

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
DIVISION OF RULEMAKING, ENVIRONMENTAL, AND FINANCIAL SUPPORT

**ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED  
RENEWAL OF U.S. NUCLEAR REGULATORY  
COMMISSION LICENSE SNM-2514 FOR THE  
HUMBOLDT BAY INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION IN HUMBOLDT COUNTY, CA**

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## ACRONYMS

ac	acre(s)
ALARA	As Low As Reasonably Achievable
BWR	boiling water reactor
CADOT	California Department of Transportation
CCC	California Coastal Commission
CDFW	California Department of Fish and Wildlife
CFR	<i>Code of Federal Regulations</i>
DHS	U.S. Department of Homeland Security
DSC	Dry Storage Canister
DTS	Dry Transfer System
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	environmental justice
EO	Executive Order
ER	environmental report
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>
FSR	Final Site Restoration
ft	foot(feet)
FWS	U.S. Fish and Wildlife Service
GCRP	U.S. Global Change Research Program
GHG	greenhouse gas
GTCC	greater than Class C
GWC	GTCC Waste Container
ha	hectare(s)
HB	Humboldt Bay
HBAP	Humboldt Bay Area Plan
HBGS	Humboldt Bay Generating Station
HBPP	Humboldt Bay Power Plant
ILTAB	Intelligence Liaison and Threat Assessment
in.	inch(es)
IPaC	Information for Planning and Consultation
ISFSI	Independent Spent Fuel Storage Installation
kg	kilogram(s)
LAR	License Amendment Request
lb	pound(s)
m	meter(s)

mi	mile(s)
MLLW	Mean Lower Low Water
MPC	Multipurpose Canisters
mrem	millirem
mSv	millisievert
MTU	metric ton of uranium
MWD	megawatt-day(s)
NAHC	Native American Heritage Commission
NCUAQMD	North Coast Unified Air Quality Management District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	U.S. National Marine Fisheries Service
NRC	Nuclear Regulatory Commission
NMSS	Office of Nuclear Material Safety and Safeguards
OUO-SRI	Official Use Only – Security Related Information
PG&E	Pacific Gas & Electric Company
PM <sub>10</sub>	particulate matter 10 micrometers or less in diameter
PWC	Process Waste Container
RIS	Regulatory Issue Summary
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SHPO	State Historic Preservation Office/Officer
SNM	Special Nuclear Material
TLD	thermoluminescent dosimeter

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# 1.0 INTRODUCTION

## 1.1 Background

By letter dated July 10, 2018, and supplemented October 22, 2018, the Pacific Gas and Electric Company (PG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) requesting renewal of Special Nuclear Materials (SNM) License SNM-2514 for the Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI) for an additional 40 years (PG&E 2018). The Humboldt Bay ISFSI stores spent fuel and associated radioactive materials from Humboldt Bay Power Plant (HBPP), Unit 3. On November 14, 2018, the NRC staff accepted PG&E's application for detailed technical review (NRC 2018a). The NRC issued a notice in the *Federal Register* (FR) providing an opportunity to request a hearing and petition for leave to intervene (83 FR 66314).

In accordance with Title 10 of the *Code of Federal Regulations* Part 51 (10 CFR Part 51), "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," that implements the National Environmental Policy Act of 1969, as amended (NEPA), the NRC staff's environmental review of the proposed license renewal is documented in this environmental assessment (EA). The purpose of this document is to assess the potential environmental impacts of the proposed 40-year license renewal. The NRC is also conducting a safety evaluation of this license renewal request, which will be documented in a separate safety evaluation report (SER).

## 1.2 Humboldt Bay ISFSI History

The NRC authorizes construction and operation of ISFSIs by issuance of general and specific licenses. A specifically licensed ISFSI is licensed separately from the nuclear power plant and requires an application to perform the licensed activities. In 2003, PG&E submitted an application requesting a site-specific license to build and operate an ISFSI to be located on the site of the HBPP. In support of PG&E's application to construct and operate the ISFSI, the NRC staff prepared a final EA (NRC 2005a) and determined that the construction, operation, and decommissioning of the Humboldt Bay ISFSI would not have a significant impact on the quality of the human environment and published the finding of no significant impact (FONSI) on November 16, 2005 (70 FR 69605). In November 2005, the NRC issued a 20-year license to PG&E to receive, possess, store, and transfer the HBPP spent nuclear fuel, and subsequently amended the license in August 2008 and August 2009 (NRC 2005b, 2008, 2009).

In 2013, License No. SNM-2514 was amended to allow PG&E to store greater than Class C (GTCC) process waste at the Humboldt Bay ISFSI, in the same storage cask in which the GTCC activated metal waste is stored. GTCC waste is a classification of radioactive waste defined in 10 CFR 61.55 and consists of activated core components composed mainly of segmented reactor vessel internals. The GTCC waste at Humboldt Bay consists of miscellaneous solid waste resulting from HBPP, Unit 3 operations and from decommissioning, including debris from spent fuel pool cleanup. The current license allows PG&E to store 400 spent fuel assemblies in five (5) HI-STAR 100 HB casks containing spent fuel and GTCC activated metal waste in the sixth storage cask at the ISFSI (NRC 2013).

## **1.3 Proposed Action**

License SNM-2514 allows PG&E to store spent nuclear fuel, as well as damaged fuel assemblies, fuel debris contained in failed fuel cans or damaged fuel containers, and GTCC waste from the decommissioned HBPP. In accordance with license SNM-2514, PG&E uses the HI-STAR HB system, which is designed to accommodate intact fuel assemblies damaged fuel assemblies and fuel debris. PG&E is requesting to renew license SNM-2514 for the Humboldt Bay ISFSI for a 40-year period. The current license will expire on November 17, 2025. The NRC's Federal major action is the proposed renewal of the license for up to an additional 40 years. If the NRC approves the renewal, PG&E would be able to continue to possess and store spent nuclear fuel at the Humboldt Bay ISFSI in accordance with the requirements in 10 CFR Part 72 for up to an additional 40 years.

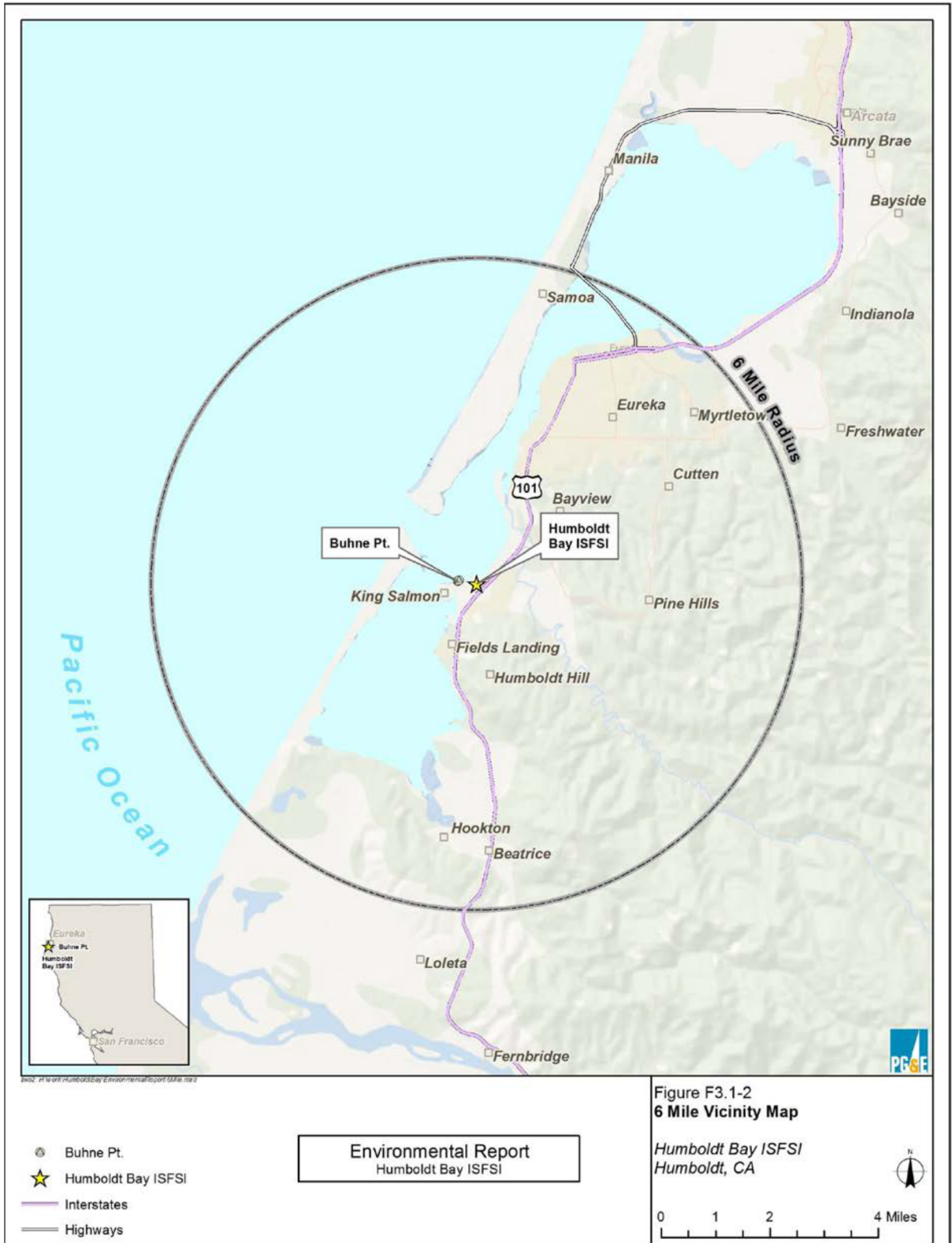
### **1.3.1 Site Location and Description**

The Humboldt Bay ISFSI is located on the HBPP site, in Humboldt County, California, approximately 4.8 kilometers (km) (3 miles [mi]) southwest of the city of Eureka, California (see Figure 1-1). The ISFSI is located on a small peninsula known as Buhne Point near the coastal community of Fields Landing on the eastern shore of Humboldt Bay. Several small residential communities are within 8 km (5 mi) of the ISFSI site, including King Salmon, Humboldt Hill, Fields Landing, and the suburban communities surrounding the city of Eureka. King Salmon serves frequent commercial and recreational boat traffic. Commercial air traffic into and out of Humboldt County is primarily through Eureka/Arcata Airport, approximately 32.2 km (20 mi) north of the ISFSI site. A set of Northwestern Pacific railroad tracks, presently not in use, runs generally north-south along the southeastern PG&E property line (PG&E 2018).

Since construction of the ISFSI, a new fossil-fueled power plant at the HBPP site, named the Humboldt Bay Generating Station (HBGS), has commenced operation within the PG&E owner-controlled area and approximately 137 meters (m) (450 feet [ft]) east of the ISFSI (PG&E 2018).

