exposures to DCPP personnel during following phases of ISFSI operation:

(1) Loading of fuel into the MPC in the 125-ton HI-TRAC transfer cask.

(2) Decontamination of the 125-ton HI-TRAC transfer cask and MPC lid closure.

(3) Transport of the 125-ton HI-TRAC transfer cask from the FHB/AB to the CTF at the ISFSI storage area.

(4) Transfer of the MPC from the 125-ton HI-TRAC transfer cask to the HI-STORM 100SA overpack.

(5) Closing of the HI-STORM 100SA overpack and placement on the ISFSI pad.

Diablo Canyon ISFSI Table 7.4-2 provides the estimated occupational exposures during the unloading of a HI-STORM 100SA overpack (the reversal of the steps listed above). In Tables 7.4-1 and 7.4-2, the total duration of the operation is shown, as well as the time the personnel will be located in the higher dose rate areas. Therefore, total dose for each operation is a product of the number of personnel, dose at location, and time in dose field.

The results presented in SAR Tables 7.4-1 and 7.4-2 are conservative. By the time the DCPP ISFSI begins operation, other utilities will have loaded numerous HI-STORM overpacks using the HI-TRAC transfer cask and a CTF. Based on the experience to be gained and the lessons to be learned, it is expected that the dose rates from loading a HI-STORM overpack will be significantly less than those listed here (that is, fewer activities and shorter durations).

Diablo Canyon ISFSI SAR Table 7.4-3 provides the estimated annual occupational exposure as a result of daily ISFSI walk-downs, occasional maintenance repairs, and security activities.

Diablo Canyon ISFSI SAR Table 7.4-4 presents the dose rate at the restricted area fence and the makeup water facility (the nearest normally occupied location) and the reactor facility. This table demonstrates that the dose rate at the restricted area fence will be below the 2 mrem/hour limit required by 10 CFR 20 for unrestricted access. This table also demonstrates that the dose rates from the ISFSI storage area in the normally occupied locations are well below the 10 CFR 20 limits for monitored radiation workers and are also below the 10 CFR 20 limit of 500 mrem/year for unmonitored workers.

4.2.9.3 Effects of Radiation on Wildlife

Diablo Canyon ISFSI radiological impacts on wildlife are discussed in Section 4.2.2.

4.2.10 REFERENCES

1. Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of the Goshute Indians and Related Transportation Facility in Tooele County, Utah, NUREG-1714, June 2000.

2. Interim Staff Guidance Document 13, Revision 0, Real Individual, USNRC, June 2000.

4.3 RESOURCES COMMITTED

The construction of the Diablo Canyon ISFSI will not result in any major irreversible commitments of resources. Development of the ISFSI will require raw materials for the ISFSI storage pad, CTF, slope protection, and road modifications. These raw materials will include cement, sand, aggregate, steel, asphalt, and other building materials. Some of the materials, such as structural steel, may be salvaged after the ISFSI is decommissioned. The materials in the concrete, shotcrete, rock anchors, and pavement are considered irretrievably committed. Table 4.3-1 lists the estimated quantities of imported material for construction of the Diablo Canyon ISFSI and related improvements. These materials are a very small fraction of available supplies in the immediate area.

4.3.1 LAND

The Diablo Canyon ISFSI and related improvements will require approximately 8-1/2 acres of the existing DCPP site, 4 acres for the ISFSI and 4-1/2 acres for placement of fill materials. The environmental effects of ISFSI construction on geography and land use are addressed in ER Section 4.1.1.

4.3.2 WATER

There will be no commitments of waterways or bodies of water involved in the construction of the Diablo Canyon ISFSI. Small amounts of onsite water will be used in batching of concrete, dust control, and wash down of concrete transport and pouring equipment. Offsite water supplies will be used predominantly for concrete and shotcrete mixes. The environmental effects of ISFSI construction on hydrological resources are addressed in ER Section 4.1.4.

4.3.3 AIR

No local or site air resources will be committed to the construction of the Diablo Canyon ISFSI. The environmental effects of ISFSI construction on air quality are addressed in ER Section 4.1.3.

4.3.4 ECOLOGICAL RESOURCES

Vegetation loss during construction of the Diablo Canyon ISFSI will be limited to the clearing of a small amount of native and non-native vegetation along the cut-bank of the existing plant access road and at the excavation disposal sites (Table 4.1-3). This impact will be mitigated, to some extent, through BMPs for erosion control and revegetation, but some net loss of vegetation may result. As this previously disturbed area currently provides some wildlife habitat value to certain common terrestrial species, further disturbance may have an incremental but highly localized effect on future habitat suitability. The majority of the area required for the ISFSI storage pad and CTF consists of existing developed areas that are currently covered with gravel or asphalt/concrete. The project will result in no further commitment of ecological resources in these areas. The environmental effects of ISFSI construction on ecological resources are addressed in ER Section 4.1.2.

4.4 DECONTAMINATION AND DECOMMISSIONING

4.4.1 PRELIMINARY DECOMMISSIONING PLAN

Prior to the end of the Diablo Canyon ISFSI life, MPCs loaded with spent fuel will be transferred from storage overpacks into transportation casks and transported offsite. Since the MPCs are designed to meet DOE guidance applicable to MPCs for storage, transport, and disposal of spent fuel, the fuel assemblies will remain sealed in the MPCs such that decontamination of the MPCs is not required. Following shipment of the MPCs offsite, the ISFSI will be decommissioned by identification and removal of any residual radioactive material, and performance of a final radiological survey. Details on decommissioning are provided in the ISFSI License Application, Attachment F, "Preliminary Decommissioning Plan." A brief summary is provided in this section.

4.4.2 FEATURES THAT FACILITATE DECONTAMINATION AND DECOMMISSIONING

The sources of contamination are the spent fuel itself and the spent fuel pool water. In conformance with 10 CFR 72.130, the spread of contamination from these sources can be controlled via various ISFSI design features and health physics measures.

The design features of the HI-STORM 100 dry cask storage system, plus a "start clean/stay clean" philosophy, will facilitate decommissioning the Diablo Canyon ISFSI. Radioactive materials associated with spent fuel assemblies are contained within MPCs, which will be sealed welded before leaving the DCPP FHB/AB. The MPC conforms to the requirements of Section III of the ASME code and provides assurance that radioactive material will not be released from the MPC over the life of the Diablo Canyon ISFSI. Health physics measures to ensure MPC external surfaces are maintained in a clean condition are implemented during the MPC loading operations. These measures minimize contaminated fuel pool water from contacting the external surfaces of the MPC. Following fuel loading operations, a swipe survey is performed on the MPC lid and on the HI-TRAC transfer cask. Using administrative controls, transport of the transfer cask and MPC to the CTF and storage pad is not permitted if removable contamination levels exceed defined limits. Therefore, it is expected that the transfer cask and MPCs will have minimal, if any, contamination on external surfaces. Since the MPCs are sealed to preclude release of radioactive material from inside the MPCs, minimizing contamination on the external surfaces of the MPCs transported to the ISFSI storage pads minimizes the quantity of radioactive waste and contaminated equipment.

The HI-STORM 100S storage cask overpacks that house the MPCs are clean and have no radioactive contamination when they are fabricated. The storage overpack is not used inside DCPP. Under normal conditions of MPC transfer and storage operations, the potential does not exist for contaminating the HI-STORM 100S overpacks. However, the interior design of the overpacks facilitates decommissioning, if necessary. The cavities of the overpacks are mostly lined with steel and coated - including the cylindrical walls, pedestal that supports the MPC, and the lid - making them relatively easy to decontaminate.

Health physics technicians monitor the MPC transfer operations, and perform swipe surveys of the HI-TRAC transfer cask, MPC lid, transporter, CTF, and HI-STORM 100S storage overpack during and following each MPC transfer operation. If the HI-TRAC transfer cask has contamination levels on its outer surfaces above those established by administrative controls to prevent the spread of contamination to the storage pads, it will be decontaminated prior to movement to the CTF. These measures help to prevent the spread of any contamination to the CTF and from the CTF to the storage pads.

As shown in Section 2.4 of the HI-STORM 100 System FSAR, the storage overpack materials will be only slightly activated as a result of their long-term exposure to the relatively small neutron flux emanating from the spent fuel. This will allow the slightly activated overpack materials to qualify as Class A waste in stable form in accordance with 10 CFR 61.55 (Reference 1). As such, the material would be suitable for burial in a near-surface disposal as low specific activity (LSA) material. The results for the storage overpacks can be conservatively applied to the ISFSI pads because the storage overpacks shield most of the neutron flux from the spent fuel. Hence, any tasks necessary to decommission the overpacks and the storage pads are expected to involve only surface decontamination, as necessary, and not removal of activation products at depths below the surface.

The design of the HI-TRAC transfer cask also facilitates its decontamination. It has layers of gamma (lead) and neutron shield materials sandwiched between steel. The inner and outer liners both consist of carbon steel, which is relatively easy to decontaminate.

To facilitate decommissioning of the CTF, nonthreaded surfaces, where practical, are covered with a nonporous coating. This provision helps to ensure that decontamination can be performed by wiping down surfaces or stripping the coating, without the need to use more aggressive methods (for example, abrasive blasting, scabbling) that require removal of surface concrete.

Radioactive waste generated during decontamination operations will be packaged and temporarily staged for disposal in a temporary radiological control area for the CTF.

Minimal nonradioactive hazardous materials may be used or stored at the Diablo Canyon ISFSI and any that are needed to support the ISFSI operations will be identified and controlled in accordance with procedures. Strict measures will be applied to prevent any hazardous materials from contacting radioactive contamination, so that mixed hazardous and radioactive waste will not be generated at the Diablo Canyon ISFSI.

4.4.3 COST OF DECOMMISSIONING AND FUNDING METHOD

10 CFR 72.30(b) requires that the proposed decommissioning plan include a decommissioning cost estimate, a funding plan, and a method of ensuring the availability of decommissioning funds.

The philosophy of operating the Diablo Canyon ISFSI is "start clean/stay clean." Thus, the intention is to maintain the facility free of radiological contamination at all times. During the operational phase of the facility, all radioactive contamination will be removed, if possible, immediately upon its discovery.

Nonetheless, a cost estimate for decommissioning has been done that assumes certain areas and components will require decontamination. As described in the Preliminary Decommissioning Plan, this cost estimate is part of the total estimate performed by TLG Services, Inc., for DCPP Units 1 and 2. This detailed cost estimate is contained in the PG&E March 2001 Decommissioning Funding Report to the NRC (Reference 2), as required by 10 CFR 50.75(f)(1). As shown therein, it is estimated that decommissioning the Diablo Canyon ISFSI will cost about $12.5 million when escalated to 2001 dollars - for the DECON alternative. This estimate of $12.5 million only covers the costs for decontamination and disposal of low-level waste; it does not cover the costs for demolition and disposal of noncontaminated material, which are estimated at $6.5 million in 2001 dollars.

