Pre-decisional Information
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ENVIRONMENTAL ASSESSMENT RELATED TO THE CONSTRUCTION AND OPERATION OF THE HUMBOLDT BAY INDEPENDENT SPENT FUEL STORAGE INSTALLATION

DOCKET NO. 72-27
PACIFIC GAS AND ELECTRIC COMPANY

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Division of Waste Management and Environmental Protection

DRAFT May 2005 DRAFT

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ACRONYMS

ALARA:	As low as reasonably achievable
ANSI/ANS:	American National Standards Institute / American Nuclear Society
CCC:	California Coastal Commission
CEC:	California Energy Commission
CMP:	Coastal Management Plan
CFR:	Code of Federal Regulations
DOE:	U.S. Department of Energy
EA:	Environmental Assessment (prepared by the NRC)
ER:	Environmental Report (submitted by PG&E)
FONSI:	Finding of No Significant Impact
GTCC:	Greater than Class C waste
HI-STAR HB:	Holtec International's HI-STAR 100 dry cask storage system modified for the Humboldt Bay spent fuel
HBPP:	Humboldt Bay Power Plant
ISFSI:	Independent Spent Fuel Storage Installation
MLLW:	Mean lower low water
MPC:	multi-purpose canister
NCRWQCB:	North Coast [CA] Regional Water Quality Control Board
NCRP:	National Council on Radiation Protection and Measurements
NOAA Fisheries:	U.S. National Oceanographic & Atmospheric Administration National Marine Fisheries Service
NRC:	U.S. Nuclear Regulatory Commission
NRHP:	National Register of Historic Places
PG&E:	Pacific Gas & Electric Company
REMP:	Radiological and Environmental Monitoring Program
RFB:	refueling building
SAR:	Safety Analysis Report (submitted by PG&E)
SER:	Safety Evaluation Report (prepared by the NRC)
SHPO:	State Historic Preservation Officer
USFWS/AFWO:	U.S. Fish & Wildlife Service / Arcata [CA] Fish and Wildlife Office

1.0 INTRODUCTION

By letter dated December 15, 2003, Pacific Gas and Electric Company (PG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC), requesting a site-specific license to build and operate an Independent Spent Fuel Storage Installation (ISFSI), to be located on the site of the Humboldt Bay Power Plant (HBPP), in Humboldt County, California. PG&E provided supplemental information by electronic mail on July 14, 2004 in response to two questions for clarification from the NRC staff.

A holder of an NRC license for a power reactor under 10 CFR Part 50 can construct and operate an ISFSI at that power reactor site under the general license provisions of 10 CFR Part 72, or may apply for a separate site-specific license. PG&E has applied for a site-specific license for the proposed Humboldt Bay ISFSI in accordance with the applicable regulations in 10 CFR Part 72.

1.1 Background

The HBPP consists of five electric generation units. Unit 3, a boiling water reactor, operated for approximately 13 years before being shutdown for a refueling in July 1976 (PG&E, 2003a). It has remained inactive since that time. PG&E received a construction permit for the HBPP on October 17, 1960. A provisional operating license, DPR-7, was issued in August 1962, with commercial operation of the Unit 3 reactor beginning in August 1963. On May 17, 1976, the NRC issued an order that required completion of seismic design upgrades and resolution of additional geologic and seismic concerns. In 1983, PG&E concluded that the necessary modifications were not economical and chose to decommission Unit 3. In 1988, the NRC approved the SAFSTOR[1] plan for Unit 3 and amended the plant's license under 10 CFR Part 50 to a "possession only" license that expires on November 9, 2015. PG&E currently stores spent fuel from previous HBPP operations in the Unit 3 spent fuel pool.

1.2 Need for the Proposed Action

Removal of the spent fuel from the HBPP Unit 3 spent fuel pool to the proposed ISFSI would permit the dismantling of the existing radioactive reactor structures, thereby providing for earlier decommissioning of the HBPP Unit 3 facility. This would allow earlier termination of the SAFSTOR license and restoration of most areas on site to unrestricted use.

Transfer of the fuel to dry storage in an ISFSI also would result in lowered operational costs for PG&E. In contrast with the currently-used wet storage method (*i.e.*, storage in the spent fuel pool), dry storage in an ISFSI is a passive storage process that does not require extensive

[1] SAFSTOR is a method of decommissioning in which the nuclear facility is placed and maintained in such condition that the nuclear facility can be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use (NRC, 2004).

operating equipment or personnel to maintain. The dry storage process would reduce both the amount of effluents generated by the existing SAFSTOR operation and the amount of solid radioactive wastes generated.

1.3 Scope

The NRC staff is reviewing PG&E's request in accordance with the requirements under 10 CFR Part 72 for ISFSIs and under the environmental protection regulations in 10 CFR Part 51. This document provides the results of the NRC staff's environmental review; the staff's radiation safety review is documented separately in a Safety Evaluation Report.

The NRC staff has prepared this Environmental Assessment (EA) in accordance with NRC requirements in 10 CFR 51.21 and 51.30, and with the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC, 2003). In 40 CFR 1508.9, the Council on Environmental Quality defines an EA as a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

This review will not address either the decommissioning of Unit 3 following transfer of the spent fuel to the ISFSI, or the transportation of the fuel offsite to a permanent federal repository.

1.4 Previous Environmental Assessments and Supporting Documents

Among the documents evaluated in the preparation of this EA were:

- "Humboldt Bay Independent Spent Fuel Storage Installation Environmental Report" (PG&E, December 2003a), and amendments thereto;
- "Humboldt Bay Independent Spent Fuel Storage Installation Safety Analysis Report" (PG&E, December 2003b);
- NUREG-1166, "Final Environmental Statement for Decommissioning Humboldt Bay Power Plant, Unit 3" (NRC, April 1987); and
- "Holtec International HI-STORM 100 Cask System Amendment 1 Safety Evaluation Report" (NRC, July 2002).

Additional references may be found in Section 10.0 of this EA.

2.0 THE PROPOSED ACTION

The proposed action is for PG&E to construct, operate, and decommission an ISFSI at the HBPP site. The ISFSI would provide temporary dry storage capacity for the spent nuclear fuel that PG&E currently stores in the HBPP spent fuel pool, located in the shut-down Unit 3. The proposed ISFSI is intended as an interim facility consisting of an in-ground concrete structure with storage capacity for six shielded casks. Five casks would contain spent nuclear fuel and one would contain Greater-than-Class C (GTCC) waste. (GTCC waste is low-level radioactive waste generated by the commercial sector that exceeds NRC concentration limits for Class C low-level waste, as specified in 10 CFR 61.55). All such spent fuel and GTCC waste to be placed in the casks was generated from prior HBPP operations. The spent fuel would be stored in the ISFSI until the U.S. Department of Energy (DOE) takes possession and transports the spent fuel offsite to a federal repository, or until PG&E elects to transfer the spent fuel to another acceptable offsite interim storage facility, if one becomes available.

2.1 Location of the Proposed Action

The Humboldt Bay ISFSI would be sited on the northern California coast in Humboldt County, approximately 4.8 kilometers (3 miles) southwest of the city of Eureka and approximately 402.3 km (250 mi) north of San Francisco. An area map is shown in Figure 1. PG&E owns 143 acres of land area along the mainland shore of Humboldt Bay and the intertidal areas extending approximately 150 meters (500 feet) into Humboldt Bay from this land area. The proposed ISFSI would be located within the HBPP site boundary on a small peninsula known as Buhne Point.

2.2 Description of Proposed ISFSI and Dry Cask Storage System

As described in PG&E's application, the proposed ISFSI would consist of (1) the dry cask storage system, (2) an on-site cask transporter, and (3) an in-ground vault. For the storage system, PG&E has selected the HI-STAR 100 dry cask storage system manufactured by Holtec International with modifications for the Humboldt Bay spent fuel. The Humboldt Bay site-specific design is referred to as HI-STAR HB.