PG&E owns approximately 57.9 hectares (ha) (143 acres [ac]) on the northeastern part of the Buhne Point of Humboldt Bay opposite the bay entrance. PG&E also owns the water area extending approximately 152.4 m (500 ft) into Humboldt Bay from the land area. Humboldt County is mostly mountainous except for the level plain that surrounds Humboldt Bay (NRC 2005a; PG&E 2018).





**Figure 1-1. Humboldt Bay ISFSI Site (PG&E 2018)**

### 1.3.2 Current ISFSI and Dry Cask Storage Description

The Humboldt Bay ISFSI consists of an ISFSI vault, cask transporter, and the Holtec International HI-STAR 100 dry cask system, as modified for the HBPP spent fuel and referred to as the HI-STAR HB (see Figure 1-2). The HI-STAR HB is both a storage and transport cask that provides structural protection and radiation shielding for the multipurpose canisters (MPCs) containing the spent fuel. The Humboldt Bay ISFSI storage vault is an underground, heavily reinforced concrete structure that has a carbon steel liner designed to support the static and dynamic loads imparted by the loaded overpacks under all design basis conditions of storage. It is an interim facility with storage capacity for six shielded casks, five containing 400 spent nuclear fuel assemblies and one containing GTCC waste. The carbon steel liner and other exposed carbon steel materials are coated with a material suitable for the saline air service conditions to prevent corrosion. The materials of construction (e.g., additives in the vault concrete) were chosen to be compatible with the environment at the Humboldt Bay ISFSI site (PG&E 2018).

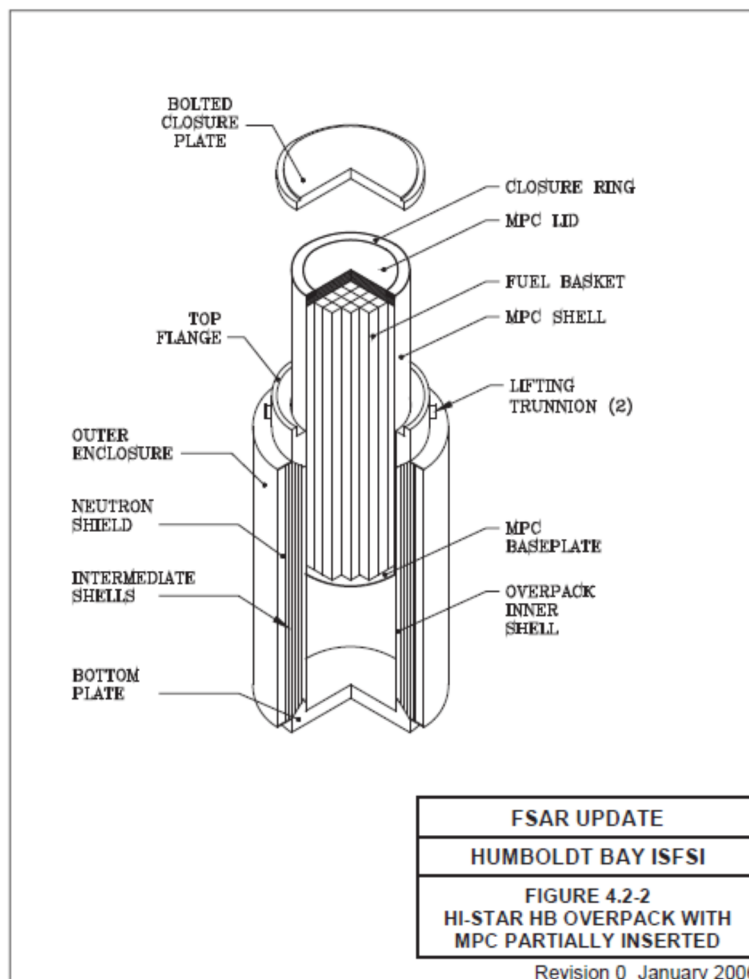


Figure 1-2. Humboldt Bay HI-STAR HB Overpack with MPC Partially Inserted (PG&E 2018)

The process waste is contained in a Process Waste Container (PWC), which is a stainless steel, cylindrical container, approximately 0.3 m (1 ft) in diameter and 0.6 m (2 ft) high and is mechanically sealed, vacuum dried, backfilled with helium and leak tested. The process waste was dried to ensure thermal destruction of all organics or hydrogen generating materials before being converted to a dry powder. The HI-STAR HB PWC was placed inside the HI-STAR HB GTCC Waste Container (GWC) and into a lidded outer container that is welded onto the bottom of the GWC. The outer container is designed to provide stabilization for the PWC and prevents comingling between the process waste and activated components. After loading was complete, the HI-STAR HB GWC was drained, backfilled with helium, and sealed. The HI-STAR HB GWC was placed in a HI-STAR HB GTCC overpack and bolted shut (PG&E 2018).

### **1.3.3 Waste Management**

Due to the design of the dry spent fuel storage casks used at the ISFSI, no gaseous or liquid effluents are released, nor is solid waste generated as a result of ISFSI operation (PG&E 2018). No additional sanitary or other wastes are generated as a result of the operation of the ISFSI.

### **1.3.4 Decommissioning**

10 CFR Section 72.54, titled “Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas,” identifies the provisions for termination of specific licenses for and decommissioning of ISFSIs. In accordance with 10 CFR 72.54(d), each licensee must notify the NRC in writing, and submit within 12 months of this notification, a final decommissioning plan if (1) the licensee has decided to permanently cease principal activities at the entire site or any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements, (2) no principal activities under the license have been conducted for a period of 24 months, or (3) no principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements.

When any of the events in 10 CFR 72.54(d)(1)–(3) occur, the licensee is required to notify and submit within 12 months a final decommissioning plan and begin decommissioning upon approval of the plan. The required content of the decommissioning plan is provided in 10 CFR 72.54(g). Pursuant to 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” the NRC would conduct a separate environmental review associated with the review of the decommissioning plan. Decommissioning of the ISFSI was discussed in the 2005 EA (NRC 2005a), which the NRC prepared as part of the original ISFSI license application review.

As stated in Section 4.7.1 of PG&E’s Safety Analysis Report (SAR) (PG&E 2018), PG&E would perform decommissioning and dismantlement consistent with the information in PG&E’s “Preliminary Decommissioning Plan,” Attachment F of the original 2003 license application for the ISFSI (PG&E 2003a). At the end of the ISFSI life, MPCs would be transported offsite, and because the MPCs are designed for storage and transport of spent fuel, the fuel assemblies would remain sealed in the MPCs such that decontamination of the MPCs would not be

required. The ISFSI then would be decommissioned by identifying and removing any residual radioactive material and conducting a final radiological survey (PG&E 2018).

#### **1.4 Purpose and Need for the Proposed Action**

The HBPP is undergoing decommissioning, which is currently scheduled to be completed in 2019 (PG&E 2018). The Humboldt Bay ISFSI was built to store the HBPP spent fuel that had been stored in the HBPP spent fuel pool, and following a 2013 license amendment, also stores GTCC process waste resulting from operation and decommissioning of HBPP, Unit 3. The ISFSI provides interim storage for all the fuel stored in the spent fuel pool and facilitates the decommissioning of HBPP and its associated spent fuel pool. The ISFSI has stored HBPP spent fuel and GTCC since that time and is needed until a permanent facility is available for offsite final disposition. If the NRC renews the Humboldt Bay ISFSI as requested, PG&E would be able to continue to maintain safe storage of the spent nuclear fuel and GTCC waste generated from the HBPP operations for an additional 40 years at the Humboldt Bay ISFSI.

#### **1.5 Scope of the Environmental Analysis**

The NRC staff has evaluated the potential environmental impacts associated with the proposed action of license renewal of SNM-2514 and alternatives to the proposed action, and has documented the results of the assessment in this EA. The NRC staff performed this review in accordance with the requirements of 10 CFR Part 51 and staff guidance found in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (NRC 2003).

The following documents were reviewed and considered in the development of this EA:

- Information contained in PG&E's License Amendment Request (LAR), which includes the environmental report (ER) and the SAR, dated July 2018 (PG&E 2018); and
- Information contained in previous NRC environmental review documents for the Humboldt Bay site and ISFSI (NRC 2005a, 2013).

##### **1.5.1 Continued Storage of Spent Nuclear Fuel**

On September 19, 2014, the NRC published a revised rule at 10 CFR 51.23, "Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operations of a Reactor" (79 FR 56238). The rule codifies the NRC's generic determinations in NUREG-2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* regarding the environmental impacts of the continued storage of spent nuclear fuel beyond the life of a reactor's operating license. In NRC Memorandum and Order CLI-14-08, the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 cured the deficiencies identified by the court in *New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012) and stated that the rule satisfies the NRC's NEPA obligations with respect to continued storage. The revised rule requires that EAs prepared for future reactor and spent fuel storage facility licensing actions consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action. In this case, the proposed action, if approved, will extend the term of the license and therefore the impacts of continued

storage of spent fuel would be relevant to the proposed action. Section 4.13 of this EA provides the NRC staff's consideration of the generic environmental impacts of NUREG-2157 for the proposed renewal of the Humboldt Bay ISFSI license.

## **2.0 ALTERNATIVES TO THE PROPOSED ACTION**

In this section, the NRC staff describes alternatives to the proposed 40-year license renewal. As described below, the NRC staff considered the no-action alternative and a 20-year renewal alternative.

### **2.1 No-Action Alternative**

The no-action alternative would consist of denial of PG&E's request to renew the Humboldt Bay ISFSI license SNM-2514 and this would result in the license expiring on November 17, 2025. The license, however, would remain in effect with respect to possession of licensed material per 10 CFR 72.54(c) until the NRC notifies the licensee in writing that the license is terminated. PG&E would continue to maintain the stored spent fuel and GTCC waste at the ISFSI.

Impacts from the no-action alternative would result from activities supporting the continued operation of the ISFSI. These activities would be similar to the current maintenance, monitoring, and inspection activities. The NRC staff concludes, thus, that the impacts associated with the continued operation of the ISFSI would not be significant.

Ultimately, PG&E would need to remove the stored fuel and GTCC waste from the ISFSI, transport the fuel and GTCC waste to another licensed storage facility, and decommission the storage facility associated with SNM-2514. Pursuant to 10 CFR 72.54, decommissioning of the Humboldt Bay ISFSI could commence once the NRC approves a final decommissioning plan. NRC approval of a decommissioning plan would constitute a major Federal action under NEPA and would be subject to a separate environmental review. Section 1.3.4 of this EA provides additional information about decommissioning.

### **2.2 License Renewal for a 20-Year Term**

The Humboldt Bay ISFSI was originally licensed for a 20-year period of operation. For this alternative, the ISFSI license would be renewed for an additional 20-year period consistent with the current license term. The NRC staff considered as an alternative the continued operation of the Humboldt Bay ISFSI for an additional 20 years to understand whether the environmental impacts of continued operations for an additional 20 years would differ from those of continued operation for an additional 40 years (proposed action).

The NRC staff did not separately address the potential impacts from the 20-year alternative, because the staff determined that the site operations during the 20-year interval would be the same as those activities for the proposed action (i.e., the 40-year license renewal). The types and significance of impacts associated with these operations for a 20-year period would be bounded by the impacts as assessed for the proposed action period of 40 years.