In developing this estimate, TLG Services had to make some default assumptions regarding the spent fuel storage system and the size of the ISFSI due to PG&E not having yet selected the storage system vendor. TLG assumed "NUHOMS" storage casks would be used. The TLG Services' cost estimate will be updated to reflect the Holtec International HI-STORM 100S System. This update will be contained in the applicable biennial PG&E Decommissioning Funding Report to the NRC; thereafter, the Preliminary Decommissioning Plan will be updated accordingly.

PG&E has established an external sinking fund account for decommissioning DCPP Units 1 and 2. As discussed in the Preliminary Decommissioning Plan and the March 2001 Decommissioning Funding Report to the NRC, this account contains designated monies for decommissioning the Diablo Canyon ISFSI.

4.4.4 LONG-TERM LAND USE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Following removal of all storage overpacks from the ISFSI and decontamination of the storage pad and the CTF, as necessary, these structures and associated areas can be released for unrestricted use.

The security-related structures and the CTF could be dismantled and removed. The concrete storage pads and the concrete floor of the CTF could be sectioned and removed, or, alternatively, left in place. In either case, the storage pads and CTF areas could be covered with top soil and replanted with native vègetation; thus returning the land to its original condition.

The long-term plan will be addressed further in the final decommissioning plan that will be submitted prior to ISFSI license termination.

4.4.5 RECORDKEEPING FOR DECOMMISSIONING

The following records will be maintained until the Diablo Canyon ISFSI is released for unrestricted use, in accordance with 10 CFR 72.30(d), and will be used to plan the actual decommissioning efforts:

- Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records will include any known information on identification of nuclides, quantities, forms, and concentrations.
- As-built drawings and modifications of structure and equipment in restricted areas.
- A document, which is updated a minimum of every 2 years, containing: (a) a list of all areas designated at any time as restricted areas as defined in 10 CFR 20.1003, and (b) a list of all areas outside of restricted areas involved in a spread of contamination as required by 10 CFR 72.30(d)(1).
- Records of decommissioning cost estimates and the funding method used.

These records will be stored at DCPP as part of the Records Management System.

4.4.6 REFERENCES

1. Final Safety Analysis Report for the HI-STORM 100 System, Holtec International Report No. HI-2002444, Revision 0, July 2000.

2. Decommissioning Funding Reports for Diablo Canyon Power Plant Units 1 and 2 and Humboldt Bay Power Plant, PG&E Letters DCL-01-026 and HBL-01-005 to the NRC, March 30, 2001.

4.5 RADIOACTIVE MATERIAL MOVEMENT

Cask handling and transfer operations will be conducted totally within the DCPP site boundary. Since offsite transportation of radioactive material is not within the scope of this ER, this section is not applicable.

TABLE 4.1-1

DCPP WATER SUPPLIES AND DEMANDS

DCPP Supply:

(all in gpm)	Seawater Reverse Osmosis	Diablo Creek		Ranny Well	Deep Well 2	Total Supply
Maximum output [a] (short term)	450	400		400	170	1420
Normal Capability [b]	450	(200	or	200)	170	820

DCPP Demand:

Maximum Demand [c], gpm/acre-ft per yr........850/1370

Normal Demand, gpm/acre-ft per yr........290/470

ISFSI Demand, gpm/acre-ft per yr........0.3/0.5

(a) These sources can only be run for several hours before depleting the source.
(b) For sustained operation, Ranny Well and Diablo Creek are essentially the same, as Ranny Well draws from the creek bed infiltration.
(c) These demand levels have been experienced in drought years.

TABLE 4.1-2

BEST MANAGEMENT PRACTICES TO BE USED DURING CONSTRUCTION

Construction Activity	BMPs to be Implemented
Containment of sediment-ladened storm water runoff during grading and construction	Drainage ditches will be installed where appropriate.
Dissipation of storm water runoff around the facility boundary.	Box culverts and drainage ditches will be installed where appropriate.
Stabilization of the soils spoils area and cut slopes	Silt fencing and sediment traps will be installed where appropriate. A revegetation program will be developed and implemented.
Fugitive dust controls	Construction watering trucks will be used to periodically wet active construction areas
All	Construction equipment maintenance and repair will be designated and controlled to prevent the discharge of oils, grease, hydraulic fluids, etc.
All	Waste receptacles and/or trash dumpsters will be placed at convenient locations for the regular collection of waste. Where practicable materials suitable to recycling will be collected. Debris shall, at the earliest opportunity, be disposed of at an appropriate offsite facility.
All	Any construction debris or material present onsite, including construction debris or material subject to removal that could potentially contribute to increased sediment loading, shall be covered and/or contained during precipitation events.
All	If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be captured in a sediment trap.
All	Adequately maintained sanitary facilities will be provided for all construction crews.
Commute traffic for construction materials on county roadways	Comply with any local regulatory traffic timeframe restrictions

TABLE 4.1-2 Sheet 2 of 2

Best Management Practices are defined in both Federal and State regulations. The EPA definition is contained in 40 CFR 122.2, which consists of regulations that address the management of practices that could create water pollution. This definition is as follows:

Best Management Practices (BMPs): Include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

TABLE 4.1-3

VEGETATION DISTURBED
DURING ISFSI CONSTRUCTION

Area [a]	Disturbed Vegetation (acres)
ISFSI Storage Site	2.5
Disposal Site 1	1.75
Disposal Site 2	0
Disposal Site 3	0.75

(a) Locations shown in Figure 2.1-2.

TABLE 4.1-4

VIBRATION CRITERIA

Human Annoyance	
Vibration Type and Permissible Aggregate Duration	**Vibration Limit (rms)**
Sustained (≥ 1 hour/day)	0.01 inch/second
Transient (> 1 hour/day)	0.03 inch/second
Transient (< 10 minutes/day)	0.10 inch/second
Potential Building Damage	
Type of Building	**Vibration Limit (ppv)**
Industrial, heavy office, modern construction	1.0 inch/second
Residential, reinforced	0.15 inch/second
Historic, unreinforced	0.05 inch/second

rms = root-mean-square.
ppv = peak particle velocity.

TABLE 4.1-5

TYPICAL NOISE LEVELS OF CONSTRUCTION EQUIPMENT

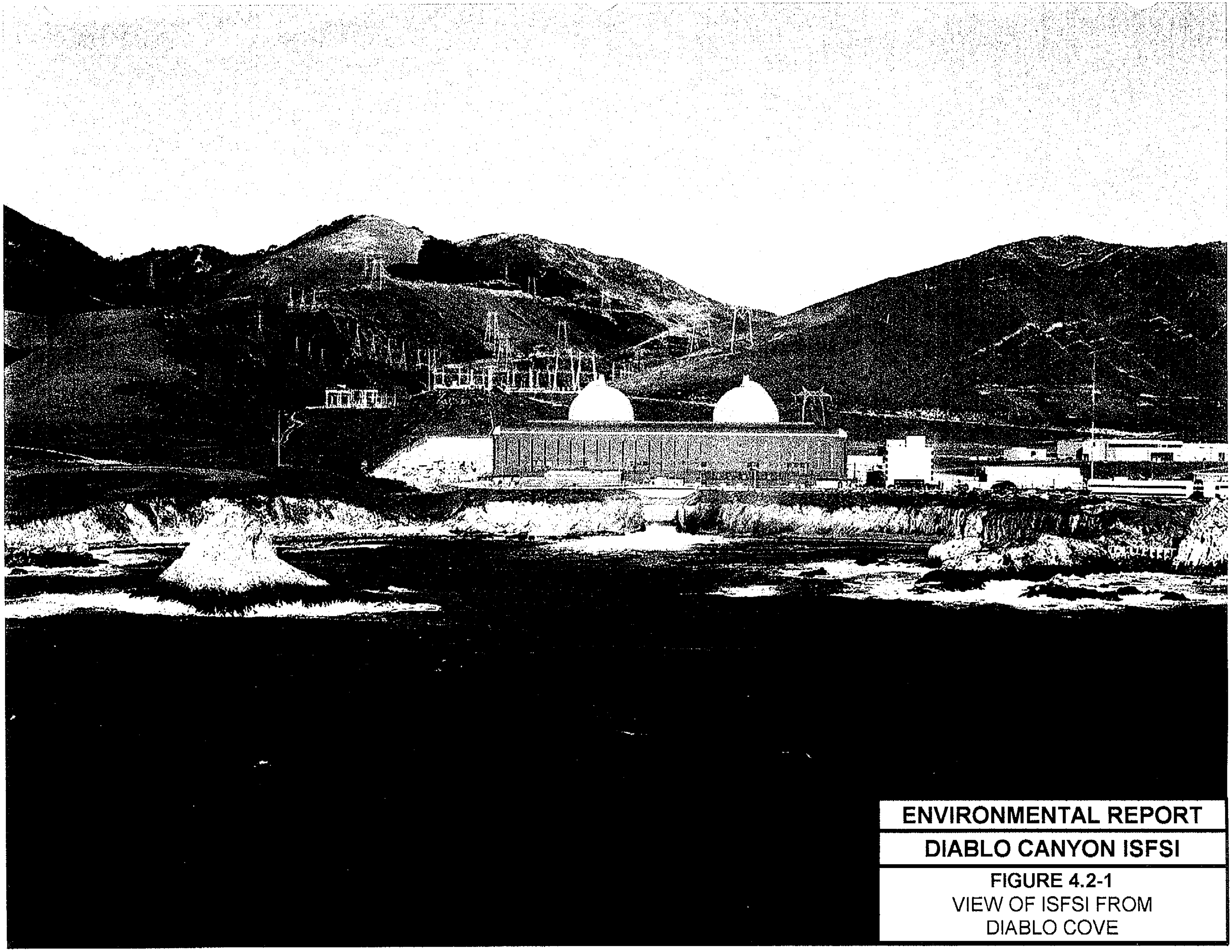
Equipment	Range of Noise Level (dBA) at 50 ft
Earthmoving	
Front loaders	72-84
Backhoes	72-93
Tractors, Dozers	76-96
Scrapers, Graders	80-93
Pavers	86-88
Trucks	82-94
Materials Handling	
Concrete mixers	75-88
Concrete pumps	81-83
Concrete batch plant	75-90
Cranes (movable)	75-86
Cranes (derrick)	86-88
Forklifts	76-82
Stationary	
Pumps	69-71
Generators	71-82
Compressors	74-86
Drill Rigs	70-85
Impact	
Pneumatic tools	83-88
Jack hammers and rock drills	81-98
Compactors	84-90

Source: adapted from Magrab (1975) by Wilson, Ihrig & Associates, Inc. (WIA, 1986).