PG&E would use the HI-STAR HB Cask System to load, transfer, and store the HBPP spent fuel. The system consists of a multi-purpose canister (MPC) that contains the fuel and a HI-STAR HB overpack (cask) which contains the MPC during transfer and storage. These two components are described generally below; a more detailed description is contained in PG&E's application (PG&E, 2003a).

The MPC is a welded, cylindrical structure with flat ends and a honeycomb fuel basket. The structural function of the MPC in the storage mode is to (1) position the spent fuel in a sub-critical configuration, and (2) provide a confinement boundary.

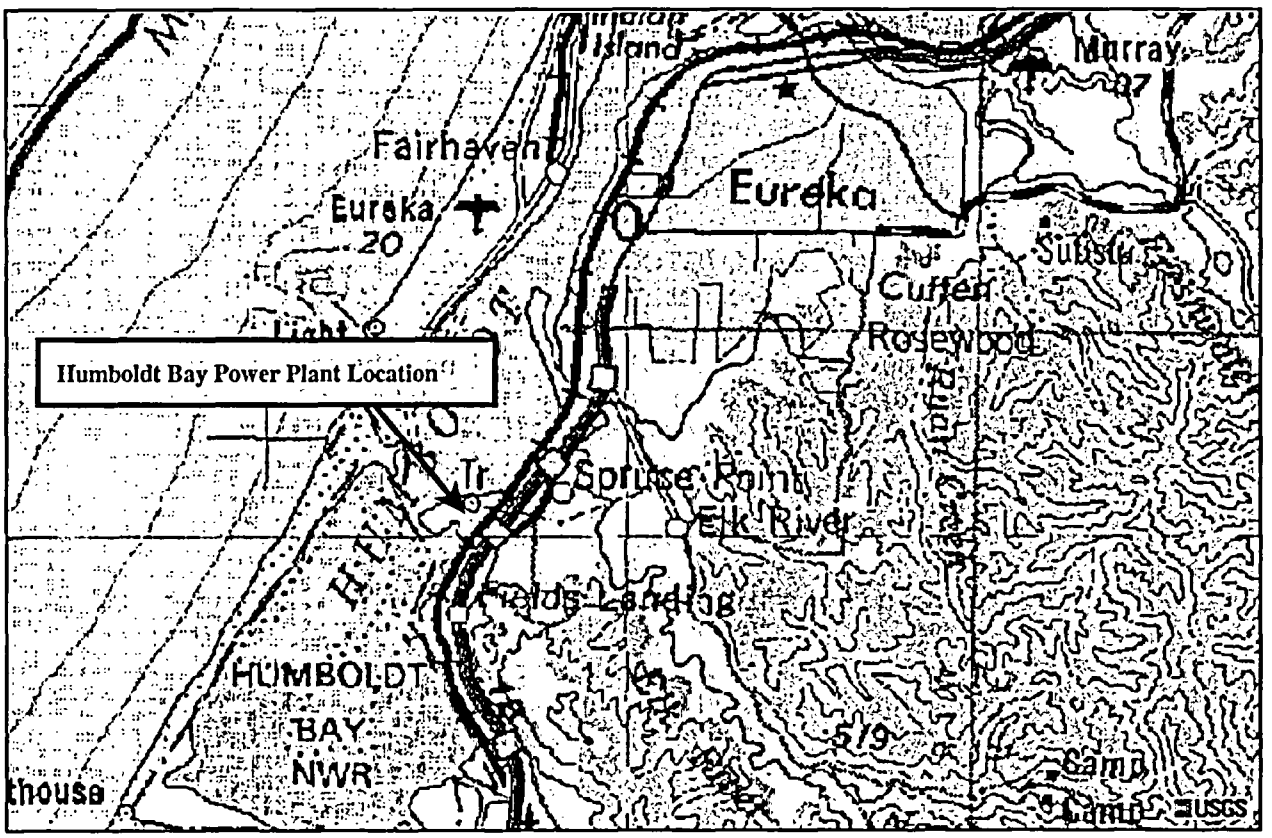

Figure 1. Humboldt Bay Power Plant and Its Environs (USGS, 2005 figure as modified)

The closure system for the MPC consists of two components; the MPC lid and closure ring. The MPC lid is a thick, circular ring plate that is welded to the MPC shell and lid. The MPC lid is equipped with vent and drain ports, which are used for evacuating moisture and air from the MPC following fuel loading and the subsequent backfilling with helium. The vent and drain ports are covered by a cover plate and welded shut before the closure ring is installed. The seal-welded closure ring provides redundant closure of the MPC lid and cover plate confinement closure welds.

The HI-STAR HB overpack is a heavy, cylindrical, multilayered steel vessel. It serves as a missile barrier and radiation shield, in the storage mode. The multilayered approach eliminates the potential for a crack in any one layer to travel uninterrupted through the vessel wall, thus lessening concerns over brittle fracture at low temperature. The overpack also is equipped with lifting trunnions to facilitate handling of a loaded cask.

The HI-STAR HB system is designed to accommodate intact fuel assemblies, damaged fuel assemblies, and fuel debris. The damaged fuel assemblies and fuel debris must be placed in a damaged fuel container, which is designed to confine gross fuel particulates to a known,

sub-critical geometry. The physical characteristics of the spent fuel assemblies to be stored are described in greater detail in Section 3.1 of the Humboldt Bay ISFSI Safety Analysis Report (SAR) (PG&E, 2003b).

The movement of the HI-STAR cask system from the Unit 3 refueling building (RFB) to the ISFSI will be accomplished using a tracked transporter. PG&E proposes to use the transporter developed for the Diablo Canyon Power Plant ISFSI. The HI-STAR HB may also be licensed under 10 CFR Part 71 for offsite transport of the spent fuel; however, that is outside the scope of the proposed action.

The storage vault would be comprised of six below-grade, cylindrical storage cells that are structural units constructed of steel-reinforced concrete with a carbon steel liner. Each storage cell would be approximately 2.7 m (9 ft) in diameter by 3.5 m (11-1/2 ft) deep. The bottom of the vault would be constructed of 0.9 m (3 ft) thick reinforced concrete, with the end walls of approximately 2.1 m (7 ft) thick and the longitudinal (side) walls of 1.7 m (5-1/2 ft) thick concrete. The concrete wall thickness would vary around the circumference of the storage cells and have a minimum thickness of approximately 0.2 m (9 inches) to 0.3 m (1 ft) of concrete between adjacent cells. Each of the storage cells would accommodate one cask (either a loaded HI-STAR HB overpack or the GTCC cask). The elevation of the vault top (without the storage cell lids installed) would be approximately flush with grade, with the lids approximately 0.4 m (16-1/4 inches) high, not including the height of the lid bolt caps.

2.3 Planned Activities

PG&E has identified three phases to the HBPP ISFSI project: construction, operation, and decommissioning.

2.3.1 Construction

The major construction elements of the Humboldt Bay ISFSI would be (1) the ISFSI vault structure, (2) an associated security building, (3) the transport route modification from the RFB, and (4) installations and minor modifications inside the RFB. Construction is expected to take approximately 6 months, with activity occurring generally during daylight hours. Activities would be confined to the area within the HBPP site boundaries, with the construction limited to the vicinity of the ISFSI site and the nearby, onsite excavation spoils disposal area.

Construction of the ISFSI storage vault would require the removal of vegetation, soil excavation, spoils disposal, forming and pouring the concrete vault structure, and excavation backfill. PG&E estimates that approximately 917 cubic meters (1200 cubic yards) of material would be excavated using standard earthmoving equipment and disposed onsite at the spoils disposal site. Another approximately 765 m^3 (1000 yd^3) would be moved around during construction and used at the ISFSI for final site contouring. Concrete for the ISFSI vault would be obtained from offsite sources. The in-ground vault, with dimensions of approximately 6.1 m x 23.2 m (20 ft x

76 ft), is designed to accommodate the six storage casks.

