11 RADIATION PROTECTION EVALUATION

11.1 Conduct of Review

The objective of Chapter 11 is to evaluate the capability of the organizational, design, and operational elements of the Humboldt Bay ISFSI radiation protection plan to meet regulatory requirements. The requirements for providing adequate radiation protection to personnel and members of the public are specified in 10 CFR Part 20, "Standards for Protection Against Radiation" and 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

The review considered how the Safety Analysis Report (SAR) (Pacific Gas and Electric Company, 2004a) and related documents address the regulatory requirements of 10 CFR §20.1101(a–d), §20.1201(a), §20.1301(a–b), §20.1301(e), §20.1302(a), §20.1406, §20.1501(a)(1), §20.1701, §20.1702(a), §72.24(e), §72.104(a–c), §72.106(b–c), §72.122(e), §72.126(a), §72.126(c)(1), §72.126(c)(2), §72.126(d), and §72.128(a)(2). Complete citations of these regulations are provided in the Appendix of this Safety Evaluation Report (SER).

The applicant will use the HI-STAR HB system for spent fuel storage the Humboldt Bay ISFSI. This cask system is a metal canister storage system designed to store boiling water reactor (BWR) fuel in a dry configuration in the below-grade ISFSI vault. The HI-STAR HB system is a modified version of the NRC-certified HI-STAR 100 system, as described in the HI-STAR 100 Final Safety Analysis Report (FSAR) (Holtec International, 2002). The HI-STAR HB system is made up of an all-welded multipurpose canister (MPC-HB) designed to store up to 80 Humboldt Bay Power Plant (HBPP) spent nuclear fuel (SNF) assemblies inside a bolted-lid steel overpack.

The staff's review included the applicable sections of the SAR, additional supporting documentation cited in the SAR, and responses to the NRC staff's request for additional information (Pacific Gas and Electric Company, 2004b, 2005). Chapter 7 of the SAR describes the radiation protection features of the proposed ISFSI that ensure that radiation exposures to personnel and members of the public meet the regulatory requirements. Information included in the HI-STAR 100 system FSAR (Holtec International, 2002) relevant to radiation protection for the Humboldt Bay ISFSI was also considered in the review.

11.1.1 As Low As Reasonably Achievable Considerations

The objective of this section is to evaluate whether the applicant has appropriately considered the goal of maintaining occupational doses and doses to members of the public as low as is reasonably achievable (ALARA) during the operation of the ISFSI. Considerations related to maintaining doses ALARA are described in Section 7.1 of the SAR.

11.1.1.1 As Low As Reasonably Achievable Policy and Program

The primary objective of the Health Physics Program is to maintain radiation exposure to workers, visitors, and members of the public below regulatory limits and ALARA. The existing HBPP Health Physics Program complies with the requirements of 10 CFR Part 20 and

10 CFR Part 50. The Health Physics Program that will be implemented for the Humboldt Bay ISFSI is described in Section 7.6 of the SAR, with the policy and program for maintaining doses ALARA described in Section 7.1 of the SAR. The applicant will apply the existing HBPP SAFSTOR Health Physics Program for maintaining doses ALARA to all ISFSI-related activities governed by 10 CFR Part 72. The program and procedures will be revised and supplemented, as appropriate, to address ISFSI-related activities and to comply with the description of the ISFSI Health Physics Program as described in Section 7.6 of the SAR. The program for maintaining doses ALARA follows the guidance in Regulatory Guides 8.8 (U.S. Nuclear Regulatory Commission, 1978) and 8.10 (U.S. Nuclear Regulatory Commission, 1975).