TABLE 4.3-1

IMPORTED CONSTRUCTION MATERIAL QUANTITIES

ITEM		QUANTITY
Concrete Aggregates		15,000 cu yd
Crushed rock grading		3,000 cu yd
Fill materials		
Structural fill		3,000 cu yd
Common fill		7,000 cu yd
Asphalt paving		3,000 tons
Steel		1,300 tons



ENVIRONMENTAL REPORT

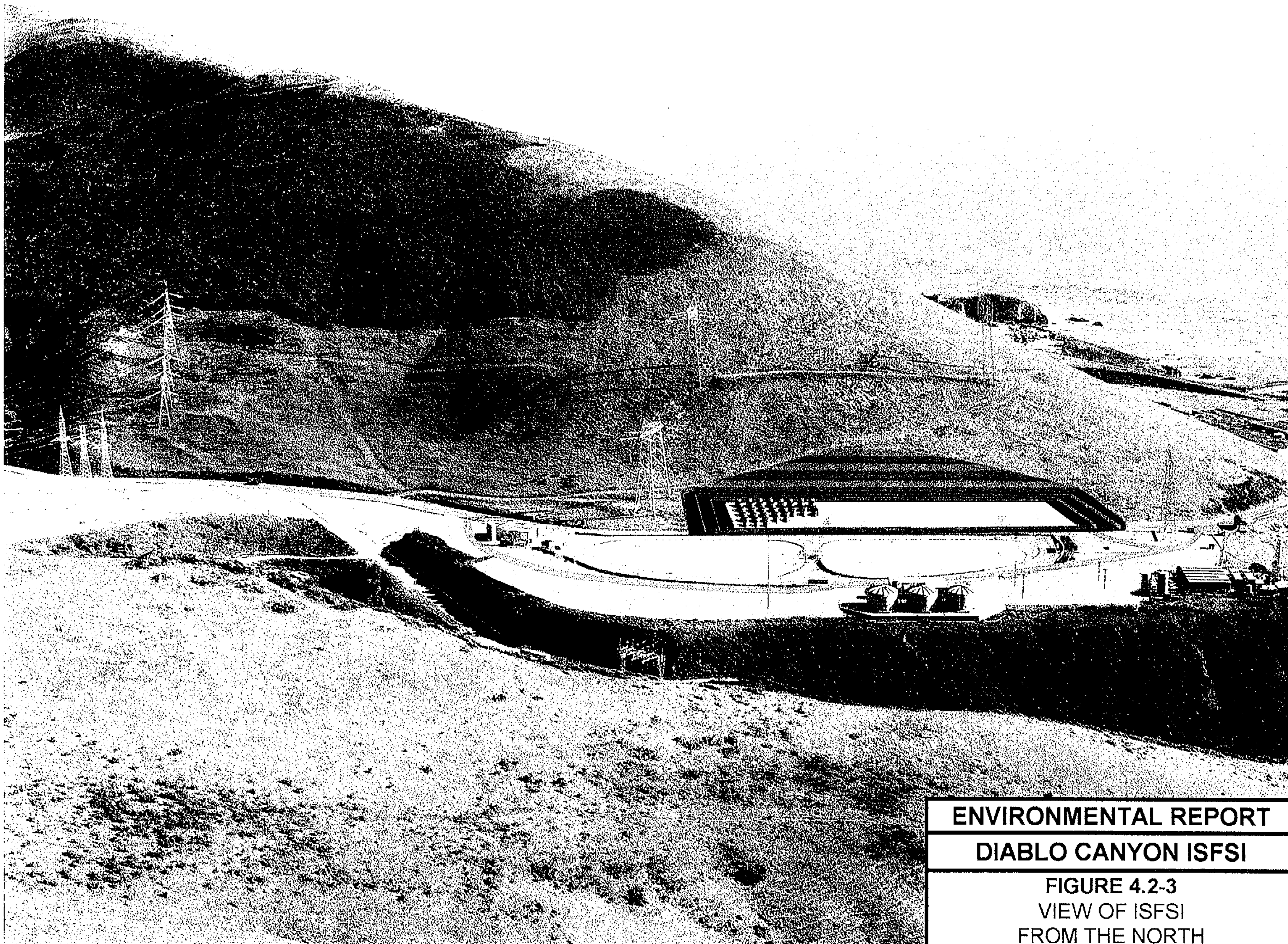
DIABLO CANYON ISFSI

FIGURE 4.2-1
VIEW OF ISFSI FROM
DIABLO COVE

ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 4.2-2
VIEW OF ISFSI FROM
NORTH OF DCPP



ENVIRONMENTAL REPORT
DIABLO CANYON ISFSI
FIGURE 4.2-3
VIEW OF ISFSI
FROM THE NORTH

CHAPTER 5

ENVIRONMENTAL EFFECTS OF ACCIDENTS

CONTENTS

CHAPTER 5

ENVIRONMENTAL EFFECTS OF ACCIDENTS

TABLES

CHAPTER 5

ENVIRONMENTAL EFFECTS OF ACCIDENTS

5.1 ACCIDENTS INVOLVING RADIOACTIVITY

The Diablo Canyon ISFSI SAR addresses the four categories of design events as defined in ANSI/ANS-57.9, which include normal, off-normal, and accident events that are postulated to occur while a loaded storage cask is being moved to the ISFSI storage pad and after the storage cask has been placed on the pad. The four ANSI/ANS-57.9 categories considered in the ISFSI SAR are:

(1) Design Event I: an event associated with normal operations.

(2) Design Event II: an event associated with off-normal operations that can be expected to occur with moderate frequency, or on the order of once during a calendar year of operation of the ISFSI.

(3) Design Event III: an infrequent event that could be reasonably expected to occur over the lifetime of the ISFSI.

(4) Design Event IV: an event that is postulated to occur because it establishes a conservative design basis for systems, structures, and components important to safety.

5.1.1 DESIGN EVENT I

Doses from the Design Event I category are included in the normal routine radiological effects discussion in ER Section 4.2.9. The annual doses resulting from normal operations and anticipated occurrences at the ISFSI are well below the 10 CFR 72.104 criteria for radioactive materials in effluents and direct radiation. Table 5.1-1 presents the annual doses at the site boundary and nearest resident from direct radiation and nonmechanistic effluent release for normal ISFSI operations. The dose rates from other fuel cycle operations (i.e., DCPP) are also shown in this table to demonstrate compliance with 10 CFR 72.104. While Table 5.1-1 demonstrates that the Diablo Canyon ISFSI will meet 10 CFR 72.104 regulatory requirements, ultimate compliance will be demonstrated through the DCPP environmental monitoring program. The actual dose from the ISFSI will be considerably less than the conservatively estimated values in Table 5.1-1. The following are some of the conservative assumptions used in calculating the dose rates presented:

- The design basis fuel assembly and design basis burnup and cooling time were conservatively chosen.

- All fuel assemblies in the MPC are assumed to be identical with the design basis burnup and cooling time.
- Burnable poison and rod assemblies are assumed to be present in all fuel assemblies in all casks.
- The assumed ISFSI loading plan was conservatively chosen to result in the highest offsite dose rate.
- The dose rate was calculated at the most conservative location around the ISFSI.

Table 5.1-2 presents the occupational exposures associated with ISFSI activities.

5.1.2 DESIGN EVENT II

Off-normal operations and accidents could potentially result in members of the general public being exposed to additional levels of radiation or radiological effluents beyond those associated with routine operations. The analyses of potential radiological impacts of off-normal operations and hypothetical accidents are presented in this section only to identify and bound the types of environmental impacts that could accompany these events. A more detailed assessment is included in SAR Chapter 8. None of the credible off-normal operations and hypothetical accidents results in offsite radiological consequences except for the postulated off-normal confinement boundary leakage.

The events designated as Design Event II include a loss of external electrical power, off-normal ambient temperatures, off-normal pressures internal to the MPC, confinement boundary leakage, cask drop less than allowable heights, off-normal transporter operation, and MPC partial blockage of storage cask air ducts. Of these events, only partial blockage of the storage cask inlet ducts was found to result in worker exposures in association with the corrective actions to remove the debris or other foreign material blocking the duct(s).

5.1.2.1 Off-Normal Confinement Leakage

The HI-STORM 100 System MPC has a reliable seal-welded confinement boundary to contain radioactive fission products under all design basis normal, off-normal, and accident conditions. Notwithstanding these design features, a nonmechanistic leak in the MPC confinement boundary has been evaluated as both an off-normal and an accident condition. The difference between the two evaluations is in the radioactive source terms, where 10 percent and 100 percent of the fuel rods are assumed to rupture under off-normal and accident conditions, respectively. This is consistent with Interim Staff Guidance (ISG) Document 5 (Reference 1).

The dose consequences of a non-mechanistic leak in the MPC confinement boundary have been analyzed on a site-specific basis for the Diablo Canyon ISFSI using appropriate source terms, release fraction, leak rate, meteorology, breathing rate, and occupancy times. The analysis of a confinement boundary leak as an off-normal event considers a rupture of 10 percent of the stored fuel rods. The evaluation of this event is discussed in SAR Section 7.5.2. Annual doses at the site boundary were calculated assuming leakage from 140 storage casks (MPC-24 or MPC-32) and 100 percent occupancy, and are provided in Table 5.1-3. The calculated doses are less than the regulatory limits in the 10 CFR 72.104(a).

5.1.2.1.1 Partial Duct Blockage

The corrective action for the partial blockage of air ducts is the removal of the cause of the blockage, and the cleaning, repair, or replacement, as necessary, of the affected mesh screens. After clearing of the blockage, the cask heat removal system is restored to its design condition and temperatures will return to the normal range. Partial blockage of the air ducts does not affect the HI-STORM 100 Systems ability to safely store spent fuel in the long term (SAR Section 8.1.4). The radiation dose received by the worker who removes a partial blockage of the inlet ducts on the storage cask is presented in Table 5.1-4. The radiation dose received by the worker would be well below the acceptance limits of 10 CFR 20, Subpart C for occupational dose. Exposures to members of the public are not affected by this event.

5.1.3 DESIGN EVENTS III AND IV

For the purpose of this evaluation, no distinction is made between Design Events III and IV. Design Events III and IV include events such as earthquakes; tornados and missiles generated by natural phenomena; floods; fire and explosions; canister leakage under hypothetical accident conditions; storage cask drop or tip-over; loss of shielding; 100 percent blockage of air inlet ducts; electrical accidents; and transmission tower collapse. Three of these events (that is, 100 percent duct blockage, canister leakage, and loss of neutron shielding) might create situations in which worker personnel could be exposed to higher levels of radiation than normal. For the purposes of demonstrating compliance with 10 CFR 72.106(b), a hypothetical accident that results in an offsite release is described in Section 5.1.3.2.

5.1.3.1 Complete Duct Blockage

Onsite workers might receive a dose during removal of debris or other foreign material that created a 100 percent blockage of the inlet ducts on a storage cask. A partial blockage was discussed under Design Event II. The radiation worker who removes the 100 percent blockage is estimated to receive double the dose estimated for the partial blockage case. The radiation dose received by the worker who removes the 100 percent blockage of the inlet ducts on the storage cask is presented in Table 5.1-4. However, the radiation dose received by the worker would still be well below the acceptance limits of 10 CFR 20, Subpart C for occupational dose. Exposures to members of the public are not affected by this event.