A single-story security building would be constructed for the ISFSI. The security building would be approximately 6.1 m x 12.2 m (20 ft x 40 ft) and no more than 6.1 m (20 ft) in height. It would be located outside the security fencing for the ISFSI, to the east of the vault, and there would be water, sewer, electrical, and telephone connections to the security building. Construction of the security building would involve minor excavation in order to install the footing and foundation for the building, with concrete for this operation delivered from offsite. Lumber, glass, and insulation also may be brought to the ISFSI security building construction site. Other auxiliary security components of the ISFSI include the installation of chain-link fencing, perimeter lighting, and security surveillance monitoring equipment.

A road approximately 7.9 m (26 ft) wide and surfaced appropriately for the loading would provide the transport route from the RFB to the ISFSI site. The existing oil supply road would be widened from 5.5 m to 7.9 m (18 ft to 26 ft) for this purpose and extended approximately 61 m (200 ft) to the proposed ISFSI site.

Additionally, inside the RFB, PG&E would install a cask handling crane and a rail dolly for transporting the casks into and out of the building.

2.3.2 Operation

The second phase of the project, operation of the ISFSI, involves pre-operational testing, transfer of the spent fuel from the spent fuel pool to the ISFSI, closure of the vault, and operational monitoring.

Before any fuel would be moved from the spent fuel pool for placement in the ISFSI, PG&E would perform pre-operational and start-up testing of the relevant equipment. These pre-operational tests would be performed on the davit crane, the transporter, and all ancillary storage system components, such as the automated welding and drying systems. The startup testing plan would be used to verify the performance of the storage system and to ensure that plant equipment meets the functional requirements identified in the ISFSI Safety Analysis Report. Mock-ups and actual plant equipment would be used during start-up activities.

The spent fuel storage process would begin in the HBPP Unit 3 RFB, where a HI-STAR HB cask, with an empty MPC inside, would be lowered into the spent fuel pool. Spent fuel assemblies then would be loaded into the MPC and verification of the assembly identification provided. While still underwater, a thick MPC lid would be installed for shielding. When the HI-STAR HB cask is removed from the spent fuel pool, the lift yoke, cask, and top of the MPC would be rinsed down. Once removed from the spent fuel pool, the top surfaces of the MPC lid and the upper flange of the cask then would be decontaminated. Dose rates would be measured at the cask to ensure that they fall within expected values. The MPC lid would then be seal-welded and all liquid water removed from the MPC.

Following successful completion of a dryness test, the MPC would be backfilled to a pre-determined pressure of helium gas. The backfill ensures adequate heat transfer during storage, and provides an inert atmosphere for long-term fuel integrity. Cover plates then would be installed and seal-welded over the MPC vent and drain ports. To provide redundant closure of the MPC lid and cover plate confinement closure welds, the MPC closure ring is placed on the MPC and seal-welded. The MPC lid and accessible areas of the top of the MPC shell would be smeared, tested, and checked for removable contamination and the HI-STAR cask dose rates measured. The overpack top next would be installed and the lid studs and nuts torqued.

After the overpack top lid is installed, the loaded HI-STAR HB system would be rigged to the onsite transporter and transferred to the ISFSI vault. Once in the vault, no active components would be needed to ensure safe storage of the spent fuel.

2.3.3 Decommissioning

Prior to the end of the Humboldt Bay ISFSI's operational life, the HI-STAR HB casks containing the spent fuel elements and GTCC waste would be removed from the vault and transported offsite. The system is designed to allow the spent fuel to remain sealed inside the MPCs such that decontamination of the casks is not required.

Following shipment of the casks offsite, the Humboldt Bay ISFSI would be decommissioned through the following steps:

- the timely identification and removal of any residual radioactive materials above the applicable NRC limits for unrestricted use;
- performance of a final radiological survey;
- release of the site for unrestricted use in accordance with Regulatory Guide 1.86 (NRC, 1974), and
- termination of the NRC SAFSTOR license.

Preliminary details on PG&E's plans for decommissioning are provided in its Humboldt Bay ISFSI application, Attachment F, " Preliminary Decommissioning Plan" (PG&E, 2003a).

2.4 Duration of the Proposed Action

Upon NRC approval, the HBPP ISFSI would be licensed for a period of 20 years, as specified in 10 CFR 72.42, plus an additional period of up to several years for decommissioning. Decommissioning of the ISFSI could commence prior to the license expiration date, but in any case, it would not begin until after the spent fuel being stored in the ISFSI is transferred to a permanent disposal facility or to another offsite interim storage facility. At the end of the 20-year license period, a licensee may request renewal of its ISFSI license, subject to further NRC review and approval.

3.0 ALTERNATIVES TO THE PROPOSED ACTION

3.1 No Action Alternative

Under the "no action" alternative, PG&E would continue to store the spent fuel from prior operations at the HBPP in the spent fuel pool in Unit 3. PG&E would continue to conduct approved and appropriate maintenance and monitoring. Unit 3 would remain under the SAFSTOR license.

Under this alternative, PG&E would not be permitted to completely dismantle the existing HBPP Unit 3 radioactive reactor structures, and therefore would not be able to decommission the Unit 3 facility to allow unrestricted use, and thus could not terminate the SAFSTOR license. PG&E would continue to incur the costs associated with maintaining and monitoring the spent fuel pool, the management of solid radioactive wastes, and the monitoring of effluents generated by the existing SAFSTOR operation.

3.2 Building a New Storage Pool

Alternately, PG&E could construct a new storage pool and support facilities separate from the existing HBPP Unit 3. This would allow PG&E to decommission the Unit 3 facility. However, in addition to requiring the same support facilities, maintenance and surveillance as for the current spent fuel pool, a new storage pool would require new fuel handling equipment, a large capacity cask crane, building ventilation, and a water quality system. The fuel would be moved from the current fuel pool to the new pool and would require some type of dry cask transfer system to safely move the fuel.

This alternative increases the number of times a fuel assembly is handled and, consequently, the potential occupational exposure to the workers. The additional maintenance and surveillance activities to support operation of the new pool would also result in higher worker exposures. This alternative also has a high cost, due to construction of the new pool and facilities, and for the dry transfer system needed to transfer the fuel. For these reasons, building a new fuel pool is not considered a viable alternative and is eliminated from further detailed study.

3.3 Shipment Offsite

PG&E could ship the spent fuel offsite. This would permit PG&E to proceed subsequently with dismantling and decommissioning of the Unit 3 facility. Termination of the HBPP SAFSTOR license could then follow. In addition, there would be no environmental impacts associated with construction, operation, and decommissioning of an ISFSI. However, radiological and non-radiological impacts resulting from the packaging and transfer of the spent fuel for shipment and from the transportation of the fuel to the alternate site would need to be assessed.

The alternatives of shipping spent fuel from HBPP to a permanent federal repository, to a reprocessing facility, or to a privately-owned spent fuel storage facility are not reasonable given that no such facilities are currently available in the United States. Although reprocessing facilities exist in other countries, the political, legal, and logistical uncertainties and the high cost of shipping spent fuel overseas also make this alternative not viable.

PG&E could ship the HBPP spent nuclear fuel to another nuclear power plant with sufficient storage capacity. The receiving utility would need to be licensed to accept the HBPP spent nuclear fuel and would have to be willing to accept the fuel. Because most nuclear power plant operators are expected to face their own limitations on spent fuel storage capacity, PG&E felt it unlikely that other operators would be willing to accept spent fuel owned by another company. Shipment to a PG&E-owned facility (*e.g.*, the Diablo Canyon Power Plant) would be subject to similar considerations.

3.4 Siting Alternatives

PG&E evaluated several sites within its HBPP-controlled area as potential locations to construct the ISFSI. This evaluation is discussed in Chapter 8 of the ER (PG&E, 2003a). Evaluation criteria addressed (1) design parameters for the vault and associated separation and security needs; (2) site-specific geological and geotechnical issues (*e.g.*, bearing capacity of the foundation, flood hazards, landslide potential); (3) specifications for the transfer route from the RFB; (4) impacts to existing facilities; (5) minimization of environmental impacts; (6) as low as reasonably achievable (ALARA) issues, operational efficiency, and cost considerations.