### **2.3 Shipment of Spent Fuel to an Offsite Facility**

Shipment of the spent fuel to a commercial reprocessing facility, a Federal repository, or an interim storage facility is not a reasonable alternative, because these facilities are currently not available in the United States. The NRC, however, has received license applications for

consolidated interim storage facilities. If approved by the NRC, such a facility could become available during the proposed license renewal period.

## **3.0 AFFECTED ENVIRONMENT**

NEPA defines the affected environment as a description of the existing environment to be affected by the proposed action (40 CFR 1502.15). The current conditions of each resource area, including geographic area and any past, present, or future actions relevant to the current status of each resource area are described in this section.

### **3.1 Land Use**

The Humboldt Bay ISFSI site is located on the HBPP site on the northern California coast in Humboldt County, approximately 4.8 km (3 mi) southwest of the city of Eureka. PG&E owns 57.9 ha (143 ac) 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. PG&E has full authority to control all activities within its property lines at the HBPP site. The ISFSI site is near several ports that support commercial and sport fishing activities, and a public trail to access a breakwater for recreational fishing crosses the controlled area for the ISFSI (NRC 2013).

Land use in the vicinity consists of final site restoration as part of HBPP decommissioning activities, as well as operation of a new fossil-fuel power plant at the adjacent HBGS site within the PG&E owner-controlled area. As part of the Final Site Restoration (FSR) Plans, which were approved in April 2016 by the California Coastal Commission, PG&E transferred 12.5 ha (30.94 ac) upland of the Fisherman's Channel to the Humboldt Bay Harbor, Recreation, and Conservation District (CCC 2016; PG&E 2018).

A petition is currently planned to be filed with the California Energy Commission prior to completion of HBPP decommissioning and site restoration activities to modify the HBGS site boundary to include portions of the HBPP site that will be repurposed to support HBGS (PG&E 2018).

### **3.2 Transportation**

The HBPP site area is not traversed by a public highway or a railroad. The only access to the 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 portion of the PG&E-controlled area. The major travel access near the ISFSI and other communities of Humboldt County is via U.S. 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) southeast of the site. Highway 101 continues north into Oregon and south to San Francisco and Los Angeles (NRC 2013). As of November 2016, approximately 18 full-time personnel were commuting to HBGS each workday (PG&E 2018).

A set of Northwestern Pacific railroad tracks runs north-south along the southeastern PG&E property line. Presently, the tracks are not in use and the North Coast Railroad Authority has no plans to rehabilitate and reuse the tracks (PG&E 2018).



The ISFSI site is located within 61 m (200 ft) of the shoreline of Humboldt Bay, which is open to the Pacific Ocean through a maintained shipping entrance channel northwest of the ISFSI site. The bay has two main channels, a North Channel and a South Channel. Both are dredged annually by the U.S. Army Corps of Engineers and used by recreational vessels (PG&E 2018).

### **3.3 Geology and Soils**

The licensee stated that information regarding geology, soils, and seismology of the HB ISFSI area has not changed from the information presented in the ER (PG&E 2018). HBPP and the 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 (1,100 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 (NRC 2013).

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 2003b). However, the style and structure of deformation associated with future activity along the Little Salmon fault zone are not expected to cause surface rupture, and the site is not susceptible to deep landslides from such activity (NRC 2013).

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 run-ups within Humboldt Bay. The ISFSI is located at 13.4 m (44 ft) above mean lower low water (MLLW), which would be 2.4 m (8 ft) higher than the conservative estimates of tsunami run-up calculated by PG&E.

### **3.4 Water Resources**

The licensee stated that information provided in the ER accurately describes the present condition of the surface and groundwater use at the HB ISFSI area (PG&E 2018). The Humboldt Bay ISFSI 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 (NRC 2013).

Several rivers and creeks drain the region around the HBPP and the 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 are 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 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 ranges 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, and it has an average depth of 3.7 m (12 ft) MLLW. Very little freshwater discharges into Humboldt Bay.

Wetlands also are present near the 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.

Humboldt County recently received grant funding from the Ocean Protection Council and the California Coastal Commission to update the Humboldt Bay Area Plan (HBAP), a component of the County’s Local Coastal Program. The HBAP was originally certified in 1982 and establishes policies that govern the use of approximately 8,700 ha (21,500 ac) of land in the unincorporated area around Humboldt Bay and over 32.2 km (20 mi) of Pacific coastline. The primary objective of the HBAP update is to build on the coordinated sea level rise planning around Humboldt Bay and address potential impacts on coastal-dependent uses; i.e., critical public facilities such as roads, wastewater treatment plants and shoreline protection structures; communities; agricultural land; and environmentally sensitive habitat areas. In addition, the sea level rise planning will help direct policy initiatives to protect priority land uses, such as coastal-dependent activities and environmentally sensitive habitat areas. This grant will also support Humboldt Bay-wide tsunami safety planning by compiling community planning efforts that have been completed to date and conducting planning for sparsely populated areas (Humboldt County website 2019).

### **3.5 Threatened and Endangered Species**

Under Section 7 of the Endangered Species Act (ESA) of 1973, prior to taking a proposed action, a Federal agency must determine whether (1) endangered and threatened species or their critical habitats are known to be near the proposed action and if so, whether (2) the proposed Federal action may affect listed species or critical habitats.

In the ER supplement submitted for the license renewal, PG&E referenced the HBPP Final Restoration Plan Implementation Coastal Development Permit/Amendment Application and the

fact that a desktop literature review was conducted for known occurrences of sensitive natural communities, critical habitat, and special-status plant and wildlife species to support the plan. Tables B-1 and B-2 of PG&E's "Project Description and Coastal Resource Assessment" document submitted to the State of California as part of its HBPP FSR Plan list special-status plant and wildlife species that were evaluated and their likelihood to be present in the proposed project area (PG&E 2015). In the ER supplement, PG&E concludes that based on queried sources, numerous field surveys, and the literature review, no species listed as threatened or endangered are known to currently occupy the ISFSI site (PG&E 2018).

In response to a letter from NRC staff on the current ISFSI license renewal project (NRC 2019a), the California Department of Fish and Wildlife (CDFW) indicated that they did not anticipate the project would result in take of or impacts on State-listed species (CDFW 2019). The details of this consultation are provided in Section 4.5 of this EA. The NRC visited the FWS Information for Planning and Consultation (IPaC) website and completed its online project review process. The results of the review process generated a list of threatened or endangered species (FWS 2018). The critical habitat of three of the threatened/endangered species were identified as overlapping the Humboldt Bay ISFSI site (Marbled Murrelet, Tidewater Goby, and Western Snowy Plover). However, the ISFSI does not use any water located within any critical habitat identified for these species. This information was shared with the CDFW for informational purposes.

### **3.6 Climate, Meteorology, and Air Quality**

The climate of the greater Humboldt Bay region, including Eureka and the immediate coastal strip where the Humboldt Bay ISFSI is located, is characterized as Mediterranean. The warmest months are from July to September, and the coldest months are from December to February. The rainy season generally falls between November and March. The wind is predominantly from the north to northwest, with a shift to the south to southeast during the winter months (NRC 2016).

The HB ISFSI site is located within the North Coast Unified Air Quality Management District (NCUAQMD), which monitors the air quality in the area and published air quality information pertinent to the ISFSI. The U.S. Environmental Protection Agency and California Air Resources Board have set ambient air quality standards for criteria pollutants to protect human health; the listed criteria pollutants are ozone, sulfur dioxide, nitrogen dioxide, particulate matter 10 micrometers or less in diameter (PM<sub>10</sub>), carbon monoxide, sulfates, lead, hydrogen sulfide, and vinyl chloride. Based on information from the NCUAQMD, the ambient air quality at the ISFSI site meets national and State standards for all criteria pollutants except PM<sub>10</sub>. Ambient air concentrations of PM<sub>10</sub> would not impact the operation of the ISFSI facility (PG&E 2018).

Studies show approximately 141,640 ha (350,000 ac) of California's coastal wetlands are at risk for flooding from sea level rise over the next 20 years. Humboldt County has a high potential for wetlands to migrate inland rather than being completely lost to coastal inundation. Wetlands contribute to the health of Humboldt Bay but also serve to absorb storm surges, thereby minimizing flood damage on higher ground (Humboldt County website 2019).

### 3.7 Demography, Socioeconomics, and Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, focuses Federal attention on the environmental and human health effects of Federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities. The EO directs Federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. The EO also directs each agency to develop a strategy for implementing environmental justice. The EO is also intended to promote nondiscrimination in Federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

As defined in EO 12898, “minorities” are defined as individual who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. The EO states that “minority populations” should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

According to the U.S. Census Bureau, as of July 2018 the population of Humboldt County was 136,373, representing an increase of 1.9 percent since 2010. The nearest population center to the ISFSI site is the city of Eureka, located approximately 6.4 km (4 mi) north-northeast of the site. As of July 2018, Eureka had a population of 26,998, representing a decrease of 0.7 percent since 2010 (USCB 2019). Employment in Humboldt County increased from 2010 to 2016 by about 4 percent (CADOT 2017). Several K-12 schools serving Eureka and neighboring communities are located within 8 km (5 mi) of the site. Humboldt State University, with an enrollment of approximately 7,800 students, is in Arcata approximately 24.1 km (15 mi) northeast of the ISFSI site. The College of the Redwoods is within 8 km (5 mi) of the site just south of Eureka and has an enrollment of approximately 7,500 students.

Table 3-1 shows the ethnicity breakdown and median income level for both Humboldt County and the State of California. Table 3-2 provides information for Humboldt County and other geographic areas for comparison regarding populations with poverty status.

**Table 3-1. Ethnicity and Median Income Levels for Humboldt County and State of California**

Ethnicity Percent, 2017	Humboldt County	State of California
White <sup>(a)</sup>	83.5	72.4
Black or African American <sup>(a)</sup>	1.4	6.5
American Indian and Alaska Native <sup>(a)</sup>	6.3	1.6
Asian <sup>a</sup>	2.9	15.2
Native Hawaiian and other Pacific Islander <sup>(a)</sup>	0.3	0.5
Persons reporting two or more races	5.6	3.9
Persons of Hispanic or Latino origin <sup>(b)</sup>	11.7	39.1

White persons not Hispanic	74.3	37.2
Median household income, 2013–2017 (in 2017 dollars)	\$43,718	\$67,169

Source: U.S. Census website

<https://www.census.gov/quickfacts/fact/table/humboldtcountycalifornia,eurekacitycalifornia,US/PST045218>

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race, thus are also included in applicable race categories.