5.1.3.2 Canister Boundary Leakage

Canister leakage under hypothetical accident conditions is not considered to be a credible event. Nevertheless, to demonstrate compliance with 10 CFR 72.106(b), a bounding calculation for exposures to personnel and the members of the public was performed to assess the consequences of the leakage. The radioactive source term assumes 100 percent of the fuel rods within the cask rupture. The breach could result in the release of gaseous fission products, fines, volatiles, and airborne crud particulates to the MPC cavity. Doses resulting from the canister leakage under hypothetical accident conditions were calculated in accordance with Interim Staff Guidance (ISG) Document 5, ISG- 11 (Reference 2) and NUREG/CR-6487 (Reference 3).

The assumption that 100 percent of the fuel rods have ruptured is incorporated into the postulated pressure increase within the MPC cavity to determine the maximum possible pressure of the MPC cavity. This pressure, combined with the maximum MPC cavity temperature under accident conditions, is used to determine a postulated leakage rate during an anticipated occurrence. This leakage rate is based on the Diablo Canyon ISFSI Technical Specification leakage rate limit for the helium leak rate test, and is adjusted for the higher temperature and pressure during the accident to result in a hypothetical accident leak rate of 1.28×10^{-5} cm^3/sec.

The radionuclide release fractions, which account for the radionuclides trapped in the fuel matrix and radionuclides that exist in a chemical or physical form that is not releasable to the MPC cavity from the fuel cladding, are based on ISG-5. Additionally, only 10 percent of the fines released to the MPC cavity are assumed to remain airborne long enough to be available for release through the confinement boundary (Reference 4). It is conservatively assumed that 100 percent of the volatiles, crud, and gases remain airborne and available for release. The release rate for each radionuclide was calculated by multiplying the quantity of radionuclides available for release in the MPC cavity by the leakage rate calculated above, divided by the MPC cavity volume. No credit is taken for any confinement function of the fuel cladding or the ventilated HI-STORM 100 overpack.

Doses at the Diablo Canyon ISFSI site boundary resulting from a postulated leaking MPC-32 were calculated. The nearest distance from the ISFSI to the DCPP site boundary was estimated to be 1,400 ft. A χ/Q value of 4.50×10^{-4} sec/m^3 was assumed based on 1,325 ft being the nearest distance from the ISFSI to the DCPP site boundary. This χ/Q value is conservative because the χ/Q value at 1,325 ft would bound the χ/Q value at 1,400 ft and it is based on a 1-hour release period, whereas the hypothetical accident duration is 30 days per ISG-5. The dose conversion factors for internal doses due to inhalation and submersion in a radioactive plume were taken from EPA Federal Guidance Report No. 11 (Reference 5) and EPA Federal Guidance Report No. 12 (Reference 6), respectively. An adult breathing rate of 3.3×10^{-4} m^3/s was assumed, as recommended by ISG-5.

The following 30-day doses to an individual being continuously present at the minimum controlled area boundary of 1,400 ft and the wind constantly blowing in the same direction for 30 days as a result of an assumed effluent release from a single cask under hypothetical accident conditions were determined:

- The committed dose equivalent from inhalation and the deep dose equivalent from submersion for critical organs and tissues (gonad, breast, lung, red marrow, bone surface, and thyroid).
- The committed effective dose equivalent from inhalation and the deep dose equivalent from submersion for the whole body.
- The lens dose equivalent for the lens of the eye.
- The shallow dose equivalent from submersion for the skin.
- The resulting total effective dose equivalent and total organ dose equivalent.

Table 5.1-5 summarizes the accident doses for a hypothetical confinement boundary leak. The estimated doses are a fraction of the limits specified in 10 CFR 72.106(b).

5.1.3.3 Loss of Neutron Shielding

This accident event postulates the loss of neutron shielding provided by the HI-TRAC transfer cask water jacket and the Holtite-A solid neutron shielding in the HI-TRAC transfer cask top lid and bottom shield. Throughout all design basis accident conditions, the axial location of the fuel will remain fixed within the MPC because of the upper and lower fuel spacers. ISFSI SAR Chapter 3 shows that the fuel spacers, transfer cask inner shell, lead, and outer shell remain intact throughout all design basis normal, off-normal, and accident loading conditions. Localized damage of the transfer cask outer shell could be experienced during a drop event, but no loss of shielding results.

Three potential causes for the loss of neutron shielding provided by the transfer cask are:

(1) Elevated temperatures as a result of a fire accident could cause the temperature of the Holtite-A to exceed its design accident temperature and the pressure of the water jacket could increase to the point where overpressure relief valve on the water jacket would vent steam and water to the atmosphere. This would result in the loss of some amount of the water used for neutron shielding.

(2) Puncture of the transfer cask outer neutron shield jacket by a small object traveling at high speed, such as a tornado-borne missile, would cause the shield water to drain out at the point of puncture.

(3) A drop of the loaded transfer cask may cause local damage to the water jacket sufficient to drain the shield water.

Other shielding credited in the shielding analyses includes the steel transfer cask and overpack structures, concrete, and lead. There are no credible events that could cause a significant degradation or loss of these solid forms of shielding.

In the 125-ton HI-TRAC, which uses Holtite-A in the top lid and the bottom shield for neutron shielding, the elevated fire temperatures could cause the Holtite-A to exceed its design accident temperature limit. For the dose analysis, it is conservatively assumed that all the Holtite-A in the 125-ton HI-TRAC transfer cask top lid and the bottom shield is lost. The potential reduction in shielding effectiveness of the Holtite-A in the transfer cask top lid and the bottom shield is bounded by the normal dose rates in the area of the access hole in the top lid. Therefore, no additional analysis of this scenario is performed.

The bounding consequence that affects the shielding materials of the HI-TRAC transfer cask is the potential for damage to the water jacket shell and the loss of the neutron shield (water). In the accident consequence analysis, it is conservatively assumed that the neutron shield (water) is completely lost and replaced by a void.

The assumed loss of all the water in the water jacket results in an increase in the radiation dose rates at locations adjacent to the water jacket. The assumed loss of all of the Holtite-A in the HI-TRAC transfer cask top lid and the bottom shield results in an increase in the radiation dose rates at locations adjacent to the lids. The shielding analysis results presented in Section 5.1.2 of the HI-STORM 100 FSAR, as amended by LAR 1014-1, demonstrate that the dose limits of 10 CFR 72.106 are not exceeded.

There is no degradation in confinement capabilities of the MPC due to the minimal increase in fuel cladding temperatures caused by the loss of water in the water jacket. There are increases in the local dose rates adjacent to the water jacket. The complete loss of the HI-TRAC transfer cask neutron shield along with the water jacket shell is assumed in the shielding analysis for the post-accident analysis of the loaded transfer cask in Section 5.1.2 of the HI-STORM 100 FSAR, as amended by LAR 1014-1. The complete loss of the HI-TRAC neutron shield significantly affects the dose rate at mid-height of the transfer cask. The accident dose rate (calculated using the burnups and cooling times that produce the highest dose rates) is 1.47 mrem/hr at the minimum allowed controlled area boundary distance of 100 meters from the ISFSI. For the 30-day duration of the event, the total dose at this location is 1.058 Rem, which is less than the accident dose limits in 10 CFR 72.106. The controlled area boundary at the Diablo Canyon ISFSI is approximately 1,400 ft (427 m). Therefore, the generically calculated doses for this accident from the HI-STORM 100 System FSAR bound the Diablo Canyon ISFSI site.

Doses to onsite personnel will be monitored after the loss of neutron shielding event and temporary shielding may be employed at the discretion of the DCPP radiation protection organization.

The consequences of the design basis accident conditions for the MPC-24E storing damaged fuel and the MPC-24EF storing damaged fuel and/or fuel debris differ slightly from those with intact fuel. It is conservatively assumed that during a drop accident (vertical, horizontal, or tip-over) the damaged fuel collapses and the fuel pellets rest in the bottom of the damaged fuel container. Analyses discussed in HI-STORM FSAR Section 5.4.2 demonstrate that the damaged fuel in the post-accident condition does not significantly affect the dose rates around the cask. Therefore, the damaged fuel post-accident doses are bounded by the intact fuel post-accident doses.

5.1.4 REFERENCES

1. Interim Staff Guidance Document 5, Revision 1, Normal, Off-normal and Hypothetical Dose Estimate Calculations, USNRC, June 1999.

2. Interim Staff Guidance Document 11, Revision 1, Transportation and Storage of Spent Fuel Having Burnups in Excess of 45GWD/MTU, USNRC, May 2000.

3. NUREG/CR-6487, Containment Analysis for Type B Packages Used to Transport Various Contents, UCRL-ID-124822, Anderson, B.L. et al, Lawrence Livermore National Laboratory, November 1996.

4. SAND88-2778C, An Estimate of the Contribution of Spent Fuel Products to the Releasable Source Term in Spent Fuel Transport Casks, Rashid, Y.R., et al, Sandia National Laboratories, 1988.

5. US EPA, Federal Guidance Report No.11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion, DE89-011065, 1988.

6. US EPA, Federal Guidance Report No. 12, External Exposure to Radionuclides in Air, Water, and Soil, EPA 402-R-93-081, 1993.

5.2 TRANSPORTATION ACCIDENTS INVOLVING RADIOACTIVITY

Cask handling and transfer operations will be conducted totally within the DCPP site boundary. Potential accidents involving drops and tipovers during transport of a loaded transfer cask from the DCPP fuel handling building/auxiliary building (FHB/AB) to the ISFSI are considered in SAR Section 8.2.4. It is concluded that such accidents are not credible events outside the DCPP FHB/AB.

This section is considered to be non-applicable, as it is believed to apply to accidents associated with offsite transportation of spent fuel in accordance with 10 CFR 71, which is beyond the scope of this ER.

TABLE 5.1-1

TOTAL ANNUAL OFFSITE COLLECTIVE DOSE (MREM) AT THE SITE BOUNDARY AND NEAREST RESIDENT FROM THE DIABLO CANYON ISFSI CONTAINING 140 CASKS FOR NORMAL OPERATION[a]

Organ	Effluent Release	Direct Radiation	HI-STORM Loading Operations	Other Uranium Fuel Cycle Operations[b]	10 CFR 72.104 Regulatory Limit
Site Boundary (1,400 ft/427 m)					
Whole body ADE[c]	0.064	5.6	13.1E-02	4.357E-02	25
Thyroid ADE	0.010	5.6	13.1E-02	1.260E-01	75
Critical Organ ADE (Max)	0.33	5.6	13.1E-02	5.590E-02	25
Nearest Resident (1.5 miles/7,920 ft/2,414 m)					
Whole body ADE	0.27	3.5E-04	13.1E-02	4.357E-02	25
Thyroid ADE	0.043	3.5E-04	13.1E-02	1.260E-01	75
Critical Organ ADE (Max)	1.46	3.5E-04	13.1E-02	5.590E-02	25

[a] This table was taken from ISFSI SAR Table 7.5-4.