11.1.1.2 Design Considerations

The description of the design considerations to maintain doses ALARA is provided in Section 7.1.2 of the SAR, which delineates the following specific features of the Humboldt Bay ISFSI:

- Use of the below-grade storage vault located approximately 16 m [53 ft] from a fenced public access trail will maintain doses ALARA to members of the public who occasionally use this trail.
- Placement of the storage vault pads at a sufficient distance {greater than 100 m [328 ft]} from administrative buildings and the currently operating fossil-fuel powered generating units, so that doses to workers are maintained ALARA.
- Use of a restricted area fence and a security perimeter fence with a locked gate to protect individuals against undue risks from radiation exposure and to prevent unauthorized access to the ISFSI.
- Use of thick biological shielding in overpacks to provide gamma and neutron shielding.
- Use of a dry environment inside the seal-welded MPC-HBs to preclude the possibility for release of radioactive effluents from inside the canister.
- Use of inflatable seals in the canister-cask annulus to prevent spent fuel pool (SFP) water from contacting the exterior of the MPC-HB smooth surfaces, and use of an overpack coating material to minimize surface contamination and reduce decontamination time.

The ISFSI will be located within the owner-controlled boundary of the HBPP. Therefore, the transfer of the SNF from the SFP to the ISFSI will not take place on any public roads. The Humboldt Bay ISFSI incorporates a below-grade concrete vault providing significant shielding in addition to that provided by each shielded HI-STAR HB cask, and the vault is located at a sufficient distance from the controlled area boundary such that offsite exposures will be further minimized.

The staff finds that the design of the Humboldt Bay ISFSI provides reasonable assurance that doses to personnel and members of the public will be maintained ALARA and meets the requirements of 10 CFR §72.126(a). The staff also finds that the requirements for minimization of contamination and the amount of generated radioactive waste outlined in 10 CFR §20.1406 are satisfied. The staff finds that the design of the seal-welded MPC-HBs, which are not opened at the ISFSI and allow no generation of effluents, meets the requirements of 10 CFR §72.126(d).

11.1.1.3 Operational Considerations

The operational considerations to maintain doses ALARA are described in Section 7.1.3 of the SAR. The operating procedures for the Humboldt Bay ISFSI, such as cask loading, unloading, and transfer to the ISFSI storage vault, are summarized in Chapter 5 of the SAR and discussed in Chapters 3 and 10 of this SER. Specifically, the program to maintain doses ALARA includes the following operational elements:

- Use of classroom training, mockups, and dry-run training to train personnel about canister transfer procedures, verify equipment operability and procedure efficiency and minimize radiation exposure
- Fuel loading procedures will follow accepted work practices that reflect lessons learned about maintaining doses ALARA from other facilities that use dry cask storage
- Filling the annulus between the MPC-HB and the HI-STAR HB cask with clean water and using an inflatable annulus seal and overpressure system to minimize contamination of the MPC-HB exterior
- Use of power-operated tools when possible in bolting operations to minimize personnel exposure time
- Use of temporary portable shielding during fuel transfer to minimize personnel exposure to direct radiation

The staff finds that the applicant's description of the operational considerations for maintaining doses ALARA satisfies the requirements of 10 CFR §72.24(e) and that the described use of Regulatory Guides 8.8 (U.S. Nuclear Regulatory Commission, 1978) and 8.10 (U.S. Nuclear Regulatory Commission, 1975) in SAR Section 7.1.3 for planning operations is appropriate and provides reasonable assurance that doses to personnel and members of the public will be maintained ALARA.

11.1.2 Radiation Protection Design Features

Information relevant to the proposed radiation design features of the ISFSI is contained in Section 7.3 of the SAR.

11.1.2.1 Installation Design Features

The ISFSI radiation protection design features are described in Section 7.3.1 of the SAR. The ISFSI will be located within the HBPP owner-controlled area and will house 6 storage cells in a below-grade vault. Five of the storage cells will contain HI-STAR HB casks filled with HBPP SNF fuel, and 1 cell will contain a Greater than Class C (GTCC) waste cask. The storage cells/casks will be positioned on a 3.28 m [10 ft, 9 in] pitch in a single row in the ISFSI vault. Periodic inspections, placement of loaded storage casks, and routine security checks are the planned operations that will be conducted at the ISFSI.

The major components of the HI-STAR HB system include a stainless steel cylindrical MPC-HB canister (confinement vessel) and an overpack (cask), consisting of a large mass of steel and neutron shield material (Holtite-A) in the radial direction and thick steel bottom forging and top lid components.