**Table 3-2. Population for Whom Poverty Status Is Determined by Geographic Comparison Area (data from [www.census.gov](http://www.census.gov), QuickFacts)**

Geographic Area of Comparison	Black or African American	Asian	American Indian and Alaska Native	Native Hawaiian and Other Pacific Islander	Multi-Racial	Hispanic or Latino Ethnicity	Low-Income Households/ Persons in Poverty
Eureka, CA	2.3	7.1	3.4	0.0	7.0	11.1	22.8
Humboldt County, CA	1.4	2.9	6.3	0.3	5.6	11.7	19.7
State of California	6.5	15.2	1.6	0.5	3.9	39.1	13.3

The socioeconomic region of influence is defined as the area in which the Humboldt Bay ISFSI employees and their families reside, spend their income, and use their benefits, thereby affecting economic conditions in the region. The socioeconomic region of influence consists of Humboldt County, California. There is a seasonal influx of vacation and weekend visitors, 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. Several parks and recreation areas are located within 16 km (10 mi) of the ISFSI site. The beaches around Humboldt Bay and the Pacific Ocean are popular with local residents as well as visitors from outside the local area. The city of Eureka has several municipal parks and there is a municipal golf course located approximately 4.8 km (3 mi) northeast of the ISFSI site (PG&E 2018)

In its environmental justice review, the NRC staff defined a 6 km (4 mi) radius as the area of potential effect and compared demographic and economic data from this area to data for the state and county. Specifically, the staff defined the area for comparative analysis as the State of California, Humboldt County, and the city of Eureka. The results of the analysis indicate that census block groups within the 6 km (4 mi) radius do not have significant percentages of minority populations. Low-income information was not available at the census block level for the area of interest; thus, census tract information was used. The results indicate that no census tracts within the 6 km (4 mi) radius have significant percentages of low-income households (USCB 2019; PG&E 2018).

### **3.8 Historic and Cultural Resources**

Section 106 of the National Historic Preservation Act (NHPA) requires the NRC staff to take into account the effects of the proposed licensing action on historic properties. The area of potential effect for this proposed action consists of the Humboldt Bay ISFSI site. For the original issuance of the Humboldt Bay ISFSI license in 2005, the NRC staff analyzed the potential environmental impacts associated with construction and operation of the ISFSI in an EA published in October 2005 (NRC 2005a). The 2005 EA stated that PG&E had conducted research to identify archaeological sites before constructing the ISFSI; research activities included records searches, literature reviews, and a field survey. No cultural resources were identified on the ISFSI site as a result of the research (NRC 2005a; PG&E 2018)

The proposed license renewal action does not involve any construction, excavation, or ground disturbance and would be a continuation of existing conditions. Due to the design of the casks used at the ISFSI, no gaseous or liquid effluents are generated or released at the ISFSI during operation. PG&E anticipates no new significant construction at the existing ISFSI and no impact on cultural resources. Should future ground disturbance be undertaken, PG&E's current excavation program requires stopping work and taking appropriate actions if unexpected conditions occur or unidentified items are unearthed (PG&E 2018).

As described in Section 5.1, the NRC staff contacted the California Native American Heritage Commission (NAHC), the California Historic Preservation Office (NRC 2019b), and nine Native American tribes (NRC 2018b). The NRC will update this information in the EA to indicate the nature of the State Historic Preservation Office's (SHPO) response, if applicable.

### **3.9 Public and Occupational Health and Safety**

Risks to occupational health and safety can include exposure to radiological and nonradiological hazards. The primary source of radiation exposure is neutron and gamma radiation emanating from the spent fuel and the shielded casks. External radiation from the casks could potentially affect workers and members of the public; however, the cask is a passive system designed to limit exposure to radiation. Nonradiological (industrial) hazards include moving heavy objects, working outside, working with heavy equipment during cask transfer operations, and exposure to hazardous materials. The Humboldt Bay ISFSI does not generate any liquid or gaseous effluents to the environment from operation.

PG&E conducts environmental monitoring of the ISFSI and surrounding area under the HBPP site-wide environmental monitoring program. Because no radioactive gas, liquid, or solid waste effluents are released from the Humboldt Bay ISFSI during operation, a radioactive effluent monitoring system is not required. However, PG&E uses an ALARA program to maintain radiation exposures to ISFSI personnel, visitors, and the general public below regulatory limits and as low as reasonably achievable (ALARA). PG&E provides an annual radioactive effluent release report to the NRC, per 10 CFR 72.44(d), noting that no radionuclides are released to the environment from liquid or gaseous effluents. Section 4.9 discusses the potential radiological and nonradiological impacts on workers and the public from ISFSI activities associated with the proposed license renewal.

For a U.S. resident, the average annual estimated total effective dose equivalent from natural background and anthropogenic (manmade) radiation sources is about 6.2 millisieverts (mSv) (620 millirem [mrem]) (NRC 2019c). The source of this dose includes cosmic radiation, background radiation (radon and thoron), radiation sources in the Earth (terrestrial sources), naturally occurring radionuclides that exist in the body, medical and occupational sources, industrial sources, and radionuclides present in consumer products. The U.S. population is exposed to two primary sources: naturally occurring background radiation and medical exposure to patients.

### **3.10 Visual and Scenic Resources**

There is limited or no visibility of the Humboldt Bay ISFSI from areas accessible to the public. The HB ISFSI is located near the top of Buhne Point, which is a small hill that is surrounded by wetlands to the east and Humboldt Bay to the west. HBPP decommissioning efforts have resulted in the removal of plant buildings, enabling Buhne Point and the ISFSI to be seen from U. S. Highway 101 and King Salmon Avenue. However, visibility of the ISFSI is limited because it is an in-ground vault—the top of the vault is approximately flush with the ground surface. The view of the ISFSI from Humboldt Bay is blocked by vegetation, but the security building and fencing are visible from a public trail that runs along the shoreline in the ISFSI controlled area (PG&E 2018).

### **3.11 Noise**

The ER supplement states that no noise is directly attributable to the operation of the HB ISFSI (PG&E 2018). Users of Humboldt Bay Park and the adjacent natural area within the Humboldt Bay property are potential noise receptors. There have been no changes to the facility or its surrounding environment since the last licensing action.

## 4.0 ENVIRONMENTAL IMPACTS

The NRC staff reviewed the ER prepared by PG&E (PG&E 2018), collected information from Federal and State agencies, and evaluated the environmental impacts on the various resources of the affected environment from the proposed action. The staff used the guidelines outlined in NUREG-1748 (NRC 2003) in its evaluation. In accordance with this guidance, the staff evaluated the environmental impacts that each resource may encounter from the proposed action. The NRC staff categorizes the impacts in terms of small, moderate, or large. These impact categories are defined below.

- **SMALL** – environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- **MODERATE** – environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
- **LARGE** – environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

### 4.1 Land Use

Approval of the proposed action will not result in any construction or expansion of the existing ISFSI footprint or operations. Routine operation of the ISFSI is largely passive; activities include continuation of existing monitoring and maintenance activities for the HI-STAR 100 HB storage casks and reinforced concrete vault structure, including upkeep of security monitoring equipment, quarterly radiation monitoring, and periodic inspections of the vault drainage system and ISFSI concrete. ISFSI security monitoring equipment is maintained operable on a continuous basis and is replaced on an as-needed basis (PG&E 2018). Because there is no new land use as a result of the proposed action, the NRC staff concludes that the impacts on land use would be **SMALL** and not significant.

### 4.2 Transportation

The NRC staff expects that the volume of traffic at the Humboldt Bay site and the surrounding area would not change due to the proposed action. The proposed action does not include new construction or expansion, and no new radioactive waste shipments or related activities are expected. Based on this information, the NRC staff concludes that the impacts on transportation from the proposed action would be **SMALL** and not significant.

### 4.3 Geology and Soils

The NRC staff does not expect the continued operation of the Humboldt Bay ISFSI to impact the underlying geology because the ISFSI has no moving parts that would impact the subsurface. In its license renewal application, PG&E indicated that no additional impacts on geology or soils are expected from continued operation of the Humboldt Bay ISFSI (PG&E 2018). The proposed action does not include any physical modifications to the ISFSI. Even if the ISFSI were inundated by a tsunami, the casks would be protected from tsunami-generated flowing water and waterborne debris within the vault. The storage casks can be temporarily wetted with



seawater without harm to the casks (NRC 2013). In addition, the ISFSI does not generate any liquid or solid effluents that might impact the geology or soils. Therefore, the NRC staff concludes that the impacts on geology and soils from the proposed action would be SMALL and not significant.

#### **4.4 Water Resources**

The NRC staff expects that the proposed action would not change water consumption, because the operation of the ISFSI does not require use of water resources. The operation of the ISFSI also does not generate or release liquid effluents. The proposed action would not result in any changes in the types, characteristics, or quantities of radiological or nonradiological effluents or solid waste. Therefore, the NRC staff does not expect changes in the impacts on water resources as a result of the proposed action and has determined that impacts are bounded by the staff's analysis in the original EA that supported license issuance (NRC 2005a), which concluded that there would be no significant impacts on water resources. Also, development of a new stormwater detention basin system as part of HBPP FSR will accommodate stormwater runoff associated with the ISFSI and support structures (PG&E 2018). Because there are no changes in water consumption or impacts on water quality as a result of the proposed action, the NRC staff concludes that the impacts on water resources from the proposed action would be SMALL and would not be significant.

#### **4.5 Threatened and Endangered Species**

The proposed renewal of the Humboldt Bay ISFSI does not involve activities that would disturb any new land or include any physical modifications. Routine operation of the ISFSI is largely passive, activities include maintenance and monitoring which primarily involve security monitoring and periodic walkdown surveillance and inspection (PG&E 2018). These activities would be the only activities that would continue if the license is renewed.

The NRC staff reached out to the CDFW regarding the potential effects that the proposed action could have on the ecology, particularly on endangered and threatened species (NRC 2019a). The CDFW responded via email that given that the proposal does not include modifications to the existing site that they did not anticipate that the project would result in take of or impacts on State-listed species. Therefore, the NRC concludes that the proposed action would not likely adversely affect either Federally listed threatened and endangered species or State-identified rare species or species of special concern.

#### **4.6 Climate, Meteorology, and Air Quality**

Continued operation of the Humboldt Bay ISFSI would have no adverse impact on the local or regional climate because the ISFSI does not release airborne emissions (PG&E 2018). ISFSI operation would not impact climate and no adverse impact is expected from continued operation. The NRC staff concludes that impacts on air quality from the proposed action would be SMALL and not significant.

## 4.7 Socioeconomics

In its license renewal application, PG&E indicated that no significant changes in staffing are anticipated to manage the ISFSI during the term of the renewed license (PG&E 2018). For this reason, the NRC staff does not anticipate an influx of people to the area as a result of the proposed action and thus does not expect that additional housing would be needed. Also, the NRC staff does not anticipate related changes or impacts on the local economy. Therefore, the NRC staff does not expect any direct or indirect socioeconomic impacts and concludes that the socioeconomic impacts from the proposed action would be SMALL and not significant.