PG&E selected five candidate sites for additional study using the criteria defined above. The site chosen by PG&E is located northwest of the plant in an area that was previously disturbed during the original HBPP construction and by on-going HBPP operational activities. Its elevation would minimize effects from tsunamis, the proposed in-ground vault would be above the water table at that location, and the distance from all known faults would be maximized. In addition, the existing fossil fuel operating units would be located outside the 100-meter (328-foot) isolation zone required under 10 CFR §72.106. Finally, PG&E identified no other adverse geologic or geotechnical conditions that would preclude development of the facility at the preferred site, and the site also was judged acceptable under the other siting selection criteria.

In summary, PG&E concluded that dry cask storage of the HBPP spent fuel is the optimum alternative for providing the necessary storage, given operational and safety considerations, and the transportation requirements associated with some of the alternatives.

3.5 Dry Storage System and Vault Design Alternatives

PG&E evaluated proposals from different vendors for dry storage systems for use in the Humboldt Bay ISFSI. Each of the systems included (1) a canister-based, dual-purpose system suitable for both storage and eventual offsite shipment, and (2) horizontal and vertical concrete

vault systems suitable only for storage.

Based on its evaluation, PG&E selected a modified version of the HI-STAR system designed by Holtec International. One unique feature of the HI-STAR system to be used at Humboldt Bay is that it will be installed in an in-ground storage structure. The system will be designed to allow the spent fuel to be shipped offsite without having to transfer the fuel to a different shipping overpack (cask).

PG&E also evaluated alternative storage structures consisting of either (1) a surface pad design or (2) an in-ground vault design. PG&E selected the vault design, because it would provide a more robust structure to resist potential seismic and tsunami loadings and site industrial hazards, and it would provide maximum shielding so as to minimize radiation exposures to the public and plant workers.

4.0 AFFECTED ENVIRONMENT

4.1 Proposed ISFSI Site Description

The ISFSI would be located within the HBPP site boundary near the power plant buildings on a small peninsula known as Buhne Point, nominally at 13.4 m (44 ft) above mean lower low water (MLLW). The site is above the surrounding flood plain and wetland areas of Humboldt Bay and lies between the North Coast Railroad (formerly the Northwestern Pacific Railroad) tracks and the north shoreline of Buhne Point. The ISFSI would be located near the top of a small hill with wetlands to the east and Humboldt Bay to the west.

The terrain in the vicinity of the HBPP rises rapidly from the bay on the north side to an elevation of approximately 21 m (69 ft) MLLW at the Buhne Point peninsula. Terrain to the north and east of the site is generally flat. To the south and east, the land rises rapidly within 3.2 km (2 mi) of the proposed ISFSI to Humboldt Hill, at an elevation of over 150 m (500 ft) MLLW and the site of several small neighborhoods. As a whole, Humboldt County is mostly mountainous except for the level plain that surrounds Humboldt Bay.

4.2 Land Use

The proposed Humboldt Bay ISFSI site is located on the northern California coast in Humboldt County, approximately 4.8 km (3 mi) southwest of the city of Eureka. PG&E owns 143 acres of land area along the mainland shore of Humboldt Bay and the intertidal areas extending approximately 150 m (500 ft) into Humboldt Bay from this land area.

At the HBPP, PG&E has full authority to control all activities within its property lines. As stated previously, the HBPP consists of four electric generation units that are currently operating and Unit 3, which is not in use. Units 1 and 2 are collocated conventional 53 megawatt-electric

(MWe) units capable of operating on fuel oil or natural gas. Unit 3 is located in a separate building, adjacent to Unit 2. Two gas turbines, rated at 15 MWe each, are located in the vicinity of the Units 1, 2, and 3 structures. The four generating units and Unit 3, as well as the plant site, are owned by PG&E.

Humboldt Bay and the surrounding lowlands comprise the region south, east, and west of the site. The lowland areas around the site are primarily vacant land and are used to a limited extent for grazing beef cattle. Humboldt Hill is the dominant feature southeast of the site. Most of the mountainous area east and southeast of the site is inaccessible.

The City of Eureka, with a population of approximately 26,000, is the largest population center in Humboldt County. Within 8 km (5 mi) of the ISFSI site, there are several small residential communities including: King Salmon, Humboldt Hill, Fields Landing, and the suburban communities surrounding Eureka. King Salmon is located to the west of the ISFSI site, adjacent to the site location, while Fields Landing is located approximately 0.4 mile south. No major new developments are currently planned for the area within 8 km (5 mi) of the ISFSI site.

A total of nine farms and ranches and one community vegetable garden have been identified within 8.0 km (5 mi) of the proposed ISFSI site. The primary local farming products are dairy products, cattle, goats, and llamas. Most of the dairies are located along the Elk River to the north of the proposed ISFSI, while the coastal lowlands are used primarily for cattle grazing and ranching. The nearest dairy, which produces approximately 3028 liters (800 gallons) of milk per day, is located 2.9 km (1.8 mi) east of the site. The nearest vegetable garden is the Wiyot Tribe community vegetable garden located approximately 6.8 km (4.2 mi) southwest of the site.

The primary industry in the area, and in Humboldt County, is lumber and lumber/paper manufacturing. Lumber production in Humboldt County in 2000 was valued at $285.5 million. A lumber-loading shipyard is located on Humboldt Bay less than 1.6 km (1 mi) south of the ISFSI site.

The ISFSI site is located in the vicinity of several ports that support commercial and sport fishing activities, and a public trail to access a breakwater for recreational fishing crosses the proposed controlled area for the ISFSI. Among the fish harvested are sole, rockfish, salmon, and tuna, along with crabs and shrimp and prawns.

Visitors are attracted to the area by the numerous state and county parks both along the coast and in the inland forests. In addition to the small beach on the western side of the peninsula, there are public beaches located along Humboldt Bay and the Pacific Ocean coast that are popular with local residents as well as tourists. Much of the coastal area on the inside of the bay falls within the boundaries of the Humboldt Bay National Wildlife Refuge, which is within 8 km (5 mi) of the proposed ISFSI site.

4.3 Demography

The population distribution and projections for areas around the proposed ISFSI site are based on the Year 2000 census and on estimates prepared by the California Department of Finance (California Department of Finance, 2004). The area within 80.5 km (50 mi) of the ISFSI includes most of Humboldt County and a small portion of Trinity County. Approximately 50 percent of the area within the radius is on land, with the balance being Humboldt Bay and the Pacific Ocean. In general, the portion of California that lies within 80.5 km (50 mi) of the ISFSI is relatively sparsely populated, with the exception of a few urbanized areas along the coast.

According to the 2000 Census (U.S. Census Bureau, 2004), the population of Humboldt County was 126,518 and the population of Trinity County was 13,022. Humboldt County has seven incorporated cities ranging in size from approximately 300 to 26,000 persons. Approximately 67,000 of county residents reside in unincorporated communities. The nearest population center to the proposed ISFSI site, the City of Eureka, had a population of 26,128 in 2000.

There are numerous schools located within 16.1 km (10 mi) of the proposed ISFSI site, particularly in the population centers. Several K-12 schools are located within 8 km (5 mi) of the site, serving the City of Eureka and neighboring communities. Humboldt State University, with an enrollment of approximately 7,500 students, is located in the City of Arcata approximately 24.1 km (15 mi) northeast of the ISFSI site. The College of the Redwoods is located within 8 km (5 mi) of the site just south of the City of Eureka and has an enrollment of approximately 5,000 full and part-time students.

In addition to the resident population, there is a seasonal influx of vacation and weekend visitors within a 80.5-km (50-mi) radius, especially during the summer months. The influx is heaviest in the area around Humboldt Redwoods State Park (located about 72.4 km (45 mi) south-southeast of Eureka) and along the Pacific Ocean coast north of the site in the area around the City of Trinidad. An estimated 2.1 to 2.2 million people visit the county per year (PG&E, 2003a).