[b] Data for uranium fuel cycle operations were obtained from the DCPP FSAR Update, Rev. 11, Table 11.3-32. Table 11.3-32 was selected based on the highest dose values in the sectors at the site boundary (0.5 miles). These dose values for the site boundary were conservatively applied to the nearest resident. The critical organ dose listed was based on the total liver dose in Table 11.3-32. The values listed in Table 11.3-32 should bound the results calculated from effective dose equivalent (EDE) methodology.

[c] ADE is the annual dose equivalent.

TABLE 5.1-2

OCCUPATIONAL EXPOSURES ASSOCIATED WITH ISFSI ACTIVITIES[a]

Activity	Dose Rate (mrem/hr)	Duration (hours/year)	Number of Personnel	Total Dose (rem/year)
Completion of ISFSI (140 casks)				
ISFSI walk-downs	15.0	122	1	1.8
Overpack repairs	65.0	12	2	1.6
Construction of last storage pad	6.0	480	15	43.2

[a] This table was taken from ISFSI SAR Table 7.4-3.

TABLE 5.1-3

NORMAL OPERATION ANNUAL DOSES AT THE SITE BOUNDARY AND NEAREST RESIDENT FROM AN ASSUMED EFFLUENT RELEASE FROM THE 140 CASKS AT THE DIABLO CANYON ISFSI[(a)]

	Annual Dose[(b)] (mrem)
Site Boundary (1,400 ft/427 m)	
Whole body ADE	0.064
Thyroid ADE	0.010
Critical Organ ADE (Max)	0.35
Nearest Resident (1.5 miles/7,920 ft/2,414 m)	
Whole body ADE	0.27
Thyroid ADE	0.043
Critical Organ ADE (Max)	1.46

TABLE 5.1-4

OCCUPATIONAL EXPOSURES ASSOCIATED WITH REMOVING A CASK INLET VENT BLOCKAGE

Activity	Dose Rate (mrem/hr)	Duration (hours/year)	Number of Personnel	Total Dose (man-rem)
Completion of ISFSI (140 casks)				
Removal of Partial Inlet Blockage	58	1	2	0.116
Removal of 100% Inlet Blockage	58	2	2	0.232

TABLE 5.1-5

CONFINEMENT BOUNDARY LEAKAGE DOSES AT THE SITE BOUNDARY[(a)]

Dose Category	30-Day Dose (mrem)	10 CFR 72.106 Limit (mrem)
TEDE	0.83	5,000
TODE=DDE+CDE (Max)	6.36	50,000
LDE	0.022	15,000
SDE	0.026	50,000

(a) This table was taken from ISFSI SAR Table 8.2-12
TEDE: Total Effective Dose Equivalent
TODE: Total Organ Dose Equivalent
DDE: Deep Dose Equivalent
CDE: Committed Dose Equivalent
LDE: Lens Dose Equivalent
SDE: Shallow Dose Equivalent

CHAPTER 6

EFFLUENT AND ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

CONTENTS

CHAPTER 6

EFFLUENT AND ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

6.1 PREOPERATIONAL ENVIRONMENTAL PROGRAMS

The existing environmental monitoring programs that are in effect to support operation of DCPP Units 1 and 2 will be used as the preoperational environmental monitoring programs for the ISFSI. These programs provide a comprehensive base for the environmental impact evaluations of the proposed ISFSI. The implementation of these programs is defined in DCPP procedures. The programs conform to the requirements of the NRC as well as various other agencies such as the US Environmental Protection Agency and the California Department of Health Services.

Results of the DCPP operational monitoring programs are routinely submitted to the NRC in annual reports, as required by the operating licenses of Units 1 and 2.

Operation of the ISFSI will not generate any chemical or sanitary wastes. Further, there will be no releases of radioactive materials in gaseous or liquid form. Therefore, only the meteorological and radiological portions of the environmental monitoring programs, which establish the bases for the evaluation of the impact of ISFSI operation on the environment, need to be addressed.

A description of the operational meteorological measurement program for the DCPP site is provided in Section 2.3.3 of the DCPP FSAR Update. Plant procedures further identify specific requirements for compiling and recording meteorological measurements.

The operational Radiological Environmental Monitoring Program (REMP) for DCPP has been conducted since initial operation of Units 1 and 2, and is specifically defined in plant procedures. The locations and frequency of monitoring, analysis of samples, and program results are provided in annual reports submitted to the NRC.

No changes are necessary to either the existing meteorological measurement program or to the REMP for applicability to the ISFSI at DCPP.

6.2 PROPOSED OPERATIONAL MONITORING PROGRAM

The current DCPP REMP will also be used for the Diablo Canyon ISFSI operational monitoring program. This program will be augmented to include additional thermoluminescent dosimeters along the ISFSI restricted area fence to record gamma radiation doses. Refer to the SAR Section 7.3, "Radiation Protection Design Features."

An estimate of the maximum dose to the public from DCPP is provided in the Annual Radiological Effluent Release Report. Since there are no effluents from the ISFSI, there will be no additional radiological effluent monitoring.

6.3 RELATED ENVIRONMENTAL MEASUREMENT AND MONITORING PROGRAMS

The California State Department of Health Services (DHS), Radiological Health Branch, conducts an intercomparison radiological monitoring program for nuclear power plants in the state. DCPP is a participant of this program. While the DHS program applies specifically to nuclear power plants, PG&E anticipates that the program will be continued at the Diablo Canyon site as long as spent fuel is stored in the Diablo Canyon ISFSI. If differences are noted between licensee and state laboratory data, the DHS follows up to determine the cause.

CHAPTER 7

ECONOMIC AND SOCIAL EFFECTS OF CONSTRUCTION AND OPERATION

CONTENTS

CHAPTER 7

ECONOMIC AND SOCIAL EFFECTS OF CONSTRUCTION AND OPERATION

Construction activities for the Diablo Canyon ISFSI and associated facilities are similar to those required for construction of the foundation for a large commercial building. These types of activities occur routinely throughout San Luis Obispo County. The areas to be disturbed during construction activities are areas that were previously disturbed during the original construction of DCPP. Construction of the ISFSI is not expected to have any significant effect on the local demography. The construction force during all phases of the ISFSI will be drawn from the local work force in San Luis Obispo and surrounding communities and will be minimal compared with the overall population in the area. The increase in employment will contribute to the local economy to a slight extent, although, again, any effect is expected to be minimal because of the small work force involved compared with the overall population in the area. Therefore, ISFSI construction will not induce any immigration of families with school-age children, and there will be no impact on housing availability, levels of local government service and infrastructure, or other demographic variables in the area. Construction costs for the ISFSI are estimated to be $10 million. Much of the materials for the ISFSI construction will be purchased in the local area, resulting in a positive impact to the local economy.

ISFSI operational activities are addressed in Chapter 5 of the ISFSI SAR and are insignificant compared with power operation of DCPP; any additional demand on local human resources due to concurrent operation of the ISFSI with DCPP is expected to be minimal. The employees needed to support ISFSI operation will be drawn from the existing work force at DCPP and, if necessary, from elsewhere in PG&E or other labor pools available in the area. These employees are expected to reside primarily in the San Luis Obispo County area and commute daily to DCPP and the ISFSI facility. ISFSI personnel will be shared staff that also provides support for DCPP during the plant operating life, or for other site activities following termination of plant operation. Operations related to the transfer of spent fuel from the DCPP FHB/AB to the ISFSI will only occur periodically during non-outage times. Since the number of staff needed to support ISFSI operation is expected to be small in any event (ER Section 4.2.6), there will be virtually no disturbance to the local population and related social activities in the area. Should DCPP have to shutdown early because of a lack of spent fuel storage capacity, the loss of employment would have a significant negative impact on the local economy. As shown in Figures 4.2-1, 4.2-2, and 4.2-3, the visual impact of the ISFSI structure will be small and should not intrude on any scenic outlook along the coastal areas adjacent to the DCPP site, as the ISFSI site is located inland from the coast on higher elevation between hilltops. Annual operating costs for the ISFSI are estimated to be a fixed cost of $300,000 per year and a maintenance cost of $5,000 per cask per year for the first 20 casks; an additional $2,000 per cask per year for the next 80 casks; and an additional $1,000 per cask per year beyond 100 casks. There are no property taxes anticipated for this project. Benefits will accrue to the local economy primarily through the employment of ISFSI personnel.

CHAPTER 8

SITING AND DESIGN ALTERNATIVES

CONTENTS

CHAPTER 8

SITING AND DESIGN ALTERNATIVES

FIGURES

CHAPTER 8

SITING AND DESIGN ALTERNATIVES

8.1 SITING ALTERNATIVES

8.1.1 SITE SELECTION CRITERIA

Site evaluation factors were developed based on ISFSI license applications from other utilities and discussions with vendors holding NRC licenses for spent fuel storage casks. The site selection process consisted of three steps: (a) initial evaluation of potential sites, (b) detailed evaluation of potential sites, and (c) selection of the ISFSI location where extensive additional data were collected. The following site selection attributes were used in evaluating the potential sites:

8.1.1.1 Area Requirements

The site of the ISFSI should be (a) adequate to accommodate the required number of storage casks with provisions for storage pads, space for handling of casks, radiological separation zones, and space necessary to meet security requirements and (b)large enough to meet future storage capacity requirements.

8.1.1.2 Geological/Geotechnical Requirements

The specific selection criteria included the following:

- Bedrock characterization: The site bedrock properties and site seismic response characteristics should be comparable to those of the bedrock beneath DCPP, such that the existing DCPP design earthquake ground motions can be used for the ISFSI.

- Geologic hazards: The site should be free of known and potential geologic hazards, including landslides, debris flows, coastal retreat, and seismically-induced ground failure.

- Flood hazards: The site should avoid Diablo Creek flood zones, marine storm surge areas, and tsunami inundation areas.

- Foundation conditions: The site should have a minimal overburden (depth to bedrock) and suitable foundation properties (for example, bearing capacity, rock strength).

- Access: The site should have suitable access and acceptable roadway grade and stability.

- Topography: The site should require minimal grading requirements and avoid steep topography.

8.1.1.3 Transportation Access

The gradient of the access road to be used for transport of the casks should not exceed approximately 8 percent. The width of the transfer route should be no less than 30 ft with an asphalt paved surface and compacted gravel shoulders.

8.1.1.4 Effect of Existing Site Facilities

The disruption to existing plant facilities should be evaluated. If any of the existing facilities, including their underground utilities, need to be relocated, the effect of their relocation on cost and plant operation should be evaluated.

8.1.1.5 Operational Impact

The site should be located near the power plant vicinity for ALARA and operational efficiency considerations and to minimize the fuel transport distance and time from the DCPP fuel handling building to the ISFSI.