## 4.8 Environmental Justice

Under EO 12898 (59 FR 7629; February 11, 1994), Federal agencies are responsible for identifying and addressing potential disproportionately high and adverse human health and environmental impacts on minority and low-income populations. In 2004, the Commission issued, *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions* (69 FR 52040; August 24, 2004). Regarding EAs, the NRC's policy statement on environmental justice (EJ) states:

If there will be no significant impact as a result of the proposed action, it follows that an EJ review would not be necessary. However, the agency must be mindful of special circumstances that might warrant not making a FONSI. In most EAs, the Commission expects that there will be little or no offsite impacts and, consequently, impacts would not occur to people outside the facility. However, if there is a clear potential for significant offsite impacts from the proposed action, then an appropriate EJ review might be needed to provide a basis for concluding that there are no unique impacts that would be significant. If the impacts are significant because of the uniqueness of the communities, then a FONSI may not be possible and mitigation or an EIS should be considered. (69 FR 52047).

In the section "Guidelines for Implementation of NEPA as to EJ Issues" (69 FR 52048), the NRC explains that special circumstances arise only where the proposed action has a clear potential for offsite impacts on minority and low-income communities associated with the proposed action.

In its ER, PG&E explained that there are no significant percentages of minority or low-income populations within a 6 km (4 mi) radius of the Humboldt Bay ISFSI (PG&E 2018). There would be no significant impacts on any offsite population associated with the proposed action or the alternatives. Therefore, the NRC staff concludes that there are no disproportionate human health or environmental impacts on any population.

## 4.9 Historic and Cultural Resources

As discussed in Section 3.8, there are no known historic or cultural properties within the ISFSI site. Additionally, the NRC staff contacted the NAHC to request a Sacred Lands File search.

The NAHC responded, indicating that its search of the Sacred Lands File for this project was completed “with negative results” (NAHC 2018).

As stated in Section 4.1, the licensee has no plans for expansion or construction activities. Therefore, there would be no impact on cultural resources around the immediate vicinity of the Humboldt Bay ISFSI. Because the NRC concluded that the proposed undertaking, renewal of the HB ISFSI, does not have the potential to affect historic or cultural resources, the NRC did not conduct consultation under Section 106 of the NHPA. This was done in accordance with the definition in 36 CFR 800.3(a)(1) of *no potential to cause effects*, “... if the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under Section 106 or this part.” The proposed action does not result in any construction or expansion of the existing ISFSI footprint or operations. Based on this information and consistent with previous EAs conducted for the HB ISFSI (NRC 2013, 2005a), the NRC staff concludes that the proposed action would have no effect on historic and cultural resources.

## **4.10 Public and Occupational Health**

### **4.10.1 Nonradiological Impacts**

The proposed action would not result in any changes in the types, characteristics, or quantities of nonradiological effluents or solid waste. There are no planned refurbishments beyond maintenance, storage, and routine inspections and monitoring of the ISFSI site in accordance with the requirements in 10 CFR Parts 20 and 72. No liquid or gaseous effluents are released during operation of the ISFSI. Accordingly, the NRC staff concludes that nonradiological impacts from the proposed action on public and occupational health and safety would be SMALL and not significant.

### **4.10.2 Radiological Impacts**

The ISFSI is within the owner-controlled area of the HBPP site and is surrounded by an access control gated fence within the HBPP site. The proposed action involves no change in routine operations, and no new construction or land disturbance is being requested as part of this license renewal application. License SNM-2514 allows PG&E to store up to 5 HI-STAR 100 HB casks containing spent fuel and 1 HI-STAR 100 HB cask containing GTCC waste within the ISFSI. Operations during the proposed license renewal period would include storage and routine inspections and monitoring of the ISFSI site in accordance with the requirements in 10 CFR Parts 20 and 72.

Because the radioactive material stored in the ISFSI emits direct radiation, PG&E’s environmental monitoring program monitors direct radiation from the ISFSI through the use of thermoluminescent dosimeters (TLDs), which have been installed along the controlled access fence (PG&E 2018). Through the environmental monitoring program, PG&E evaluates exposure to the public during the term of the ISFSI license and verifies compliance with dose limits in 10 CFR 72.104.

The proposed license renewal would not affect the staff's previous radiation protection evaluation that supported the original license issuance, and the radiological impacts on workers and the public from the proposed license renewal are bounded by the impacts evaluated in the original EA supporting ISFSI license issuance (NRC 2005a).

#### *4.10.2.1 Occupational Dose*

In accordance with 10 CFR Part 20, PG&E maintains a radiation protection program for the ISFSI to ensure that radiation doses are maintained ALARA (PG&E 2018). The ISFSI is routinely monitored and evaluated. The HBPP Unit 3 BWR was shut down and has not operated since July 1976. PG&E completed the transfer of spent fuel from the HBPP Unit 3 spent fuel pool into the ISFSI on December 11, 2008 (NRC 2016). No additional casks will be placed at the ISFSI.

The only occupational dose received would occur during weekly surveillance, quarterly surveys, and regular maintenance activities. PG&E conservatively estimated that the annual occupational exposure from ISFSI walkdowns and occasional maintenance and inspections is approximately 1.12 mSv (112 mrem) for those years when a license renewal inspection is performed with a vault lid removed (every five years). For the years when a license renewal inspection with a removed vault lid is not performed, PG&E estimated that the annual exposure is approximately 0.00153 mSv (0.153 mrem). PG&E estimated that the annual exposure from overpack repairs is approximately 0.0036 mSv (0.36 mrem), assuming one repair operation occurs per month. PG&E notes that the actual doses from the ISFSI would be considerably less than these estimated values (PG&E 2018).

Licensees are required to conduct authorized operational, inspection, and maintenance activities in accordance with the occupational dose limits specified in 10 CFR 20.1201. Licensees must also have in place and follow a radiation protection program consistent with 10 CFR 20.1101. Therefore, the NRC staff concludes that the radiological impacts of the proposed action on workers would be SMALL and not significant.

#### *4.10.2.2 Dose to the Public*

No gaseous or liquid effluents are discharged from operation of the Humboldt Bay ISFSI. Therefore, only external direct and air-scattered radiation from the six, in-ground casks contribute to potential radiological dose exposure to an offsite member of the public. The edge of the ISFSI storage vault is located approximately 16.1 m (53 ft) from a public-access trail. The use of a vault minimizes radiation exposure to members of the public that occasionally use this trail. The ISFSI is surrounded by an access control gate to prevent unauthorized access. As discussed above, dosimeters have been installed along the controlled access fence.

The only dose to members of the public during normal operations would result from the gamma and neutron radiation that is emitted from the cask surfaces. PG&E's calculation of offsite collective dose is limited to one of direct radiation to the nearest residence. At a distance of 0.2 km (0.15 mi), which is the location of the nearest resident, PG&E estimated that the total annual dose rate would be 0.0448 mSv/yr (4.48 mrem/yr), which is below the 0.25 mSv/yr (25 mrem/yr) limit imposed by 10 CFR 72.104(a). However, PG&E estimated that the actual measurements

(2 microrem per hour) would result in a dose rate closer to 0.001 mSv/yr (0.1 mrem/yr) (PG&E 2018). Therefore, potential annual radiological doses to public from the proposed action would be SMALL and would not be significant.

#### 4.10.2.3 Accidents

In Chapter 8 of its SAR (PG&E 2018), PG&E evaluated potential radiological impacts resulting from postulated accidents. The accident scenarios PG&E evaluated and judged credible include off-normal pressures, off-normal environmental temperatures, loss of power, off-normal operation of a cask transporter, earthquake, tornado, flood, tsunami, fire, and explosion. PG&E determined that none of these accidents would result in radiological impacts, “because the confinement barrier is not breached and the shielding is not affected” (PG&E 2018). Through its review of the initial Humboldt Bay ISFSI license application, the NRC staff concluded that the ISFSI and cask design (for storage of spent fuel and for storage of GTCC waste) are structurally sound. The NRC staff also concluded that the components of the ISFSI that are important to safety would continue to perform their design functions during normal operation, off-normal conditions, and credible postulated accidents (NRC 2005a). Therefore, the staff concludes that the potential impacts from accidents at the ISFSI would be SMALL and not significant.

### 4.11 Visual and Scenic Resources

The proposed action does not involve any construction activities, land disturbance, excavation, or physical changes to the ISFSI site or physical environment. Therefore, the NRC staff does not anticipate any changes in the local or regional scenic quality or any impacts on visual and scenic resources as a result of the proposed action. Accordingly, the staff concludes that impacts on visual and scenic resources would be SMALL and not significant.

### 4.12 Noise

The NRC staff expects that because storage of spent nuclear fuel and associated materials at the ISFSI is largely a passive system and no additional casks would be added during the license renewal period, there would be no significant noise generated by the continued operation of the ISFSI. Based on this information, the NRC staff concludes that the impacts on noise from the proposed action would be SMALL and not significant.

### 4.13 Cumulative Impacts

The NRC staff considered the impacts of the proposed action, as described in Section 4.0 of this EA, combined with other past, present, and reasonably foreseeable future actions that could affect the same resources impacted by the proposed action. Because there are no expected offsite environmental impacts associated with the proposed action, the geographic area considered in this cumulative impacts discussion is the Humboldt Bay ISFSI site. The time frame considered for future actions extends through 2059, the expiration year of the site-specific license SNM-2514 for the Humboldt Bay ISFSI, if the license is renewed.

As discussed in the preceding sections of Chapter 4, the NRC staff determined that impacts for all resource areas from the proposed action would not be significant. This is due to the passive

nature of the ISFSI. Also, the ISFSI is designed to minimize radiological doses to workers and members of the public, as discussed in Section 4.9. Thus, the NRC staff concludes that the proposed action would not significantly contribute to potential cumulative impacts when added to the past, present, or reasonably foreseeable future actions in the area.

#### **4.14 Continued Storage of Spent Nuclear Fuel**

NRC licensing proceedings for nuclear reactors and ISFSIs historically have relied on a generic determination codified in the NRC's regulations at 10 CFR 51.23. These proceedings satisfy the agency's obligations under NEPA with respect to the narrow area of the environmental impacts of storage of spent nuclear fuel (spent fuel) beyond a reactor's licensed life for operation and prior to ultimate disposal (continued storage). The Court of Appeals for the District of Columbia Circuit, in *New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012), vacated the NRC's 2010 update to that rule and remanded it to the NRC. Thereafter, the Commission determined that NRC would not issue licenses dependent upon the formerly known Waste Confidence Decision and Temporary Storage Rule until deficiencies identified by the Courts of Appeals were appropriately addressed (NRC Commission Order CLI-12-16 2012).

On September 19, 2014, the NRC published a revised rule at 10 CFR 51.23, "Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operations of a Reactor" (79 FR 56238 2014). The rule codifies the NRC's generic determinations in NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," regarding the environmental impacts of the continued storage of spent nuclear fuel beyond a reactor's operating license. In CLI-14-08 (NRC Commission Order CLI-14-08 2012), the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 resolved the deficiencies identified by the court in *New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012) and stated that the rule satisfies the NRC's NEPA obligations with respect to continued storage. The rule, however, does not authorize the storage of spent fuel. As discussed in the statements of consideration for the final rule (79 FR 56238; September 19, 2014), the rule does not address the safety of continued storage of spent fuel. Appendix B of NUREG-2157, however, discusses the feasibility of the safe storage of spent fuel.