4.4 Climatology and Meteorology

The climate of the greater Humboldt Bay region, including Eureka and the immediate coastal strip where the project site is located, is characterized as Mediterranean. The average annual temperature is 10.5°C (51°F), with the warmest months from July to September and the coldest months from December to February. The rainy season generally falls between November and March, with an average annual rainfall of 98.73 centimeters (38.87 inches) over the 110-year measured record at Eureka, and a maximum recorded annual rainfall of 170.76 cm (67.23 in). The wind is predominantly from the north to northwest, with a shift to the south to southeast during the winter months.

4.5 Hydrology

The proposed ISFSI site is located on a relatively flat area on Buhne Point at elevation 13.4 m (44 ft) MLLW. Surface drainage around the ISFSI area flows naturally into the existing plant drainage system. By way of the plant drain system, the surface water then discharges into the cooling water intake canal, flows through the plant, and discharges into Humboldt Bay via the cooling water discharge canal. Outside the area served by the plant drainage system, most of the surface runoff drains to the east and into the discharge canal. The remainder drains into Buhne Slough, a natural drainage for the area, which drains directly into both the intake canal and Humboldt Bay.

4.5.1 Surface Water

Several rivers and creeks drain the region around the HBPP and the proposed ISFSI site, including the Mad River, which flows west approximately 24.1 km (15 mi) northeast of the site, and the Eel River, which discharges into the Pacific Ocean approximately 12.9 km (8 mi) south of the site. Of the four major creeks that drain into Humboldt Bay, Salmon Creek and Elk River are the ones nearest to the site; both within 1.6 km (1 mi) south and north, respectively, of the ISFSI site. Salmon Creek and Elk River are used for watering livestock, but are not used as a potable water supply.

With respect to the proposed ISFSI site, the watersheds of Humboldt Bay and the bay itself are the most relevant surface water bodies. Humboldt Bay is a large, shallow body of water with deep channels, separated from the ocean by two long, narrow spits. It is a tidal bay, receiving and discharging ocean water through the inlet between the spits. The bay is approximately 22.5 km (14 mi) long, its width ranging from 0.8 km (0.5 mi) near its middle to over 3.2 km (2 mi) at the south end and 6.4 km (4 mi) at the north end, with an average depth of 3.7 m (12 ft) MLLW. Very little fresh water discharges into Humboldt Bay.

Wetlands also are present in the vicinity of the proposed ISFSI, to the east and south. Those closest to the site are classified as "freshwater emergent" or "estuarine and marine wetland" under the National Wetlands Inventory classification (U.S. Fish and Wildlife Service, 2004).

4.5.2 Groundwater

PG&E investigated groundwater in the ISFSI site area over a several-year period during the mid- to late-1980s. Two areas were investigated in detail, one near Unit 3 and one near the former wastewater pond site that is east of Unit 3. Based on information taken from borings and analysis of the stratigraphy and aquifer characteristics, several aquifers and zones of perched groundwater in the ISFSI Site Area are evident. Groundwater level and flow direction at the Humboldt Bay ISFSI is influenced by several factors, including topography, proximity to Humboldt Bay, stratigraphy, and tectonic tilting and faulting of the Hookton Formation.

4.6 Geology and Seismology

HBPP and the proposed ISFSI site are on the east flank of Buhne Point, a small headland on the eastern shore of Humboldt Bay. The site is underlain by a thick sequence of late Tertiary and Quaternary sedimentary rocks, and is capped by a late Pleistocene terrace. The main geologic formation in the area is the Pleistocene Hookton Formation that is about 335 m (1100 ft) thick beneath the ISFSI site area. Its sediments hold several of the important groundwater aquifers in the area and the region. Buhne Point is situated within the Little Salmon fault zone, and has been uplifted and tilted gently to the northeast by displacement on the fault. Mapping, borehole, trenching, and dating studies at and near the HBPP site were used to document the stratigraphy of the site (PG&E, 2003a).

Four traces of the Little Salmon fault zone are mapped in the vicinity of the ISFSI site. These include two primary fault traces: the Little Salmon and Bay Entrance faults, and two subsidiary faults: the Buhne Point and Discharge Canal faults, located in the hanging wall of the Bay Entrance fault. The Little Salmon, Bay Entrance, and Buhne Point faults all dip to the northeast and displace the Hookton Formation down to the southwest. The Discharge Canal fault dips steeply to the southwest and has down-to-the-northeast displacement. Faults in the Little Salmon Fault Zone are close to the site and have the potential to generate large-magnitude earthquakes (PG&E, 2003a).

Tsunami hazards along the coast of northern California have been recognized for many decades. The tsunami associated with the 1964 "Good Friday" Alaska earthquake was very destructive in Crescent City (approximately 136.8 km (85 mi) to the north) and caused minor runups within Humboldt Bay.

With respect to potential seismic and tsunami hazards, PG&E's evaluation of the seismology of the ISFSI site is being considered by the NRC staff in its safety review of the ISFSI application. The results of the NRC staff's review will be documented in a separate Safety Evaluation Report.

4.7 Ecology

The vicinity within 8.0 km (5 mi) of the proposed ISFSI site provides a wide array of habitats for plants and animals. Terrestrial ecological surveys identified more than 200 vascular plants and 12 vegetation communities in the area in and around the ISFSI site. Additionally, an extensive list of birds, mammals, reptiles, and amphibians is provided in the Tables 2.3-3 through 2.3-5 of the Humboldt Bay ISFSI Environmental Report (PG&E, 2003a).

PG&E-owned land near the ISFSI site was inventoried for the presence of special status plant species in 1999 and 2002. Site vegetation habitats, present in the project area (storage site, fill disposal area, and transportation route) consist primarily of disturbed coastal terrace prairie. The site has been disturbed considerably over the life of the HBPP facility, from initial

construction to the ongoing maintenance activities (e.g., mowing). Most of the species occurring on the site and related project areas are nonnative species, many of which are ruderals. Areas previously cleared of vegetation, such as along the discharge canal, access roads, and parking lots, are dominated by the ruderal species present in the disturbed grassland. A comprehensive field study in 2002 on the HBPP site did not locate suitable habitat for or any presence of plant species designated for special status by the State of California or federally listed or candidate threatened or endangered plant species (PG&E, 2003a). The western lily (*lilium occidentale*), which is federal- and state-listed as endangered and reported in the freshwater marsh south of Fields Landing (more than 1.6 km (1 mi) south of the ISFSI site), would not be affected by ISFSI-related activities at the HBPP.

Numerous special status terrestrial wildlife species occur withing the ecologically diverse and productive habitats in the vicinity of the ISFSI project site. Inventories conducted in 1999 and 2002 on PG&E-owned property, including the ISFSI site, did not indicate the presence of any of these species and found that the lack of suitable habitat made their presence unlikely (PG&E, 2003a).

In the vicinity of the project, five special-status species of fish (tidewater goby, Chinook salmon, coho salmon, steelhead, and coastal cutthroat trout) occur or have the potential to occur based on the presence of suitable habitat. An inventory of PG&E-owned land, including the ISFSI site, in 1999 and 2002 did not observe these species on PG&E property or at the ISFSI site. Lack of suitable habitat for these species indicates that they are not present at the ISFSI site. Harbor seals (*Phoca vitulina*) do not have official status as a listed endangered or threatened species, but they are protected under the Marine Mammal Protection Act. Harbor seals are year-round residents of the Humboldt Bay region. The seals haul out on tidal flats in areas remote from human activity to rest and bear their young. The Humboldt Bay National Wildlife Refuge in the southern part of Humboldt Bay is a key breeding and hauling out area used by harbor seals (PG&E, 2003a).

PG&E-owned land in the vicinity of the ISFSI site was inventoried for the presence of special status freshwater aquatic species in 1999 and 2002. Five special-status freshwater aquatic species occur in the vicinity of the ISFSI project: the northern red-legged frog, the foothill yellow-legged frog, the tailed frog, the southern torrent salamander, and the northwestern pond turtle. No special status freshwater aquatic species appear to occur at the ISFSI site (PG&E, 2003a).