8.1.1.6 Environmental Impact

The selected site location should minimize environmental impacts at DCPP, as addressed in the following DCPP documents:

- Master Plan

- Final Environmental Statement

- Emergency Plan

- Erosion Control Plan

- Spill Prevention, Control, and Countermeasure Plan

To the extent possible, the site should be in a previously developed area to minimize new construction and operations impacts as well as new impacts on visual and cultural resources.

8.1.1.7 Cost impact

The site location should be cost effective with regard to both public health and safety and environmental considerations. The cost evaluation should consider life cycle costs.

8.1.2 INITIAL SITE EVALUATION

Numerous potential sites along the coastal terrace near DCPP were initially considered for the location of the ISFSI. Some of these potential sites were eliminated in the screening because they were subject to landslides, were near coastal bluffs, or near Diablo Creek; or had insufficient land area to support the ISFSI, or were underlain by deep surficial deposits (commonly marine terrace and colluvial sediments).

Six candidate sites were selected for additional study using the criteria defined above in Section 8.1.1 (Figure 8.1-1 for location of candidate sites). These sites are as follows:

- Tower Site: The Tower Site was selected because a portion of the area is relatively flat, appeared to be underlain by shallow competent bedrock, and appeared to be free of geologic and flood hazards.

- Water Tank Site: The Water Tank Site was selected because of its proximity to the power plant, its location between the 500-kV and 230-kV switchyards, and the possibility of constructing an ISFSI facility on a reinforced fill pad.

- Parking Lot 7, Parking Lot 8, and Firing Range Sites: These three sites are clustered together on coastal terraces and were selected because of accessibility to the power plant, apparent lack of geologic hazards, potential for bedrock comparable to the bedrock at the DCPP power block, and relatively level, previously graded condition.

- Borrow Site: The Borrow Site was selected because it is a previously disturbed site with bedrock exposed at the surface that appeared comparable to bedrock at the DCPP power block. Also, the site is free from any known or potential geologic or flood hazard.

8.1.3 EVALUATION OF CANDIDATE SITES

Further investigations were conducted at each of the candidate sites to confirm geologic conditions, bedrock characteristics, and to reduce geologic uncertainties. These investigations were conducted in a phased approach that provided the flexibility to focus additional effort on more favorable sites and to eliminate sites from further investigation if preliminary results showed that the sites did not meet the selection criteria. A brief synopsis of each site is provided below.

8.1.3.1 Tower Site

The Tower Site was assessed as a less feasible candidate site because the siltstone and sandy siltstone bedrock is significantly different from that at the power block, and because of its proximity to large landslides. Additionally, development of a suitable access road that would be over one mile long would require construction of this road across existing large landslides. The site itself would also require extensive grading, drainage, and slope stabilization.

The Tower Site is the farthest candidate site from the power block, which would result in greater travel distances for construction truck traffic, cask transport, and fire and emergency services personnel. The site is, however, the only candidate site located outside the Coastal Zone.

The Tower Site does not occupy an area having prime agricultural soils or mineral resources. There are no current agricultural uses near the site. The site is not immediately adjacent to any watercourse. It is within the Diablo Creek watershed, south and upstream of an undisturbed part of Diablo Creek.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in this area. Similarly, no designated Critical Habitats for federally listed species would be affected. Compared with the preferred Borrow Site, a larger percentage of the Tower Site is characterized by the presence of native and introduced vegetation; consequently, selection of the Tower Site would result in greater disturbance to natural plant and animal habitats.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Tower Site area. A review of the California Register of Historical Resources also indicates no resources are listed for this area. Since extensive grading and removal of native undisturbed vegetation is required, the direct construction impacts would be greater than the Borrow Site. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The scenic and visual qualities associated with the vicinity of the Tower Site would not impact ocean views, however, the site would have an impact on scenic coastal areas and natural landforms would be altered.

8.1.3.2 Water Tank Site

The Water Tank Site was assessed as a less feasible candidate site because the diabase bedrock at the site is significantly different from that at the power block. The presence of steep slopes and recently active landslides make the water tank site undesirable.

Although these slope stability issues could be mitigated, potential landslides would be a significant design and construction issue.

The Water Tank Site does not have prime agricultural soils or mineral deposits. There are no current agricultural uses near the site. The soil at the site has low water retention and surface erosion is high. The site is within the Diablo Creek watershed, near its downstream terminus. Although the site is located near the underground portion of Diablo Creek, road improvements to accommodate spent fuel transport could impact creek water quality near the mouth of the creek at the Pacific Ocean.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in the immediate area of the Water Tank Site, and no designated Critical Habitats for federally listed species would be affected. Compared with the preferred Borrow Site, a larger percentage of the Water Tank Site is characterized by the presence of native and introduced vegetation; consequently, selection of this site would result in greater disturbance to natural plant and animal habitats. This site would require upgrading the existing road crossing Diablo Canyon Creek with potential short-term impacts to aquatic and riparian habitats, and additional state permitting under Section 1600 of the State Fish and Game Code.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Water Tank Site area. A review of the California Register of Historical Resources also indicates no resources are listed for this area. Since the Diablo Creek crossing is bounded on the north side by archaeological site CA-SLO-2, potential impacts to the site could occur. Therefore, the direct construction impacts would be greater than the Borrow Site. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The scenic and visual qualities associated with the vicinity of the Water Tank Site would not be impacted. The site is located at an elevation that naturally protects views to and along the ocean and scenic coastal areas. Alteration of natural landforms would be required.

8.1.3.3 Parking Lot 7 Site

The paved Parking Lot 7 Site was assessed as a less feasible candidate site because siltstone and shale bedrock is extremely weathered and significantly different from that at the power block. Also, the site is in an area of relative thick terrace deposits (soils) that overlie bedrock. The site would require some grading.

The site was also undesirable because of potential direct radiation and shine at the main warehouse.

The Parking Lot 7 Site has no agricultural use or mineral resources. The site drains into the existing, adjacent storm drain system. Location of the ISFSI at this site would not cause an increase in stormwater runoff; erosion and sedimentation are not issues. Traffic, air quality, noise levels, and surface and groundwater quality and quantity would be essentially unaffected.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in this area. Similarly, no designated Critical Habitats for federally listed species would be affected. Because the majority of the site is paved, impacts on plant and animal habitats would be small.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Parking Lot 7 Site. A review of the California Register of Historical Resources also indicates no resources are listed for this area. There will be no direct construction impacts on archaeological resources. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The scenic and visual qualities associated with the vicinity of the Parking Lot 7 Site would be impacted because the site is located on the coastal terrace. The site is located at a previously disturbed location so natural landforms would not be altered.

8.1.3.4 Parking Lot 8 Site

The Parking Lot 8 Site was assessed as a less feasible candidate site because it is underlain by siltstone and shale bedrock substantially different from that at the power block. The site lies on thick terrace and debris-flow fan deposits that would require extensive grading. In addition, the site lies in front of a debris flow chute on the adjoining hillside, so the hazard from potential small debris flows would require mitigation prior to development of an ISFSI facility.

The Parking Lot 8 Site has no agricultural use or mineral resources. The site drains into the existing, adjacent storm drain system. Location of the ISFSI at this site would not cause an increase in storm water runoff; erosion and sedimentation are not issues. Traffic, air quality, noise levels, and surface and groundwater quality and quantity would be essentially unaffected.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in this area. Similarly, no designated Critical Habitats for federally listed species would be affected. Because the majority of the site is paved, impacts on plant and animal habitats would be small.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Parking Lot 8 Site. A review of the California Register of Historical Resources also indicates no resources are listed for this area. There will be no direct construction impacts on archaeological resources. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The scenic and visual qualities associated with the Parking Lot 8 site would be impacted because the site is located on the coastal terrace. The site is at a previously disturbed location so natural landforms would not be altered.

8.1.3.5 Firing Range Site

The Firing Range Site was assessed as a less feasible candidate site because the site is relatively small and the siltstone and shale bedrock is significantly different from that at the power block (similar to Parking Lot 8). The site lies on thick terrace and debris flow fan deposits that would require extensive grading. In addition the site lies in front of a debris flow chute on the adjoining hillside, so the hazard from potential small debris flows would require mitigation prior to development of an ISFSI facility.

The Firing Range Site has no agricultural use or mineral resources. The site drains into the existing, adjacent storm drain system and is subject to moderate to severe erosion. Traffic, air quality, noise levels, and surface and groundwater quality and quantity would be essentially unaffected.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in this area. Similarly, no designated Critical Habitats for federally listed species would be affected. The majority of the site is maintained free of vegetation to reduce fire risk. Some loss of native vegetation would occur, however, around the periphery of the site. Impacts on plant and animal habitats would be small.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Firing Range Site. A review of the California Register of Historical Resources also indicates no resources are listed for this area. Since extensive grading and removal of native undisturbed vegetation is required, the direct construction impacts would be greater than the Borrow Site. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The excavation and site would be visible from the ocean and coastal terrace. The scenic and visual qualities associated with the Firing Range Site would be impacted. The site is located on the coastal terrace and natural landforms would be altered due to excavation. Finally, if the Firing Range Site were used for the ISFSI, a new firing range would need to be constructed near DCPP.

8.1.3.6 Borrow Site

The Borrow Site was assessed as a feasible candidate site because geologic and geophysical investigations showed that the site has no superficial deposits and is underlain by sandstone and dolomite that is similar in composition, rock mass character, and seismic wave velocity to the bedrock beneath the power block. Therefore, ground motions previously licensed for DCPP are applicable to the Borrow Site. The initial investigations indicated that the site had no significant geologic hazards or adverse geologic or geotechnical conditions that would preclude development of the ISFSI. The site was previously disturbed due to excavation for the DCPP facilities, so natural landforms would not be altered.

Potential environmental impacts related to land use, mineral resources, drainage, erosion, air quality, noise, and traffic associated with the Borrow Site are addressed in other parts of this ER.

No species currently listed or proposed for listing under the state or federal Endangered Species Acts are known to occur in this area. Similarly, no designated Critical Habitats for federally listed species would be affected. The site was previously disturbed during construction of the 500-kV and 230-kV switchyards and was the source of approximately 2.5 million cubic yards of borrow material. Impacts to native and introduced vegetation and wildlife habitat would occur. These effects would involve somewhat larger areas than for some of the other candidate sites, but impacts on plant and animal habitats would remain small.

No historic properties (archaeological sites) are listed in or determined eligible to be listed in the National Register of Historic Places for the Borrow Site. A review of the California Register of Historical Resources also indicates no resources are listed for this area. There will be no direct construction impacts on archaeological resources. Local Chumash Indians have expressed concern about this general area, which is of spiritual importance to them.

The scenic and visual qualities associated with the Borrow Site would have an impact on the ocean and scenic coastal views.