In EAs prepared for reactor and spent fuel storage facility licensing actions submitted after October 20, 2014, 10 CFR 51.23(b) requires that the NRC consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action. The analysis provided below documents the required consideration of the environmental impacts of continued storage, as determined in NUREG-2157, for the proposed renewal of the ISFSI license.

##### **4.14.1 Overview of 10 CFR 51.23 and NUREG-2157**

NUREG-2157 supports the revised rule at 10 CFR 51.23 and includes, among other things, the NRC staff's analyses related to the particular deficiencies identified by the D.C. Circuit in the vacated Waste Confidence decision and rule. The information in NUREG-2157 was developed using an open and public process.

The NRC evaluation of the potential environmental impacts of continued storage of spent fuel presented in NUREG-2157 identifies an impact level, or a range of impacts, for each resource area for a range of site conditions and timeframes. The timeframes analyzed in NUREG-2157 include the short-term timeframe (60 years beyond the licensed life of a reactor), the long-term timeframe (an additional 100 years after the short-term timeframe), and an indefinite timeframe (see NUREG-2157, Section 1.8.2).

The NRC concluded in NUREG-2157 that the potential impacts of spent fuel storage at the reactor site in both a spent fuel pool and in an at-reactor ISFSI would be SMALL during the short-term timeframe (see NUREG-2157, Section 4.20). However, for the longer timeframes for at-reactor storage, and for all timeframes for away-from-reactor storage, the analysis in NUREG-2157 has determined a range of potential impacts that are greater than SMALL in some resource areas (see NUREG-2157, Sections 4.20 and 5.20, respectively). The analysis in NUREG-2157 also presents an assessment of cumulative impacts for continued storage with ranges of potential impacts for most resource areas (see NUREG-2157, Section 6.5). These ranges reflect uncertainties that are inherent in analyzing environmental impacts to some resource areas over long timeframes. As explained in NUREG-2157 (Appendix D, page D-96), those uncertainties exist regardless of whether the impacts are analyzed generically or on a site-specific basis.

Appendix B of NUREG-2157 provides an assessment of the technical feasibility of a deep geologic repository and continued safe storage of spent fuel. That assessment concluded that a deep geologic repository is technically feasible and that a reasonable timeframe for its development is approximately 25 to 35 years. The assessment in NUREG-2157 referenced the U.S. Department of Energy's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* published in January 2013, which stated that the goal "... is to have a repository sited by 2026; the site characterized, and the repository designed and licensed by 2042; and the repository constructed and its operations started by 2048." Based on the evaluation of international experience with geologic repository programs, including the issues some countries have overcome, and the affirmation by the Blue Ribbon Commission of the geologic repository approach, the NRC continues to believe that 25 to 35 years is a reasonable period for repository development (i.e., candidate site selection and characterization, final site selection, licensing review, and initial construction for acceptance of waste).

#### **4.14.2 At-Reactor Storage**

The analysis in NUREG-2157 concluded that the potential impacts of at-reactor storage during the short-term timeframe would be SMALL (see NUREG-2157, Section 4.20). The analysis further stated that disposal of the spent fuel by the end of the short-term timeframe is the most likely outcome (see NUREG-2157, Section 1.2). In this EA, the NRC staff determined that impacts from the proposed renewal for 40 years would be SMALL and not significant for all environmental resource areas. This is due to the passive nature of the ISFSI in that it emits no gaseous or liquid effluents during operation. Also, the ISFSI is designed to minimize radiological doses to workers and members of the public. PG&E did not propose any significant changes in authorized operations for the ISFSI or request approval of any new construction or expansion of the existing ISFSI footprint. Thus, the potential impacts of at-reactor continued

storage during the short-term timeframe are consistent with the evaluation of the environmental impacts for the proposed Humboldt Bay ISFSI license renewal as documented in this EA.

The analysis in NUREG-2157, however, evaluated the potential impacts of continued storage if the fuel is not disposed of by the end of the short-term timeframe. During the long-term and indefinite timeframes, the analysis in NUREG-2157 determined that impacts on all resource areas would be SMALL, except for historic and cultural resources and nonradioactive waste management. The analysis determined that the potential impacts on historic and cultural resources from at-reactor storage during the long-term timeframe and the indefinite timeframe are dependent on factors that are unpredictable this far in advance, and therefore concluded those impacts would be SMALL to LARGE (see NUREG-2157, Section 4.12). Among other things, as discussed in NUREG-2157, the NRC cannot determine at this time what resources may be present or discovered at a continued storage site a century or more in the future and whether those resources will be historically or culturally significant to future generations. Additionally, potential impacts greater than SMALL could occur if the activities to replace the ISFSI and construct and replace a dry transfer system (DTS) adversely affect cultural or historic resources, and the effects cannot be mitigated. The analysis in NUREG-2157 recognized that ground-disturbing activities occurred during initial construction of the nuclear power plant and, thus, the land within and immediately surrounding the power block has been extensively disturbed. The analysis also explained that if replacement of the ISFSI and construction and replacement DTS occur within the previously disturbed areas or there are no historic or cultural resources present, then impacts would likely be SMALL. If these facilities, however, are located in less-developed or less-disturbed portions of a power plant site outside of the power block with historic and cultural resources present, then impacts on historic and cultural resources could be greater than SMALL (see NUREG-2157, Sections 4.12.2 and 4.12.3). In Section 4.8 of this EA, the NRC staff concluded that potential impacts on historic and cultural resources as a result of the proposed action would be SMALL and would not be significant.

As discussed in NUREG-2157, given the minimal size of an ISFSI and DTS, and the large land areas at nuclear power plant sites, licensees should be able to locate these facilities away from historic and cultural resources. Potential adverse effects on historic properties or impacts on historic and cultural resources could also be minimized through development of agreements and implementation of the licensee's historic and cultural resource management plans and procedures to protect known historic and cultural resources and address inadvertent discoveries during construction and replacement of these facilities. However, the analysis in NUREG-2157 recognized that it may not be possible to avoid adverse effects on historic properties under NHPA or impacts on historic and cultural resources under NEPA and, therefore, concluded that impacts would be SMALL to LARGE (see NUREG-2157, Section 4.12.2).

The NRC also concluded in NUREG-2157 that the impacts of nonradioactive waste management in the indefinite timeframe would be SMALL to MODERATE, with the higher impacts potentially occurring if the waste from repeated replacement of the ISFSI and DTS exceed local landfill capacity (see NUREG-2157, Section 4.15). Although the NRC concluded that nonradioactive waste disposal would not be destabilizing (or LARGE), the range reflects uncertainty regarding whether the volume of nonradioactive waste from continued storage would contribute to noticeable waste management impacts over the indefinite timeframe when considered in the context of the overall local volume of nonradioactive waste.



As previously discussed, the NRC found in NUREG-2157 that disposal of the spent fuel is most likely to occur by the end of the short-term timeframe. Therefore, disposal during the long-term timeframe is less likely, and the scenario depicted in the indefinite timeframe—continuing to store spent nuclear fuel indefinitely—is highly unlikely. As a result, the most likely impacts of the continued storage of spent fuel are those considered in the short-term timeframe. In the unlikely event that fuel remains onsite into the long-term and indefinite timeframes, the associated impact ranges in NUREG-2157 reflect the accordingly greater uncertainties regarding the potential impacts over these very long periods of time. Taking into account the impacts that the NRC considers most likely, which are SMALL and consistent with the environmental impacts discussed in this EA; the greater uncertainty reflected in the ranges in the long-term and indefinite timeframes compared to the greater certainty in the SMALL findings; and the relative likelihood of the timeframes, the NRC staff finds that the impact determinations for at-reactor storage from NUREG-2157 do not change the staff's evaluation of the potential environmental impacts from the proposed 40-year renewal of the Humboldt Bay ISFSI license.

#### **4.14.3 Away-From-Reactor Storage**

In NUREG-2157, the NRC concluded that a range of potential impacts could occur for some resource areas if the spent fuel from multiple reactors is shipped to a large (approximately 40,000 metric tons of uranium) away-from-reactor ISFSI (see NUREG-2157, Section 5.20). The ranges for resources such as air quality, terrestrial resources, and aesthetics are driven by the uncertainty regarding the location of such a facility and the local resources that would be affected. For example, regarding terrestrial resource impacts, the analysis in NUREG-2157 explained that the impacts would likely be SMALL. However, it also stated that “it is possible that the construction of the project could have some noticeable, but not destabilizing, impacts on terrestrial resources, depending on what resources are affected.” Therefore, in NUREG-2157, for away-from-reactor storage, the NRC concluded that the impacts on terrestrial resources would be SMALL to MODERATE (see NUREG-2157, Section 5.9.1) for the short-term timeframe, based primarily on the potential impacts of construction activities. In addition, there are uncertainties associated with the longer timeframes that contribute to the ranges for historic and cultural resources and for nonradioactive waste management, for the same reasons discussed above for at-reactor storage.

As discussed in Section 2 of this EA, the NRC staff considered the storage of the spent fuel at an away-from-reactor storage facility as an alternative. The NRC determined, however, that it is not a reasonable alternative, because no such facility exists in the United States; however, license applications have been received for consolidated interim storage facilities. A facility could become available during the continued storage period. If so, an ISFSI of the size considered in NUREG-2157 could store the fuel from up to 25 reactors, which means that only a small portion of the overall impacts of the ISFSI would be attributable to the fuel from any individual reactor.

Based on the factors discussed above, there are uncertainties regarding whether an away-from-reactor storage facility would be constructed, where it might be located, and the impacts in the short-term and the longer timeframes, leading to ranges of impacts. As a result, consideration of the generic impacts from continued storage at an away-from-reactor storage facility provides

limited insight to the decision-maker in the overall picture of the environmental impacts from the proposed renewal of the Humboldt Bay ISFSI license.

#### **4.14.4 Cumulative Impacts**

In NUREG-2157, the NRC examined the incremental impact of continued storage on each resource area analyzed in combination with other past, present, and reasonably foreseeable future actions. The analysis in NUREG-2157 presented ranges of potential cumulative impacts for multiple resource areas (see NUREG-2157, Section 6.5). These ranges, however, are primarily driven by impacts from activities other than the continued storage of spent nuclear fuel at the reactor site; the impacts from these other activities would occur regardless of whether spent fuel is stored during the continued storage period.

Similarly, the NRC evaluated the incremental impact of the proposed renewal of the Humboldt Bay ISFSI license on each resource area in combination with other past, present, and reasonably foreseeable future actions. The NRC staff concluded that the potential impacts of the proposed ISFSI license renewal are not a significant contributor to cumulative impacts. The analysis in NUREG-2157 concluded that, in the short-term timeframe, which is the most likely timeframe for the disposal of the fuel in a deep geologic repository, the potential impacts of continued storage for at-reactor storage are SMALL and would, therefore, not be a significant contributor to the cumulative impacts. Therefore, the NRC staff has determined that there would be no significant change to the cumulative impacts analysis in this EA.