The fuel is stored dry inside the MPC-HB, so there is no credible leakage of radioactive liquid. Airborne radioactive materials will be prevented from leaking from the MPC-HBs by the welded seals, and once sealed, fuel is not removed from the MPC-HBs at any location outside of the Refueling Building (RFB). The storage system is passive and requires little maintenance. The system is not expected to leak during normal, off-normal, or accident conditions. The staff, therefore, concludes that airborne radioactive monitors specified in 10 CFR §72.126(c)(1) are not required at the ISFSI. Placement of the storage casks in the below-grade vault provides significant shielding.

The staff finds that the use of Regulatory Position 2 of NRC Regulatory Guide 8.8 (U.S. Nuclear Regulatory Commission, 1978), which provides guidance regarding facility and equipment features, as discussed in Section 7.1.2 of the SAR, is appropriate. The staff also finds that given the proposed design features described in the SAR, the applicant has satisfied the requirements of 10 CFR §72.126(a). Sections 3.3.1.5.1, 3.3.1.5.2, 4.2.3.2, 4.2.3.3, 7.1.2, and 7.3.4 of the SAR discuss design features that address radiation monitoring, control of airborne contaminants, instrumentation and controls, and other considerations related to maintaining doses ALARA.

The staff finds that the information in the SAR provides reasonable assurance that the use of the HI-STAR HB system for the Humboldt Bay ISFSI will meet the regulatory requirements of 10 CFR §20.1101(b), §20.1101(d), §20.1201(a), §20.1301(a–b), §20.1701, §20.1702(a), §72.104(a-c), and §72.106(b). Chapters 7, 9, and 15 of this SER discuss the staff's evaluations of the radiation shielding features and the confinement features during normal, off-normal, and accident conditions. Based on these evaluations, the staff finds that the radiation protection features for the proposed Humboldt Bay ISFSI are acceptable.

11.1.2.2 Access Control

The access control to the ISFSI is described in Sections 2.1.2, 3.3.1.5.1, 4.1, 7.6.2, and 9.6, of the SAR. The applicant's property line and owner-controlled area are shown in Figure 2.1-2 of the SAR. The applicant's property line extends well outside the 100-m controlled area boundary around the ISFSI as is also shown in Figure 2.1-2. The applicant's property and 100-m controlled area boundary also extend into the waters of Humboldt Bay. The applicant

exercises authority to control all activities within the owner-controlled area boundaries. Access control to the restricted area around the ISFSI vault provides for both personnel radiation protection and stored fuel physical protection. Two fences will surround the Humboldt Bay ISFSI. A security fence with a locked gate will circumscribe the ISFSI storage vault. There is a minimum 6 m [20 ft] distance between the storage vault and the security fence on all sides of the vault. The second fence runs along the public trail to the north of the ISFSI site to control access to the owner-controlled area and is a minimum of 16 m [53 ft] from the ISFSI vault. Fences with lockable gates will be installed as indicated in SAR Figure 2.1-2 such that the 100-m [328 ft] controlled area boundary required by 10 CFR §72.106(b) can be established during cask movement, handling evolutions, or accident conditions requiring traffic control to protect public health and safety in the 100-m [328 ft] controlled area boundary. The Coast Guard will be relied upon, when required, to control access to water areas within the 100-m controlled area boundary. The gates on the public trail will be open during normal storage operations so that public access is not restricted by the applicant. This is consistent with 10 CFR §72.106(c), which allows the controlled area to be traversed so long as appropriate and effective arrangements are made to control traffic and protect public health and safety.

Once the Humboldt Bay ISFSI is operational, entrance to and work within the ISFSI protected area will be controlled by radiation protection and security personnel who will maintain a list of individuals authorized for access. During normal storage operations, personnel will conduct infrequent, short-duration checks on the material condition of the ISFSI vault. Higher occupancy activities will occur during the construction and placement of loaded overpacks. Radiation work permits will be required for authorized work. The ISFSI protected area will have an intrusion detection system to detect unauthorized entry. The dose rate outside the controlled area, including direct radiation from ISFSI operations and any other radiation from uranium fuel cycle operations within the region, will not exceed 0.25 mSv/yr [25 mrem/yr], as specified in 10 CFR §72.104(a).