8.1.4 SITE EVALUATION CONCLUSIONS

Geologic and geotechnical investigations were conducted at the six candidate sites to evaluate their feasibility as a location for the Diablo Canyon ISFSI. The Borrow Site was assessed as the preferred site because it has no surficial deposits and the geologic and geophysical investigations showed that the Borrow Site is underlain by dolomitic sandstone bedrock that is similar in composition, rock mass character, and seismic wave velocity to bedrock beneath the DCPP power block. Therefore, licensed DCPP ground motions are applicable to the Borrow Site. No significant geologic hazards or adverse geologic or geotechnical conditions that would preclude development of the facility were identified. In addition, the site is an area that was previously disturbed during the original DCPP construction and much of the site is already developed, thus minimizing any new environmental impacts. The site was also judged acceptable under the other siting selection criteria. Finally, a suitable location for the cask transfer facility is available immediately adjacent to the west edge of the ISFSI pads.

The site as originally conceived, would have required significant excavation. As preliminary engineering progressed, it was determined that Reservoir Road could be rerouted allowing the site to be moved closer to the raw water reservoir. This relocation resulted in a significant reduction in the quantity of excavated materials and significantly lowered the height of the excavated cut slope above the area of the pads. In the original location, the upper portions of the cut slopes would have been visible from the ocean. Following the site relocation, very little of the site is visible from the ocean or coastal terraces.

8.2 DESIGN ALTERNATIVES

8.2.1 ALTERNATIVE ACTIONS

8.2.1.1 No Action

The purpose of the Diablo Canyon ISFSI is to provide spent fuel storage such that spent fuel can be removed from the DCPP Units 1 and 2 spent fuel pools and stored until it can be moved to a permanent federal repository. If the present inventory of fuel remains in the DCPP spent fuel pools, the ability to discharge a full core from either unit would be lost by 2006 with the presently anticipated refueling schedules. Ultimately, the lack of onsite spent fuel storage could force a premature shutdown of the DCPP units and would pose significant electrical supply problems. Short and long term replacement power facilities would generate power at a much higher cost and result in higher electricity rates for PG&E customers. Also, these replacement power sources would likely involve the use of fossil fuels, thereby causing greater environmental impacts.

In the Nuclear Waste Policy Act of 1982 (NWPA) [42 U.S.C. Section 10101 et seq], Congress determined that the operators of civilian nuclear power plants have "primary responsibility" for interim storage of spent nuclear fuel pending federal development of a permanent disposal repository. The NWPA further specified that operators should meet their responsibility "by maximizing, to the extent practical, the effective use of existing storage facilities at the site of each civilian nuclear power reactor, and by adding new onsite storage capacity in a timely manner where practical" [42 U.S.C. Section 10151(a)(1)]. Congress also declared that the purpose of the NWPA was to promote the "addition of new spent nuclear fuel storage capacity" at civilian reactor sites [Id. at Section 10151(b)(1)], and directed federal agencies to "take such actions. . . necessary to encourage and expedite the effective use of available storage, and necessary additional storage" at reactor sites [Id. at Section 10152]. The Diablo Canyon ISFSI is in accord with the mandate of the NWPA. Accordingly, the "no action" alternative is not a viable approach.

8.2.1.2 Increasing Capacity of Existing Pools

As discussed below, increasing the capacity of the existing spent fuel pools through reracking or fuel rod consolidation are not preferred or viable, respectively, for long-term solutions to spent fuel storage at DCPP. However, implementing one of these options could provide short-term relief.

8.2.1.2.1 Reracking

The existing Diablo Canyon spent fuel storage racks are a high-density design that could be replaced with an even more densely configured rack system to expand the number of storage cells per unit from 1324 to 2102. For Unit 1, this increase would provide storage for all spent fuel assemblies to the end of the operating license in 2021. However, for Unit 2, this expansion would be insufficient to allow operation to the end of the operating license in 2025. In addition, the increased heat load from the higher density racks could require modifications to increase the cooling capacity of the spent fuel pool cooling systems.

Since additional storage capacity from an increased density design would not allow operation of both DCPP units until the end of their initial operating licenses, this alternative is not the preferred alternative.

8.2.1.2.2 Spent Fuel Rod Consolidation

Spent fuel rod consolidation involves removing all the fuel rods from two spent fuel assemblies, reconfiguring them into a closely packed array, and then placing them into a canister of the same outside dimensions as a fuel assembly. The canister is then stored in a rack location formerly occupied by a single fuel assembly. The remaining fuel assembly skeletons are then compacted and placed in another canister designed to hold approximately ten such skeletons. In this way ten fuel assemblies can be consolidated into approximately five canisters of fuel rods and one canister of skeletons.

Due to the high seismic design requirements at DCPP, the fuel racks are not designed to accommodate the higher mass of consolidated fuel. Additionally, consolidation requires extensive operational resources that could interfere with normal plant operations. For these reasons, this alternative was not considered viable.

8.2.1.3 Construction of a New Storage Pool

This alternative involves the construction of a new storage pool and support facilities separate from the existing DCPP spent fuel pool. A new storage pool would require the same support facilities and maintenance as the existing pool (e.g., fuel handling equipment, large capacity cask crane, building ventilation, and water quality systems). This alternative was not selected because of its high cost and the time needed for design, licensing, and construction.

8.2.1.4 Ship Fuel to a Permanent Federal Repository

This is the PG&E preferred solution to storage of spent fuel from Diablo Canyon. However, a permanent Federal repository will not be available in a timeframe consistent with the spent fuel storage needs of PG&E. DOE is currently working to develop a repository as required by the NWPA of 1982, as amended in 1987. DOE is evaluating a site in Yucca Mountain, Nevada, to determine if it is a suitable location for a high-level radioactive waste repository. Currently, DOE does not anticipate having a licensed repository ready to receive spent fuel until 2010. Although DOE recommended that a Monitored Retrievable Storage (MRS) facility be constructed and in operation by 1988, the NWPA prohibits siting an MRS before obtaining a construction permit for the permanent repository. Given the uncertainties of schedules for either a repository or an MRS, this alternative does not meet the needs of PG&E to store spent fuel.

8.2.1.5 Ship Fuel to a Reprocessing Facility

There are no operating commercial reprocessing facilities in the United States nor is there the prospect for one in the foreseeable future. Reprocessing facilities are in operation in other countries (e.g., United Kingdom, France, Germany, and Japan); however, the shipment of domestic spent fuel to a foreign country for storage or disposal involves a number of political, legal, and logistical uncertainties. This is not considered a viable alternative.

8.2.1.6 Ship Fuel to a Private Spent Fuel Storage Facility

There are no private licensed storage facilities available at this time to provide for interim storage of spent fuel and other radioactive materials from DCPP. However, several utilities have formed the Private Fuel Storage L. L. C. (PFSLLC) to construct a privately owned ISFSI that will store spent fuel from several nuclear plants at a central site. This ISFSI, called the Private Fuel Storage Facility (PFSF), will be located on the Skull Valley Indian Reservation in Utah. The PFSLLC has entered into a lease agreement with the Skull Valley Band of Goshute Indians for the site.

The PFSF would incorporate the dry cask storage technology that is currently in use or proposed for use at several operating nuclear power plants, including the HI-STORM 100 System. The construction and operation of the PFSF is therefore a potential substitute for building individual onsite ISFSIs at various nuclear power plant sites. Presently, there is no assurance the project will be successfully licensed and built. Moreover, based on current licensing and construction schedules, the PFSF would not be available until 2003 at the earliest, and there is no assurance as to when DCPP spent fuel could be accepted. Therefore, efforts must begin now for the design, licensing, and construction of the Diablo Canyon ISFSI to meet the requirements for DCPP fuel storage by 2006. Moreover, even if the PFSF were available, this alternative would involve an extra offsite shipment of the spent fuel for ultimate disposal at a DOE repository. This is not considered a viable alternative at this time.

8.2.1.7 Ship Fuel to Another Nuclear Power Plant

This alternative would involve shipping the DCPP spent fuel to another nuclear power plant with sufficient storage capacity. The other utility would have to be licensed for and agree to accept the DCPP spent fuel. Since all the power reactor operators are expected to face spent fuel pool storage shortfalls, they are not expected to be willing to reduce their own storage capacity. Therefore, this is not considered to be a viable alternative.

8.2.2 ALTERNATIVE DRY STORAGE DESIGNS

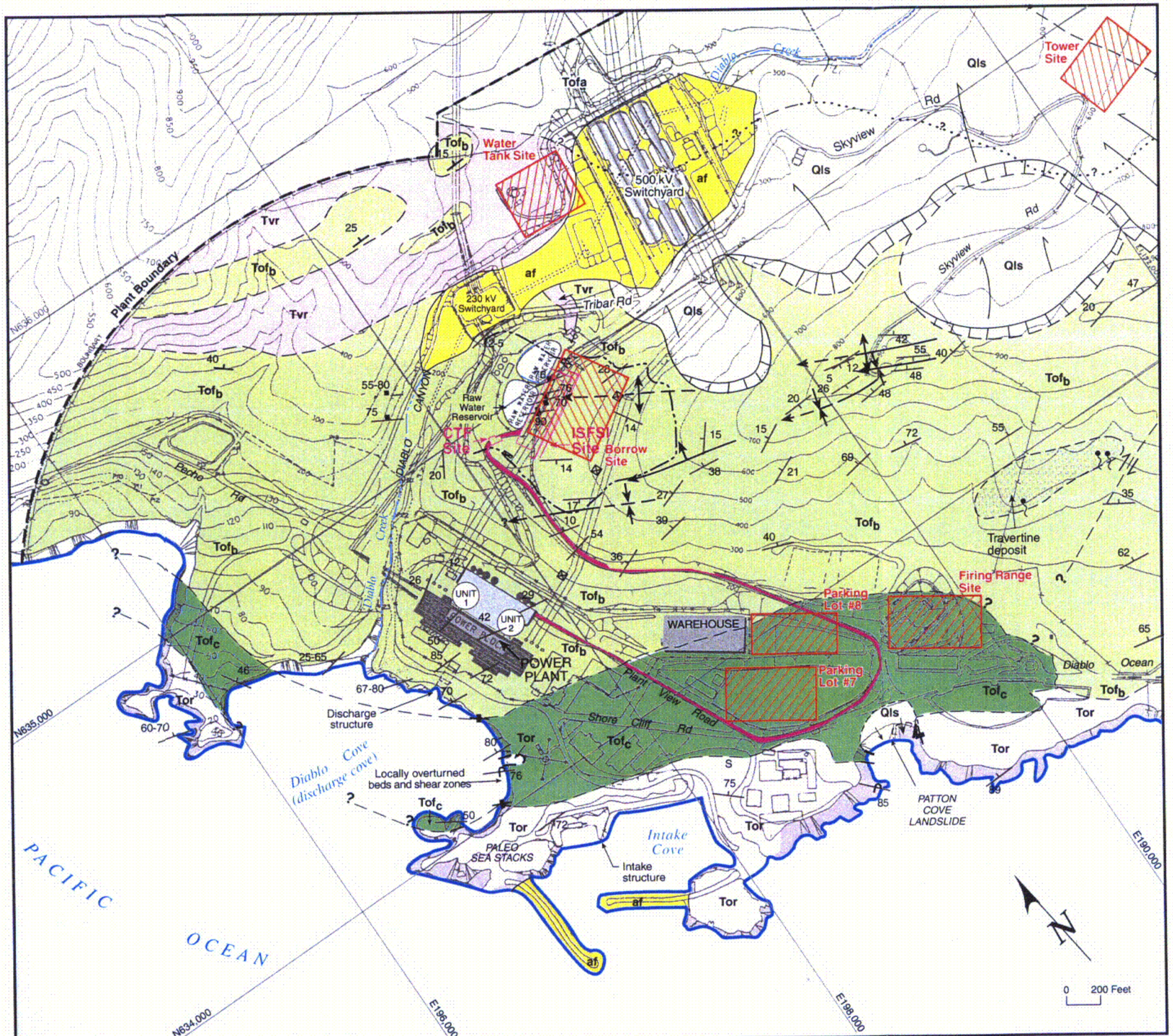
PG&E evaluated proposals from four different vendors for the Diablo Canyon ISFSI. The fuel storage systems evaluated were all dry storage systems and included:

- Canister-based dual purpose systems suitable for both storage and eventual offsite shipment
- Horizontal and vertical concrete vault systems suitable only for fuel storage

PG&E's evaluation process compared the various designs based on a number of factors including:

- Compatibility with the proposed site
- Potential radiation exposure
- Effects of postulated off-normal events
- Regulatory compliance and licensing issues
- Cost and other commercial considerations
- Engineering/licensing capability of the vendor

Based on this evaluation, PG&E selected the HI-STORM 100SA System designed by Holtec International. The HI-STORM 100SA System is a high-seismic storage system that is anchored to the storage pad. Chapter 4 of the Diablo Canyon ISFSI Safety Analysis Report contains a detailed description of the HI-STORM 100SA System.



Explanation

- **af** Artificial fill (engineered)
- **Qls** Quaternary landslide deposits

Tertiary

- **Tvr** Volcanic rock (middle Miocene), diabase intrusions of gabbro and diorite composition

Obispo Formation

(lower and middle Miocene) - bedded dolomitic sandstone, siltstone, and claystone with tuffaceous beds, locally calcareous, some chert and volcanic rock lenses

Member Tof - Sandstone and Dolomite

- **Tof_a** Unit a - Siltstone and sandy siltstone; yellow-brown to tan; thick to massive bedding; locally calcareous and diatomaceous; low to moderate hardness; low to moderate density; very blocky to blocky
- **Tof_b** Unit b - Dolomitic sandstone and dolomite; gray, yellow-brown, brown, and bluish gray; medium to very thick bedding, some units massive; moderately hard to hard; medium density; calcite and quartz veins; very blocky to blocky.
- **Tof_c** Unit c - Siliceous claystone and siltstone with lesser sandstone.
- **Tor** Member Tor - volcanic rock, zeolitized and silicified tuff.

- Fault, dashed where approximate, queried where uncertain, arrows show sense of movement
- Geologic contact, solid line where well-defined, dashed where approximate, queried and/or dotted where uncertain
- Cut or fill slope
- Large landslides. Arrows indicate direction of movement, hachures define head scarp. (Smaller landslides are not shown)
- 500 kV tower
- 10 Generalized strike and dip of bedding
- Parasitic folds on south limb of Pismo syncline
  - Axis of anticline, plunge indicated by solid arrow, dashed where approximately located
  - Axis of syncline, plunge indicated by solid arrow, dashed where approximately located
  - Axis of monocline, plunge indicated by solid arrow, dashed where approximately located
- Bedrock fault or shear zone, dashed where approximately located or buried, queried where uncertain.
- Outline of 1971 borrow excavation (ISFSI site area)
- Steep sea cliff
- 65 Strike and dip of fault
- Spring
- Firing Range Site — Investigated alternative ISFSI sites

Note: Except small faults at and near the ISFSI site, only major geologic structures and bedrock units, and large landslides, are shown.

Data sources

Base Map: PG&E Civil Site Facilities Layout Plan (modified 1994)
Compilation from air photos, PG&E Flight 753A, 1987 (scale 1:7,200)

Geology modified from Hall (1973) and Hall and others (1979)

Topography from PG&E, 1986 (and later revisions) Plot plan drawing 471124

ENVIRONMENTAL REPORT

DIABLO CANYON ISFSI

FIGURE 8.1-1
LOCATION OF CANDIDATE SITES

C04

CHAPTER 9

ENVIRONMENTAL APPROVALS AND CONSULTATION

CONTENTS

CHAPTER 9

ENVIRONMENTAL APPROVALS AND CONSULTATION

9.1 PERMITS AND LICENSES

In addition to approval from the NRC, various other permits and licenses will be required during the design, licensing, construction, and operation of the Diablo Canyon ISFSI, as described below.

9.1.1 LOCAL AND COUNTY

The local and county permits required to build the Diablo Canyon ISFSI are described in ER Section 9.2.

9.1.2 STATE OF CALIFORNIA

The State of California permits and associated permitting processes necessary to authorize construction and operation of the Diablo Canyon ISFSI are described in ER Section 9.3.

9.1.3 FEDERAL GOVERNMENT

The NRC is the primary federal agency having jurisdiction over the Diablo Canyon ISFSI. PG&E has periodically met with the NRC prior to submittal of the license application to ensure that compliance with regulations is understood and met. PG&E will maintain contact with the NRC throughout licensing, construction and operation of the Diablo Canyon ISFSI to ensure regulatory compliance. In addition, PG&E may meet with the Occupational Safety and Health Administration (OSHA), as appropriate; to ensure all applicable OSHA requirements are understood and met.

9.2 LOCAL AND COUNTY

PG&E must obtain a building permit and a grading permit from the County of San Luis Obispo Building Department for the construction of the Diablo Canyon ISFSI. Neither permit will be issued until a Diablo Canyon ISFSI Coastal Development Permit (CDP) is approved for the construction of the Diablo Canyon ISFSI. The CDP process for the Diablo Canyon ISFSI is described in ER Section 9.3.

9.3 STATE OF CALIFORNIA

At the State level, the principal regulatory instrument potentially affecting the Diablo Canyon ISFSI project is the County of San Luis Obispo General Plan (General Plan). The County of San Luis Obispo acts as the lead agency on behalf of the State. The General Plan was adopted pursuant to the authority vested in the County of San Luis Obispo by the State of California, including but not limited to the State Constitution, the Government Code, the California Environmental Quality Act (CEQA), the Coastal Act, the Housing Act, the Subdivision Map Act, the Health and Safety Code, and the Surface Mining Reclamation Act. The General Plan reflects the policies of the California Coastal Act of 1976 (Coastal Act), which mandates that local governments prepare a land use plan schedule of implementing actions to carry out the policies of the Coastal Act. Accordingly, the General Plan includes the Local Coastal Program (LCP) consisting of the Coastal Zone Land Use Ordinance (CZLUO), the Land Use Element (LUE), Local Coastal Plans and Coastal Plan Policies (CPP). The LCP addresses specific issues of shoreline access for the public, visitor-serving facilities, coastal-dependent industrial and energy-related facilities and activities, protection of sensitive habitats, as well as protection and preservation of visual and scenic resources.

The provisions of the General Plan require that an applicant obtain a Coastal Development Permit (CDP). Additional County regulations for the use and development of the land include the Real Property Division Ordinance and the Building and Construction Ordinance.

The CDP application for the Diablo Canyon ISFSI will be subject to an environmental determination as required by the CEQA. The County of San Luis Obispo Environmental Coordinator will make one of the following determinations regarding the proposed project: (a) the project may be found to be exempt from the provisions of CEQA, (b) the project may be eligible for a negative declaration by the decision-making body pursuant to CEQA, or (c) the project may require preparation and certification of a final environmental impact report (EIR) by the decision-making body pursuant to CEQA. (Section 23.02.034b.(1) of the CZLUO)

The CDP application will require archaeological, botanical, biological, noise, and visual analysis reports, as well as other information (Section 23.01.043 of the CZLUO). This information has been developed by PG&E and has been included in this ISFSI license application.

The CDP application will include notification of the following agencies: (Section 23.02.026 of the CZLUO)

Air Pollution Control Board
California Coastal Commission
Regional Water Quality Control Board
County of San Luis Obispo Engineering
Fire and Health Department

The Central Coast Regional Water Quality Control Board (RWQCB) issues permits and oversees enforcement for discharges to the waters of the State. Diablo Canyon Power Plant has an existing industrial National Pollutant Discharge Elimination System (NPDES) permit, which incorporates all discharges within the plant site boundary. It is anticipated that the NPDES permit will not require modification for the ISFSI because (a) there will be no industrial discharges from the dry storage units, and (b) stormwater discharges from the ISFSI will flow to existing, permitted discharge points that are already described as stormwater pathways.

It is anticipated that under the planned Phase II implementation of the National Storm Water Program, PG&E will apply for an NPDES Construction Stormwater Permit. This permit will contain provisions and conditions applicable to the management of storm runoff during the ISFSI construction phase only.

The San Luis Obispo County Air Pollution Control District (APCD) has permit authority under the California Clean Air Act over direct emissions sources in the Diablo Canyon ISFSI area. The permit authority enables the APCD to determine if the proposed project exceeds the APCD significance thresholds for significant air quality impacts from land use projects, and if mitigations are required (23.06.082a.1 of the CZLUO). Since the Diablo Canyon ISFSI emissions sources will be construction equipment brought onsite temporarily, the APCD may require a permit for these sources of emissions. If the APCD determines that the proposed construction activities require permitting, PG&E will submit an "Application for Authority to Construct," which serves as a permit application. PG&E may elect to contractually require vendors supplying the equipment to obtain any necessary permits from the APCD.

Coastal-dependent industrial facilities are encouraged to locate or expand within existing sites and shall be permitted long-term growth (page 4-2 of the LCP/LUE/CPP and Section 30260 of the Coastal Act).

The construction or operation of new power plants and expansion or alterations to existing plants is governed by the Coastal Act policy. The Coastal Act recognizes that power generating and other facilities, which may be incompatible (to some extent) with coastal resources protection goals, are necessary for the social and economic well being of the state and nation. Section 30001.2 of the Coastal Act provides the basis for allowing this type of development in the coastal zone. (LCP/LUE/CPP Policy 12-E, page 4-14)

As with the General Plan, the State requires that archaeological resources (Section 30244 of the Coastal Act), visual and scenic resources (Section 30251 of the Coastal Act), air quality (Section 30253.(3) of the Coastal Act) and biological resources, including marine resources (Sections 30230, 30231 and 30240 of the Coastal Act) shall be addressed during the coastal land use permit process (LCP/LUE/CPP Chapters 10, 12, 13).