### **4.15 Impacts from a Hypothetical Terrorist Attack**

#### **4.15.1 NRC Security Requirements for Independent Spent Fuel Storage Installations**

The NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include (1) the continual evaluation of the threat environment by the NRC, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of storage casks, which provides substantial resistance to penetration; and (4) NRC security assessments of the potential consequences of terrorist attacks against ISFSIs that inform the decisions made regarding the types and level of protective measures. Over the past 25 years, there have been no known or suspected attempts to sabotage, or to steal, radioactive material from storage casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, the NRC is continually evaluating the threat environment to determine whether any specific threat to ISFSIs exists.

##### *4.15.1.1 General Security Considerations*

In response to the terrorist attacks of September 11, 2001, and to intelligence information subsequently obtained, the U.S. government initiated nationwide measures to reduce the threat of terrorism. The Federal government continues to improve the sharing of intelligence information and the coordination of response actions among Federal, State, and local agencies. The NRC is an active participant in these efforts; it has regular and frequent communications

with other Federal, State, and local government agencies and industry representatives to discuss and evaluate the current threat environment, to assess the adequacy of security measures implemented at licensed facilities, and, when necessary, to recommend additional actions.

The NRC expanded its system for notifying licensees of possible threats to their facilities after the September 11, 2001 terrorist attacks, to include a broader range of licensees, including ISFSI licensees. The NRC has incorporated the threat condition levels used in the U.S. Department of Homeland Security's (DHS) National Terrorism Advisory System (previously the Homeland Security Advisory System) into its own threat advisory system. The NRC's Office of Nuclear Reactor Regulation issued Official Use Only – Security Related Information (OUO-SRI) Regulatory Issue Summary (RIS) 2018-03, "National Terrorism Advisory System and Protective Measures for the Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material (OUO-SRI)," dated June 1, 2018. The NRC revised its threat alerts and recommended specific actions in RIS 2018-03. The RIS provides recommended actions that licensees and Agreement States may wish to consider in the event that DHS issues a National Terrorism Advisory System alert.

The Intelligence Liaison and Threat Assessment Branch (ILTAB) within the NRC's Office of Nuclear Security and Incident Response reviews, analyzes, coordinates, and disseminates threat and intelligence information relevant to NRC licensees and Agreement States, at both strategic and tactical levels. The ILTAB staff also serve as NRC's liaison and coordination staff with other organizations and agencies, including the intelligence and law enforcement communities. Through these improved coordination and communication functions, the NRC is able to efficiently develop and transmit advisories to the appropriate licensees, who are then able to take prompt action. Thus, the broad actions taken by the Federal government and the specific actions taken by the NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities.

#### *4.15.1.2 Requirements for ISFSIs*

The NRC considered the potential impacts of terrorist acts in the development and implementation of its 10 CFR Part 73, "Physical Protection of Plants and Materials," security requirements (72 FR 12705). The NRC's strategy for protecting public health and safety, the common defense and security, and the environment focuses on ensuring that its requirements, in combination with the design features of storage casks, are effective in protecting against the potential effects of terrorist attacks on ISFSIs.

NRC security requirements provide high assurance that terrorist attacks cannot endanger the public's health and safety by intentionally releasing radiation from an ISFSI. The NRC reviews and approves facility security plans in evaluating the adequacy of these onsite measures. The Humboldt Bay ISFSI is also inspected to ensure complete and correct implementation of the features of the site security plan, as well as the applicable regulations and orders. The NRC staff has determined through recent inspections that the facility meets the requirements of 10 CFR Part 73 and applicable orders (NRC 2006, 2010, 2012).

The details of specific security measures for each facility are designated as Safeguards Information, in accordance with Section 147 of the Atomic Energy Act and 10 CFR 73.21, and, for that reason, cannot be released to the public. However, key features of the security programs for ISFSIs include (1) physical barriers; (2) surveillance; (3) intrusion detection; (4) intrusion response; and (5) offsite assistance from local law enforcement agencies, as necessary. After the September 11 terrorist attacks, the Commission initiated prompt and comprehensive actions to address both immediate and longer-term security measures for NRC-regulated facilities. In the months immediately after the attacks, the Commission issued numerous safeguards and threat advisories to its licensees to strengthen licensees' capabilities and readiness to respond to a potential attack on a nuclear facility. As part of the longer-term efforts, NRC conducted a comprehensive review of its security program. This review examined specific threats, such as a land-based vehicle bomb, ground assault with the use of an insider, and waterborne assaults, which have led to the imposition of additional requirements, through orders and rules, affecting many categories of licensees, including ISFSIs.

The Commission has issued orders to all licensees of operating ISFSIs to implement additional security enhancements identified in NRC's ongoing comprehensive review of its safeguards and security programs and requirements. These orders, imposing additional security measures were issued to PG&E for the Humboldt Bay ISFSI prior to the loading of spent fuel into the facility (NRC 2006). These measures, which the NRC staff has determined through its inspection activities to be fully implemented, include (1) increased security patrols; (2) augmented security forces and weapons; (3) additional security posts; (4) heightened coordination with local law enforcement and military authorities; (5) enhanced screening of personnel; and (6) additional limitations on vehicular access. Collectively, these measures further reduce the already low probability of a successful terrorist attack on an ISFSI, by providing high assurance that an attempted attack could be detected and by mitigating the extent of damage and the potential radiological consequences if an attack were successful. Based on its ongoing consideration of safeguards and security requirements, its review of information provided by the intelligence community, and the implementation of additional security measures at the nation's ISFSIs, the NRC has high assurance that public health and safety and the environment, and the common defense and security, continue to be adequately protected in the current threat environment.

#### **4.15.2 Consideration of Environmental (Radiological) Impacts from Terrorist Acts**

The NRC staff has considered the potential radiological impacts of terrorist acts on ISFSIs, even though the staff considers the probability of a malevolent act against an ISFSI that could result in a significant radiological event to be very low. By design, storage casks are highly resistant to penetration. To be licensed or certified by the NRC, these casks must meet stringent requirements for structural, thermal, shielding, and criticality performance, and for confinement integrity, for normal and accident events. Consequently, storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of tornado-generated missiles.

The Humboldt Bay ISFSI's robust design and construction provides multiple layers of protection. Both spent fuel and GTCC waste currently are stored on the Humboldt Bay site. The ISFSI is within the owner-controlled area of the PG&E HBPP located in Humboldt County, California,

near U.S. Highway 101, approximately three miles south of Eureka. A unique protective feature of the Humboldt Bay ISFSI is that the storage casks for the storage of spent fuel and GTCC waste are installed in an in-ground concrete storage vault. The storage vault comprises six below-grade, vertically-oriented, cylindrical storage cells that are structural units constructed of steel-reinforced concrete with a carbon steel liner. Each storage cell is approximately 2.7 m (9 ft) in diameter by 3.5 m (11 ft, 7 in.) deep. The vault bottom is 0.9 m (3 ft) thick, the end walls are approximately 2.1 m (7 ft) thick, and the longitudinal (side) walls are 1.7 m (5.5 ft) thick. The thickness of the concrete wall encircling the storage cells varies from 0.2 m (9 in.) to 0.3 m (1 ft) between adjacent cells. The elevation of the vault top is approximately flush with grade, before the storage cell lids are installed. The storage cell lids are approximately 0.4 m (16.25 in.) high, not including the height of the lid bolt caps. The design and construction of the vault provides radiation shielding and passively dissipates decay heat generated by the stored spent fuel (PG&E 2018).

Five of the vault cells contain spent fuel stored in MPCs, which are contained within HI-STAR HB overpacks. The MPC and overpack storage system is described in detail in Section 1.3.2 of this EA. The HI-STAR HB overpack is a heavy-walled, multilayered, cylindrical vessel constructed of carbon steel, which provides radiation shielding and protects the canister from missiles and natural phenomena. The design of the HI-STAR HB overpack facilitates the transfer of decay heat from the MPC to the environs to ensure fuel cladding temperatures remain below acceptable limits (PG&E 2018).

GTCC process waste is stored in the sixth subterranean vault cell. GTCC was placed inside a stainless steel cylinder within the GWC. The GWC was placed within a HI-STAR HB overpack, which was inserted into the vault cell. After loading GTCC waste into the GWC, the GWC was dried, backfilled with helium, and seal-welded to prevent leakage of radioactive material. The GWC is designed to confine the radioactive material during all normal, off-normal, and accident conditions. The GWC lid weld ensures that leakage of radioactive materials from the storage system are not credible, and a separate closure ring weld provides a redundant welded boundary to prevent leakage. The GTCC process waste is located in the bottom-center of the GWC, surrounded by activated metal waste (NRC 2013; PG&E 2018).

After evaluating the design and construction of the storage system at the Humboldt Bay ISFSI and the security assessments of ISFSIs discussed in Section 4.14.2.1, the NRC determined the current design features and additional security measures in place provide high assurance that the Humboldt Bay ISFSI and the GTCC process waste currently stored there, are adequately protected.

Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, the NRC recognizes that under general credible threat conditions, although the probability of such an attack is believed to be low, it cannot be reliably quantified. The NRC has adopted an approach that focuses on ensuring that the safety and security requirements are adequate and effective in countering and mitigating the effects of terrorist attacks against storage casks. To provide high assurance that a terrorist act will not lead to significant radiological consequences, the NRC has analyzed plausible threat scenarios and required enhanced security measures to protect against the threats, and has developed emergency planning requirements, which could mitigate potential consequences for certain scenarios. All of these actions have been taken without

regard to the probability of an attack. The NRC finds this protective strategy reduces the risk from a terrorist attack to an acceptable level.

#### *4.15.2.1 Generic Security Assessments*

Following issuance of the 2002 security orders for ISFSIs, the NRC used a security assessment framework as a screening and assessment tool to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs (Kipp 2004; Smith 2004; Yoshimura 2004). Initially, the NRC screened threat scenarios to determine plausibility. This screening was informed by information gathered through the NRC's regular interactions with the law enforcement and intelligence communities. For those scenarios deemed plausible, the NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. Separately, the NRC made conservative assessments of consequences, to assess the potential for prompt fatalities from radiological impacts from those plausible scenarios. The NRC then looked at the combined effect of the attractiveness and the consequence analyses, to determine whether additional security measures for ISFSIs were necessary.

In conducting the security assessments for ISFSIs, the NRC chose several storage cask designs that were representative of current NRC-certified designs. Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants. The resulting generic assessments formed the basis for NRC's conclusion that there was no need for further security measures at ISFSIs beyond those currently required by regulation and imposed by orders issued after September 11, 2001.

#### *4.15.2.2 Comparison of the Generic Security Assessment to Humboldt Bay*

The NRC staff reviewed the ISFSI security assessments and compared the assumptions in the generic assessments with the relevant features of the Humboldt Bay ISFSI, including storage cask design and atmospheric dispersion. The NRC staff determined the assumptions in the generic ISFSI security assessments for storage cask design and atmospheric dispersion are representative of actual conditions at the Humboldt Bay ISFSI. The NRC staff also concluded that a DSC, an overpack design, and construction materials for a storage cask analyzed in the generic security assessments were representative of the MPC and overpack design used at the Humboldt Bay ISFSI. The MPCs at Humboldt Bay serve the same function as the DSCs in the generic assessment. The applicant used NRC Regulatory Guide 1.145 to determine worst-case diffusion and dispersion factors, which the NRC staff found to be acceptable when it issued a specific license for the Humboldt Bay ISFSI (NRC 2005c). The NRC staff compared the wind speeds and atmospheric stability classes with those in the generic assessment and determined the conditions at the Humboldt Bay site are comparable to the conditions evaluated in the generic assessment. For these reasons, the NRC staff determined the consequences of a release of radioactive material from a hypothetical attack at the Humboldt Bay ISFSI do not differ significantly from those of the generic assessment, and thus are bounding.