A habitat assessment, conducted in August 1999 using procedures approved by the U.S. Fish and Wildlife Service, found that the ISFSI site and surrounding PG&E property have limited habitat suitable for northern red-legged or tailed frogs because of the lack of freshwater streams (PG&E, 2003a). Although no frogs or tadpoles were observed at the ISFSI site, a small stream directly east of the intake canal has limited potential to be a low-quality breeding habitat for the northern red-legged frog. Additionally, there are freshwater ponds with cattails near Highway 101 that could provide foraging and dispersal habitat for northern red-legged frogs. No suitable habitat was found for the southern torrent salamander, the foothill yellow-

legged frog, tailed frogs, or the northwestern pond turtle at the ISFSI site or on the adjacent PG&E property.

4.8 Transportation

The HBPP site area is not traversed by a public highway or a railroad. The only access to the proposed ISFSI site is from the south via King Salmon Avenue, which also serves the community of King Salmon situated on the western part of the peninsula. A public-access trail runs along the shoreline and along the fence to the northwest of the PG&E-controlled area.

The major travel access in the vicinity of the proposed ISFSI and other communities of Humboldt County is via US Highway 101, which generally traverses north-south through Humboldt County. This highway passes about 0.48 km (0.3 mi) southeast of the ISFSI site and is accessible approximately 0.56 km (0.35 mi) to the southeast of the site. Highway 101 continues north into Oregon and south to San Francisco and Los Angeles.

Commercial air traffic into and out of Humboldt County is primarily through the Arcata Airport, located in McKinleyville, approximately 25.75 km (16 mi) north of the proposed ISFSI site. The air transportation system in Humboldt County serves a range of aircraft types and aeronautical uses. Nine public-use airports are located in Humboldt County. Scheduled passenger service, typically turbo-prop planes, is only available from the Arcata Airport.

A set of North Coast Railroad tracks runs generally north-south along the southeastern PG&E property line. This rail system has been out of service since 1997. Presently, there are no existing plans to repair and reuse the tracks; however, the railroad owner and Humboldt County are considering this possibility.

The Port of Humboldt Bay is the largest marine shipping facility between San Francisco Bay, located 225 nautical miles to the south, and Coos Bay, Oregon, located 156 nautical miles to the north. Humboldt Bay can accommodate vessels up to 213.4 m (700 ft) long and 33.5 m (110 ft) wide, and weighing a total of 50,000 dead weight tons. On-board cranes and manpower are used to load and off-load cargo, as there are currently no dockside cranes in use. Seven port terminals are located on Humboldt Bay, with five of them located to the north of Eureka. The nearest terminal to the proposed ISFSI site is the Humboldt Bay Forest Product Dock, located just to the south of King Salmon, approximately 0.64 km (0.4 mi) from the HBPP. The Fields Landing lumber shipyard lies another 1.2 km (0.75 mi) or so further south along the shoreline.

There are several boat landings in the community of King Salmon, located just west of the entrance gate to the PG&E-controlled area. The community of King Salmon serves frequent commercial and recreational boat traffic.

4.9 Regional Historic, Scenic, Cultural, and Natural Features

PG&E conducted research to identify recorded or otherwise known cultural resources within or adjacent to the HBPP site, and archaeologically sensitive portions of the study area, as determined by the locations of previously recorded archaeological sites nearby and their relationship to environmental factors and topography (PG&E, 2003a). This research involved (1) a cultural resource record search for areas up to 16.1 km (10 mi) from the HBPP site; (2) examination of archival files and records for HBPP; (3) a field survey of the HBPP and ISFSI site in May 1999; (4) examination of relevant collections at public libraries; (5) review of historical literature for the area; and (6) contact with the Humboldt County Historical Society in Eureka.

At the time of Euroamerican contact, the project area was inhabited by speakers of Wiki, a dialect of Wiyot, an Algonquian language. The Wiyot, who are thought to have arrived in the North Coastal areas at approximately 900 A.D., settled along the Pacific coast, Humboldt Bay, and along the major streams of the area, such as the Mad River. No ethnographic sites are located within the area. According to a map of ethnographic site locations made near the turn of the century, one village site was located adjacent to the project on Buhne Point, but apparently it had been washed away by 1918.

There are no archaeological resources listed on national or state registries that are located within 8.0 km (5 mi) of the proposed ISFSI. However, within a 8-km (5-mi) radius of HBPP, there are approximately 30 recorded archaeological sites that have not been evaluated with regard to their eligibility for listing in national or state registers. The archeological site that lies closest to HBPP is CA-HUM-79, located about 0.8 km (0.5 mi) away. This site was examined in 1976 and again around 1983, when a U. S. Army Corps archaeologist found that it had little or no integrity.

No cultural resources were identified within the HBPP site during the current study. Considering the amount of ground disturbance that has taken place in the project area in the past, it is highly unlikely that additional unidentified resources may be present. However, certain conditions, such as dense vegetation or pavement, may have prevented a resource from being detected during the inventory.

PG&E's review of the historic literature indicated that the ISFSI site area was the location of the first town adjacent to Humboldt Bay and was settled by 1850. Due to the amount of earth-moving activities related to construction of the HBPP, it is unlikely that remnants of the town or any prehistoric remains would be identified during future construction activities.

Key factors of Unit 3 will not be impacted by the proposed action. PG&E is considering a future listing of the HBPP Unit 3 facility with the National Register of Historic Places (NRHP) for its importance in the history of the commercial nuclear power industry. PG&E does not plan to list the Unit 3 facility with the NRHP at this time (PG&E, 2003).

PG&E has contacted the Native American Heritage Commission and several local Native American groups and individuals concerning its plans to construct and operate an ISFSI at HBPP. In addition, PG&E has committed to keeping the Native American Heritage Commission and other interested Native-American groups and individuals informed of the ISFSI progress through periodic, publicly announced, meetings. PG&E would address any Native American comments and concerns through appropriate communication channels.

4.10 Background Radiological Characteristics

Since 1986, the radiological characteristics of the HBPP site have been evaluated as part of PG&E's SAFSTOR Radiological Environmental Monitoring Program (REMP). PG&E submits annual radiological environmental monitoring reports that contain results of both onsite and offsite sampling conducted under the REMP. The most recent monitoring report was submitted to the NRC by letter dated April 27, 2004 (PG&E, 2004).

The typical average annual total effective dose equivalent to a person living anywhere in the United States from background sources of radiation is approximately 3 mSv (300 mrem) (NCRP, 1987). This dose comes from exposures to cosmic radiation, cosmogenic radionuclides, terrestrial radionuclides, inhaled radionuclides, and radionuclides naturally occurring in the body.

In comparison, the results from PG&E's 2004 annual report indicate that direct radiation from all sources were below 1 mSv (100 mrem) at the HBPP site, despite an apparent long-term increase in both onsite and offsite annual doses of about 0.07 mSv (7 mrem) over a period of 15 years. PG&E states, however, that all measurements were comparable to the ranges observed since entering SAFSTOR, with onsite station dose levels approximately within the range of dose levels recorded at offsite stations.

5.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

5.1 Non-radiological Impacts

5.1.1 Construction Impacts

The environmental impacts due to construction of the HBPP ISFSI are expected to be small. The ISFSI would be located within the boundaries of the 143-acre PG&E-controlled site area, and constructed in an area previously disturbed during HBPP operations. Construction activities associated with the proposed ISFSI would impact less than 1 acre of land area. This impact would involve excavating the vault area, disposing the excavated spoils, forming and pouring of the vault structure, widening and extending the oil supply road, constructing miscellaneous structures, and controlling dust and runoff. Construction materials would be derived from offsite sources.

Dust generated during construction is expected to be minimal given that the construction traffic would be using paved onsite and offsite roadways. Dust derived from excavation and fill operations would be mitigated through dust control techniques (*e.g.,* watering and/or chemical stabilization). Routine truck washing and covering truck-hauled materials would contribute to minimizing dust emissions. Gaseous emissions from construction equipment would be mitigated through regular maintenance of the equipment (PG&E, 2003a).