The staff finds that the proposed access control at the Humboldt Bay ISFSI, as described in the SAR, is acceptable and meets the radiation protection requirements of 10 CFR §20.1301(b) and §72.126(a). The physical security plan describes the measures to prevent the entry of unauthorized personnel into radiologically controlled areas. The staff's review of the Security Program for the ISFSI is the subject of separate correspondence.

11.1.2.3 Radiation Shielding

The shielding evaluation is contained in Chapter 7 of this SER. The staff evaluated the SAR shielding calculations and found them to be acceptable. The dose rates at the onsite and offsite locations were found to be below the limits specified in 10 CFR §20.1101(d), §20.1201(a), §20.1301(a), §20.1302(a), §72.104(a) and §72.106(b). Based on its review of the information in the SAR and the sample calculation files provided by the applicant, the staff finds that there is reasonable assurance that the ISFSI shielding was adequately analyzed and meets the requirements of 10 CFR §72.128(a)(2).

11.1.2.4 Confinement and Ventilation

The evaluation of the MPC-HB confinement system is provided in Chapter 9 of this SER. The MPC-HB is a welded cylindrical enclosure with no mechanical joints or seals in the confinement

boundary and is not vented. The evaluation of site-generated waste confinement and management is provided in Chapter 14 of this SER. Based on these evaluations, the staff finds that the requirements specified in 10 CFR §72.126(c)(1) are not applicable to the Humboldt Bay ISFSI design.

11.1.2.5 Area Radiation and Airborne Radioactivity Monitoring Instrumentation

Area radiation and airborne radioactivity monitoring instrumentation are described in SAR Sections 3.3.1.3.2, 3.3.1.5.3, 6.2, and 7.3.4. All SNF at the ISFSI will be stored in seal-welded MPC-HBs. There are no credible events that could result in the release of radioactive materials from within MPC-HBs. There are also no credible events that could increase dose rates from direct radiation from the casks stored in the ISFSI vault. Area radiation and airborne radioactivity monitors, therefore, are not needed at the Humboldt Bay ISFSI vault. Continuous monitoring and audible high-radiation level alarms will be used in the RFB and SFP area as part of the existing HBPP SAFSTOR license program. Thermoluminescent dosimeters (TLDs) will be used to monitor and record area doses at appropriate intervals along and within the ISFSI restricted-area fence. Hand-held radiation protection instruments and dosimeters will be provided during fuel transfer operations and routine maintenance at the ISFSI vault.

The staff finds that the radiation monitoring instrumentation described in the SAR meets the requirements of 10 CFR §72.126(c)(2) and provides reasonable assurance that actual dose rates around the ISFSI will be adequately monitored to verify compliance with the radiological limits specified in 10 CFR Parts 20.1301(a) and 72.104(a) for members of the public, and that any unexpected increases in dose rates will be properly detected in a timely manner.

11.1.3 Dose Assessment

Dose assessments are presented in Sections 7.3.2, 7.4, 7.5, 8.1, and 8.2 of the SAR. The Humboldt Bay ISFSI has been designed as a single row of 6 storage cells in a below-grade vault with steel-encased concrete lids. This design provides a significant amount of shielding such that the estimated dose rate at the vault lid of a storage cell is expected to be less than 1.5 FSv/hr [0.15 mrem/hr].

11.1.3.1 Onsite Doses

Table 7.4-1 of the SAR provides the estimated occupational exposures to the HBPP personnel during the different phases of ISFSI operation including (i) loading fuel into the MPC-HB contained in the overpack, (ii) decontaminating the MPC-HB and overpack, (iii) transferring the cask from the RFB to the ISFSI vault, (iv) transferring the cask into a storage cell of the vault, and (v) closing the storage cell lid. Tables 7.4-1 and 7.4-2 of the SAR provide a list of the operational steps involved in loading and unloading an overpack and MPC-HB, respectively. These tables include the estimated number of personnel, the estimated dose rates, and the estimated time for each operational task. The estimated dose from loading, transferring, and emplacing a single MPC-HB in a storage overpack in the ISFSI vault was estimated at 5.68 person-mSv [567.98 person-mrem].