The NRC staff separately compared the two different types of material stored at the Humboldt Bay ISFSI—i.e., spent fuel and GTCC waste. The staff compared the radioactive material stored at the Humboldt Bay ISFSI to the source term (i.e., the amount of radioactive material stored) used in the generic assessments to determine whether the dose consequences of the generic assessments bound those of the Humboldt Bay ISFSI.

The NRC staff assumed all the fuel stored at Humboldt Bay ISFSI was burned to 23,000 megawatt-days per metric ton uranium (MWD/MTU), which is a higher burnup than for any of the spent fuel stored onsite. Because spent fuel radioactivity increases with burnup, the staff's use of the conservative assumption overpredicts the source term at the Humboldt Bay ISFSI. The actual burnup of fuel in the Humboldt Bay ISFSI is less than that used in the generic assessment. The higher burnup value evaluated in the generic assessment, 45,000 MWD/MTU and higher, also overpredicts the activity of the stored fuel. The Humboldt Bay MPCs contain a maximum of (80) spent fuel assemblies. The fuel design at Humboldt Bay is smaller and shorter than a typical boiling water reactor (BWR). The mass of spent fuel stored in a Humboldt Bay MPC is approximately 7,000 kilograms (kg) (15,432 pounds [lb]), which is less than that of the generic assessments (11,000 kg [24,250 lb] and higher). Because the source term increases with mass, the generic assessment overpredicts a hypothetical release. For these reasons, the NRC staff determined the generic assessment is bounding of the spent fuel source term at Humboldt Bay.

The NRC staff also evaluated the amount of GTCC waste stored at the Humboldt Bay ISFSI against the maximum hypothetical consequence determined from the generic assessments. The GTCC waste at Humboldt Bay consists of activated components and process waste. Staff compared the consequences by evaluating the results from scenarios with materials analogous to the activated components to estimate the releasable source term inventory in a GTCC waste MPC at Humboldt Bay versus a spent fuel DSC in the generic assessment. In scenarios where the cask system was not comparable in design or materials to the Humboldt Bay ISFSI, the staff selected the scenario for that design that resulted in the highest release fraction. This is conservative because it assumes the worst-case situation for each of the staff's evaluations. For the GTCC process waste, the staff assumed that the entire inventory is released from the storage cask and is respirable. This is conservative because it results in the maximum dose consequence possible. Based on this evaluation, the staff determined that the dose consequences of a GTCC waste release would be bounded by the generic assessments by several orders of magnitude.

The NRC staff concluded the projected dose to the maximally exposed individual would be well below the 0.05 Sv (5 rem), which is the accident dose limit in 10 CFR 72.106. Emergency planning and response actions by onsite personnel and law enforcement agencies could also provide additional protections and mitigate consequences, in the unlikely event that an attack was attempted at the Humboldt Bay ISFSI.

For the reasons discussed above, the NRC staff concludes that potential radiological dose to the public associated with a hypothetical attack on the Humboldt Bay ISFSI would be less than the dose calculated in the generic security assessments. The generic security assessments support the NRC's conclusion that the agency's security regulations and orders for the ISFSIs

provide adequate protection for the public health and safety, the common defense and security, and the environment. Therefore, additional security measures at ISFSIs are not required.

The NRC staff finds the robust structure of storage casks, specifically designed to withstand severe accidents, in conjunction with existing security regulations and orders, provide adequate protection so that a terrorist attack on the Humboldt Bay ISFSI would not result in a significant release of radiation. For these reasons, the NRC staff concludes the impact from a hypothetical terrorist attack would be SMALL and would not result in a significant impact on the environment.



## **5.0 AGENCIES AND PERSONS CONSULTED**

The NRC staff consulted with other agencies regarding the proposed action in accordance with NUREG-1748 (NRC 2003). These consultations were intended to (1) ensure that the requirements of Section 7 of the ESA of 1973 and Section 106 of the NHPA of 1966 as amended were met and (2) provide the designated State liaison agencies the opportunity to comment on the proposed action. NRC staff contacted the California Department of Health (NRC 2018c) via letter dated October 19, 2018, requesting any information they may have regarding environmental resources that may be affected by the proposed HB ISFSI license renewal. The draft version of this EA was sent to the California Department of Public Health, which indicated via email that the State had no comments (CA Department of Public Health 2019).

### **5.1 National Historic Preservation Act**

The NHPA was enacted to create a national historic preservation program, including the National Register of Historic Places and the Advisory Council on Historic Preservation. Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on historic properties. The NHPA implementing regulations at 36 CFR Part 800, "Protection of Historic Properties," defines an undertaking as "... a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval." Therefore, the NRC's approval of this license renewal request constitutes a Federal undertaking. The NRC, however, has determined that the scope of activities described in this license renewal request do not have the potential to cause effects on historic properties, assuming those were present, because the NRC's approval of this license renewal request will not result in construction or land disturbance activities. In accordance with 36 CFR 800.3(a)(1), no consultation is required under Section 106 of the NHPA.

The NRC staff, however, contacted the California Office of Historic Preservation (NRC 2019b) by letter dated June 19, 2019, the California NAHC (2018), and several Federally recognized Indian Tribes: the Wiyot Tribe, the Bear River Band of Rohnerville Rancheria, the Blue Lake Rancheria, the Big Lagoon Rancheria, the Cher-Ae Heights Indian Community of the Trinidad Rancheria, the Hoopa Valley Tribe, the Karuk Tribe, the Elk Valley Rancheria, and the Yurok Tribe of California by letter dated November 15, 2018 (NRC 2018b). In a letter dated July 11, 2019, the CA SHPO indicated that they did not object to a finding that no historic properties would be affected by this undertaking (California Office of Historic Preservation 2019).

As part of the 2013 EA, the NRC staff communicated with the California NAHC and three Federally recognized Indian Tribes: the Wiyot Tribe, the Bear River Band of Rohnerville Rancheria, and the Blue Lake Rancheria, requesting input on the NRC staff's preliminary determination that the license amendment would not adversely affect any historic sites and cultural resources. Responses received from a Blue Lake Rancheria representative and a Bear River Band of Rohnerville Rancheria representative indicated both had no concerns for the proposed action (NRC 2013).

## 5.2 The Endangered Species Act

Under Section 7 of the ESA and through its implementing regulations (50 CFR 402, Subpart B), prior to taking a proposed action, a Federal agency must determine whether (1) endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action and if so, whether (2) the proposed Federal action may affect listed species or critical habitats. If the proposed action may affect listed species or critical habitats, the Federal agency is required to consult with the FWS and/or the U.S. National Marine Fisheries Service (NMFS). The Federal agency can either initiate the process to prepare a biological assessment or alternatively, engage in informal consultation. Under informal consultation, if the agency determines that the proposed action is not likely to adversely affect endangered or threatened species or their critical habitats, and the FWS or the NMFS, as appropriate, concurs, then the consultation process is terminated and no further action is required on the part of the agency. If the agency cannot make the required informal consultation findings, or if the FWS or the NMFS does not concur with the agency's findings, then the agency must prepare a biological assessment and proceed to formal consultation with either the FWS or the NMFS, as appropriate (50 CFR 402.14). Formal consultation may result in further obligations upon the agency and/or the applicant or licensee.

Approval of PGE's proposed action is not expected to result in any new construction activities or land disturbance and therefore will not likely affect listed endangered or threatened species or their critical habitats in the vicinity of the Humboldt Bay ISFSI. The NRC staff used the U.S. Fish and Wildlife Service's IPaC website and obtained an official species list for the Humboldt Bay ISFSI area and based on the proposed action, made a no effects determination (FWS 2018). The species listed in Table 5-1 may be present in the area of the proposed action.

**Table 5-1. Listed Species that May Be Present in the Humboldt Bay Area**

	<b>Name</b>	<b>Status</b>
Reptiles	Giant Garter Snake	Threatened
Amphibians	California Red-Legged Frog	Threatened
	California Tiger Salamander	Threatened
Fishes	Delta Smelt	Threatened
Insects	Valley Elderberry Longhorn Beetle	Threatened
Crustaceans	Conservancy Fairy Shrimp	Endangered
	Vernal Pool Fairy Shrimp	Threatened
	Vernal Pool Tadpole Shrimp	Threatened
Flowering Plants	Fleshy Owl's-clover	Threatened
Critical Habitats	California Tiger Salamander	Final

The NRC staff consulted with the CDFW by letter dated March 25, 2019 (NRC 2019a). The CDFW responded via email dated April 4, 2019, that no harmful effects were likely to occur because there would be no new construction or groundbreaking activities (CDFW 2019). This conclusion is consistent with previous EAs conducted for the HB ISFSI (NRC 2005, 2013).

Therefore, the NRC concludes that the proposed action would not likely adversely affect Federally listed threatened and endangered species.

## **6.0 CONCLUSION AND FINDING OF NO SIGNIFICANT IMPACT**

Based on its review of the proposed action, in accordance with the requirements of 10 CFR Part 51, the NRC staff has preliminarily determined that renewal of NRC license SNM-2514, authorizing continued operation of the Humboldt Bay ISFSI for an additional 40 years, will not significantly affect the quality of the human environment. In its license renewal request, PG&E is proposing no changes in how it handles or stores spent fuel at the Humboldt Bay ISFSI. No significant changes in PG&E's authorized operations for the Humboldt Bay ISFSI were requested as part of the license renewal application. The proposed action would not result in any new construction or expansion of the existing ISFSI footprint beyond that previously approved. The ISFSI is a passive facility that produces no liquid or gaseous effluents.

No significant radiological or nonradiological impacts are expected from continued normal operations. Occupational dose estimates associated with the proposed action and continued normal operation and maintenance of the ISFSI are expected to be at ALARA levels and within the limits of 10 CFR 20.1201. Therefore, the NRC staff has determined that pursuant to 10 CFR 51.31, preparation of an environmental impact statement is not required for the proposed action, and pursuant to 10 CFR 51.32, a FONSI is appropriate.

## **7.0 LIST OF PREPARERS**

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- 10 CFR Part 20. *Code of Federal Regulations*, Title 10, *Energy*, Part 20, “Standards for Protection Against Radiation,” Subpart 1201, Occupational Dose Limits for Adults.
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- 10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” Subpart 32, Finding of No Significant Impact.
- 10 CFR Part 61. *Code of Federal Regulations*, Title 10, *Energy*, Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste,” Subpart 55, Waste Classification.
- 10 CFR Part 72. *Code of Federal Regulations*, Title 10, *Energy*, Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.”
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