The spoils disposal area, covering approximately 836 square meters (9000 square feet), is located within an area that had been disturbed previously by plant operations. This area will be accessed via the existing oil road, and the transport and deposition of the excavated material is not expected to have a significant environmental impact. Material disposed there would be contoured to the existing slope. As appropriate, PG&E would use BMPs to address storm water runoff, erosion control, and revegetation. All areas disturbed during construction activities would be revegetated with an appropriate seed mix.

PG&E expects that 20 to 25 construction workers would be needed for the construction activities (i.e., building the ISFSI and the security building, putting up fencing, and widening the oil road). The workers would be drawn from the local work force and therefore would have minimal impact on the local demography.

The effects of noise and traffic on the area as a result of construction activities are estimated to be small. Traffic to and from the construction site would be by way of existing paved roads and highways. The noise level from construction activities would be similar to the noise level from any similar construction project. The nearest resident is about 244 m (800 ft) from the proposed ISFSI site and should not be affected by the construction noise. The construction workers would comply with the applicable OSHA noise regulations to minimize noise impacts.

The impact of construction of the ISFSI on local water sources and wetlands is expected to be small. Discharges from the HBPP are regulated currently under a discharge permit issued by the North Coast Regional Water Quality Control Board (NCRWQCB). PG&E will take up any needed modifications to its permit with the NCRWQCB. In addition, PG&E would apply applicable BMPs during ISFSI construction to protect local waters and nearby wetlands from site runoff, spillage, and leaks.

ISFSI construction activities are not expected to impact any state or federally listed threatened or endangered plant, terrestrial wildlife, marine life, or fish species. All such species that may occur within a 8-km (5-mile) radius of the proposed facility were considered by the applicant. None of these species were found to inhabit the area on or immediately adjacent to the ISFSI site, nor were they identified at the spoils disposal site.

Construction of the proposed ISFSI would not impact identified cultural resources in the region around the HBPP site. As noted previously, the closest identified archaeological site, CA-HUM-79, was found to have little or no integrity. In addition, this site is outside the area of potential impacts from the proposed action. If any new cultural resources are located during

project activities, all work must stop and the PG&E archaeologist be notified immediately.

5.1.2 Operational Impacts

As discussed previously, operation of the proposed ISFSI would involve loading the spent fuel into the HI-STAR HB casks while in the RFB, moving the loaded casks from the RFB to the proposed in-ground vault, placing the casks in the vault, and then closing the ISFSI. Once the vault is closed, PG&E would conduct long-term monitoring of the ISFSI and surrounding area under its Radiological Environmental Monitoring Program.

Operation of the proposed ISFSI would not require any additional land beyond that used for the vault and security building. The 18.3 m x 39 m (60 ft x 128 ft), fenced-in security area surrounding the ISFSI will not significantly effect the area available for terrestrial wildlife. In addition, ISFSI operation is not expected to adversely impact terrestrial and aquatic environments or their associated plant and animal species. Operation would not require water resources. Due to the passive nature of the ISFSI, no gaseous or liquid effluents would be produced during operation. Finally, ISFSI operation would not generate any significant noise and would not impact climate or socioeconomics.

Public access to and recreation activities on the breakwater and in the bay would not be restricted by PG&E, except during ISFSI activities that require limited access within the 100-meter (328-foot) controlled area. Such activities would be for short time periods during cask movements or handling evolutions. The evolutions would occur primarily during the initial transport of storage casks to the ISFSI and potentially not again until the casks are transported off-site to a permanent storage repository.

5.2 Radiological Impacts

5.2.1 Normal Operations

During the initial phase of ISFSI construction, the radiation dose to the construction workers would be minimal. The construction workers would only be exposed to the natural background radiation of the site. Occupational doses may increase during spent fuel transfer, due to workers being in close proximity to the transfer cask while moving the loaded cask from the RFB to the ISFSI. All work would be done in accordance with the HBPP radiation protection program and occupational doses must be maintained below the limits set in 10 CFR Part 20.

The storage of spent fuel in casks at the ISFSI is expected to result in small radiation doses to the offsite population. The closest site boundary is 16.2 m (53 ft) from the ISFSI, and the nearest resident is approximately 244 m (800 ft) away. In its environmental report, PG&E provided the results of conservative calculations of offsite dose (PG&E, 2003a). These calculations assumed contributions to the total dose due to direct radiation from the spent fuel in the storage casks, as well as contributions from the spent fuel in the MPCs during their

transfer to the storage overpacks. The MPCs are seal-welded and are considered leak tight, so that no leakage is expected during normal operation, off-normal conditions, or design basis accidents.

The calculated annual dose to the nearest resident from ISFSI activities is 0.0631 mSv (6.31 mrem), which is significantly below the annual limits specified in 10 CFR 72.104(a) and 10 CFR 20.1301(a), of 0.25 mSv (25 mrem) and 1 mSv (100 mrem), respectively. The cumulative offsite dose to the nearest resident from all site activities is calculated to be about 0.0641 mSv/year (6.41 mrem/year), which is also significantly less than the limit referenced in 10 CFR 20.1301. Using the same conservative assumptions, PG&E calculated an annual dose at the nearest site boundary of approximately 0.25 mSv (25 mrem). Following transfer of the six casks to the ISFSI, the annual offsite dose will be limited primarily to direct radiation, thus reducing the calculated doses at the site boundary and to the nearest resident to approximately 0.18 mSv/yr (18 mrem/yr) and 0.045 mSv/yr (4.5 mrem/yr) respectively.

The NRC staff reviewed the calculations and assumptions provided by PG&E. The staff also performed confirmatory calculations to verify the source term and checked the dose rates. Based on these results, normal ISFSI operations would not have a significant offsite radiological impact.

Radiological effects on wildlife are expected to be small. The proposed ISFSI would be constructed below grade and surrounded by security fencing. No state or federally listed threatened or endangered species are present in the immediate area of the ISFSI site, and the area has a low habitat value due to its significant development and use. The fences would keep most species far enough from the vault that the resulting radiation doses should pose no threat to wildlife, although some birds and small wildlife may intrude into the ISFSI area. To receive a significant dose, birds and small animals would need to remain in almost constant contact with a storage cask. The ISFSI area would not provide a conducive environment for wildlife, and monitoring activity around the area also would discourage wildlife from remaining in the area. Therefore, very few, if any, animals are expected to receive significant radiation exposure as a result of ISFSI operation.

5.2.2 Accidents

In its application (PG&E, 2003a, 2003b), PG&E addressed four categories of design events as defined in ANSI/ANS-57.9, which include normal, off-normal, and accident events. Design Event I represents an event associated with normal operations, such as the normal ambient temperature range. The impacts from such events are similar to impacts due to normal operations at the ISFSI as discussed previously.

Design Event II represents an event associated with off-normal operations that can be expected to occur with moderate frequency. Such events potentially could result in members of the general public being exposed to additional levels of radiation beyond those associated with normal operations. Examples of events in this category include loss of external electrical

power, off-normal ambient temperatures, off-normal pressures internal to the MPC, a cask drop from less than the allowable lift height, and off-normal transporter operation. Based on PG&E's assessment, none of the credible off-normal operations and hypothetical Design Event II accidents results in any occupational or offsite radiological consequences.

Design Event III represents an infrequent event that could be reasonably expected to occur over the lifetime of the ISFSI, while Design Event IV represents an extremely unlikely event that is postulated to occur because it establishes a conservative design basis for systems, structures, and components important to safety. Design Events III and IV include more severe events such as earthquakes; tornados and missiles generated by natural phenomena; floods; fire and explosions; lightning; canister leakage under hypothetical accident conditions; storage cask drop or tip-over; and loss of shielding. Of these events, only fire may create situations in which worker personnel and the offsite public could be exposed to higher levels of radiation than normal.

The effects of fire on the cask during transport or storage are not expected to result in significant offsite radiation doses. The cask is designed such that the MPC confinement boundary remains intact during and after a design basis fire. In addition, should a fire occur during transport of the cask to the ISFSI, PG&E would take appropriate precautionary measures, including maintenance of the 100-meter (328-foot) controlled area; radiological and visual inspection of the overpack and vault; and temporary shielding, as appropriate, around the affected area to reduce dose rates.

Design Events II through IV are addressed in greater detail in Chapter 8 of the Humboldt Bay ISFSI SAR (PG&E, 2003b).

5.3 Impacts of Decommissioning

Decommissioning of the ISFSI would commence after the HI-STAR HB casks loaded with the spent fuel elements and GTCC waste are removed from the vault and transported offsite. After the fuel is moved off site, the ISFSI decommissioning activities would be conducted in accordance with the NRC-approved ISFSI decommissioning plan.

Decommissioning activities would include surveying the area to determine the levels, if any, of residual radioactive material. Following removal of the casks, the vault structure would be decontaminated, as necessary. The concrete structure above the vault may be sectioned and removed, or alternately, left in place, as appropriate. After the storage vault area has been decontaminated and/or removed from the site, the area may be covered with top soil, contoured, and replanted with native vegetation.

Small occupational exposures to workers could occur during decontamination activities, but these exposures would be much less than those associated with cask loading and transfer operations. Minor impacts from noise and dust could also result from dismantling the pad and

structures, but they would be much less than similar construction impacts.

A final radiological survey would be conducted. If the results of the final survey indicate there is no residual radioactive material, then the site may be released for unrestricted use.

5.4 Cumulative Impacts

The NRC has evaluated whether cumulative environmental impacts could result from the incremental impact of the proposed action when added to the past, present, or reasonably foreseeable future actions in the area. The impact of the proposed Humboldt Bay ISFSI, when combined with previously evaluated effects from the Humboldt Bay Power Plant, is not anticipated to result in any significant cumulative impact at the site. The offsite radiation exposure limits for an ISFSI specified in 10 CFR 72.104(a) explicitly include any contribution to offsite dose from other uranium fuel cycle facilities in the region. Therefore, the offsite dose contribution from the HBPP has been included in the evaluation of radiological impacts from the proposed Humboldt Bay ISFSI.

6.0 MONITORING AND MITIGATION

In addition to the existing HBPP radiological environmental monitoring program, monitoring specifically associated with the ISFSI would be performed, such as security checks and health physics monitoring. Thermoluminescent dosimeters would be placed along the ISFSI fence line to monitor the radiation dose from the stored casks and the vault.

7.0 AGENCIES AND PERSONS CONSULTED

In accordance with NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," the NRC staff consulted with several other agencies regarding the proposed action. These consultations are intended to afford the designated State Liaison agency the opportunity to comment on the proposed action, and to ensure that the requirements of Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act are met with respect to the proposed action.

7.1 California Energy Commission

By telephone call on May x, 2005, the NRC staff discussed its preliminary findings with Ms. Barbara Byron of the California Coastal Commission (CEC). On May x, 2005, the NRC staff sent a copy of its draft EA to CEC for its review and comment.

7.2 California Office of Historic Preservation

By letter dated July 14, 2004, to Mr. Milford Donaldson, the California State Historic Preservation Officer (SHPO), the NRC staff requested concurrence in its determination that the

proposed action does not adversely affect any historic properties. With the letter, the NRC staff provided information from PG&E's environmental report on which the staff's determination was made. By letter dated December 16, 2004, the SHPO requested additional information in support of the NRC staff's determination. By letter dated May x, 2005, the NRC staff provided the requested information. The SHPO concurred with the NRC staff's determination by letter dated June x, 2005.

7.3 U.S. Fish and Wildlife Service

By letter dated June 4, 2004, the NRC staff requested information on endangered species and critical habitat from the U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office (USFWS/AFWO). By telephone call on June 27, 2004, Mr. Greg Goldsmith of the USFWS/AFWO indicated that the requested information was available online, through the field office's website, http://www.ccfwo.r1.fws.gov. The NRC staff downloaded this information on June 28, 2004, for its assessment of effects from the proposed action on any endangered or threatened species or critical habitat with the area of influence for the proposed action.

Based on its assessment as documented in this EA, the NRC staff determined that the proposed action will have no effect on an endangered or threatened species or critical habitat with the area of influence for the proposed action. By letter dated May x, 2005, the NRC staff notified USFWS/AFWO of its determination and provided a copy of the draft EA for review and comment.

7.4 U.S. NOAA Fisheries

By letter dated June 3, 2004, the NRC staff requested information on endangered species from the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). NOAA Fisheries responded by letter dated July 27, 2004, providing a list of endangered species that may be present in the vicinity of the proposed ISFSI. In addition, NOAA Fisheries indicated that critical habitat for one of the identified species, coho salmon, may occur in the project area, and that additional analyses may be necessary for species managed under separate Fishery Management Plans within Humboldt Bay.

Based on its evaluation, the NRC staff has determined that the proposed action will not adversely affect endangered species nor will it adversely affect critical habitats for those species (see Sections 5.1 and 5.2). The NRC staff documented this determination in a letter to NOAA Fisheries on May x, 2005, and provided a copy of the draft EA in support of this determination.

8.0 CONCLUSION

The NRC staff concludes that the construction, operation, and decommissioning of the Humboldt Bay ISFSI would not result in a significant impact to the environment. Construction

impacts of the ISFSI would be minor and limited to the small area of the ISFSI site and the excavated material disposal site. The site chosen for the ISFSI on PG&E's owner-controlled area has been previously disturbed during plant operation. Similarly, the disposal site for the excavated material also is a previously-disturbed area, which would not be significantly impacted. There would be minor impacts of increased noise and dust from construction equipment and activities during the construction phase, but this phase would be of short duration and would not impact off-site populations. The workers needed during the construction phase could be obtained from the local population without an adverse impact on the demographics of the area. The proposed ISFSI area and the disposal areas have been extensively surveyed and are not known to contain any threatened or endangered species. Construction at the proposed ISFSI site would not adversely impact cultural or historic resources.

There would be no significant radiological or non-radiological environmental impacts from routine operation of the ISFSI. The ISFSI is a passive facility and no liquid or gaseous effluents would be released from the storage casks. The dose rates from the spent fuel would be limited by the design of both the storage casks and the in-ground vault. The total occupational dose to workers at the HBPP site may increase slightly due to work associated with loading, transferring, and storing the casks, but all occupational doses must be maintained below the limits specified in 10 CFR Part 20 and must be kept as low as reasonably achievable (ALARA), in accordance with PG&E's radiation protection program. The annual dose to the nearest resident from ISFSI activities is estimated to be 6.31 mrem/year, which is significantly below the limits specified in 10 CFR 72.104 and 10 CFR 20.1301(a). The cumulative dose to an individual offsite from all site activities would be 6.41 mrem/year, which is less than the limit specified in 10 CFR 20.1301. Occupational doses received by facility workers would not exceed the limits specified in 10 CFR 20.1201.

The impacts from decommissioning the ISFSI would be much less than the minor impacts of construction and operation. Very small occupational exposures could occur during decontamination activities, if they are necessary, and minor noise and dust impacts could result from dismantling the vault and associated structures.

The environmental impacts of the proposed action have been reviewed in accordance with the requirements of 10 CFR Part 51. The NRC staff has determined that the storage of spent nuclear fuel in an in-ground ISFSI at the Humboldt Bay Power Plant would not significantly affect the quality of the human environment. Therefore, an environmental impact statement is not warranted for the proposed action, and pursuant to 10 CFR 51.31, a Finding of No Significant Impact (FONSI) is appropriate.

The documents related to this proposed action are available for public inspection and copying at NRC's Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. Additionally, most of these documents are available for public review through the NRC's electronic reading room, at: http://www.nrc.gov/reading-rm/adams.html.

9.0 LIST OF PREPARERS

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