Section 7.4 of the SAR discusses the dose estimates for routine maintenance operations with a summary presented in Table 7.4-3 of the SAR. Routine inspections of the ISFSI are estimated

to include a single-person 10-minute walkdown of the vault area every day for an estimated annual occupancy time of 61 hours. Routine maintenance and repair operations were estimated by the applicant at 1 per month, requiring 2 personnel for 1 hour for an annual occupancy time of 24 hours. The annual occupational exposure from ISFSI walkdowns was estimated to result in a dose of 92 person-FSv [9.2 person-mrem]. The estimated annual exposure for repair activities was estimated as 36 person-FSv [3.6 person-mrem]. Based on these estimates, there is reasonable assurance that personnel exposures will be below the annual occupational dose limit of 0.05 Sv [5 rem] specified in 10 CFR §20.1201(a). Evaluation of the conduct of operations is presented in Chapter 10 of this SER.

11.1.3.2 Offsite Doses

Offsite collective dose for normal conditions is addressed in Section 7.5 of the SAR. Off-normal and accident offsite doses are addressed in Sections 8.1 and 8.2 of the SAR, respectively. The applicant calculated offsite dose estimates for two primary locations: the public trail at a point 16 m [53 ft] from the edge of the ISFSI, and the nearest resident, 247 m [811 ft] from the center of the ISFSI. Although the public trail is used only occasionally, occupancy at the closest point of the site boundary was assumed to be 2,080 hours per year, based on a 40-hour working week for 52 weeks per year. The dose estimate for the nearest resident was made assuming a continuous occupancy of 8,760 hours per year. As evaluated in Chapter 7 of this SER and described in Section 7.3.2.2 of the SAR, the dose rates from the ISFSI are conservatively calculated using a reflective boundary condition that simulates an infinite row of HI-STAR HB casks in the storage vault. The dose analyses assume that all 6 storage cells are loaded with HI-STAR HB casks containing HBPP fuel at the design-basis burnup and cooling time evaluated in Chapter 7 of this SER. This provides a bounding dose rate calculation for the ISFSI, since the ISFSI will have only 5 casks that contain HBPP fuel. The applicant will verify, through measurement, that the source strength of the sixth cask containing GTCC waste is bounded by the source strength of a SNF cask (Pacific Gas and Electric Company, 2004c, Attachment C).

Table 7.5-1 of the SAR presents the dose rate and annual doses for the locations and occupancy times discussed above. The applicant estimated the site boundary dose rate to be 0.0816 μSv/hr [8.16 Frem/hr], which corresponds to 0.17 mSv/yr [17.0 mrem/yr] for 2,080-hour annual occupancy from direct radiation exposure. As discussed in Chapter 9 of this SER, no release of radioactive materials, airborne or otherwise, is expected during normal operations; therefore, doses caused by effluents, both gaseous and liquid, are not considered. The applicant estimated an annual direct radiation dose to the nearest resident located 247 m [811 ft] away from the ISFSI as 0.0448 mSv [4.48 mrem], assuming the resident is continually present at the residence for 8,760 hours per year.

The staff's review of the controlled area boundary and nearest resident dose assessments, and of the shielding evaluation of direct radiation doses, including confirmatory calculations, is contained in Chapter 7 of this SER. Based on the evaluation in Chapter 9 of this SER, doses caused by effluents were not considered. The use of dosimeters and periodic radiological surveillance at the ISFSI, as described in SAR Section 7.7, will detect any unexpected significant releases of radioactive materials; therefore, these measures will meet the requirements of 10 CFR §72.126(c)(2), §20.1301(e), and §20.1302(a).

All of the HI-STAR HB system casks and the GTCC waste cask are assumed to be loaded and placed in the ISFSI storage vault within a single year. The applicant's offsite dose analysis also includes the estimated dose from these operations in relation to the annual dose limits specified in 10 CFR §72.104(a). The analysis assumes that the licensee will restrict access by members of the public to areas outside the 100-m controlled area boundary during loading operations. The analysis also assumes that each cask requires 8 hours to be transferred to and loaded into the vault, but for dose analysis estimation, each cask is assumed to be at the vault for the entire loading operation. This provides a conservative calculation in that each of the 6 casks is assumed to be at the closest possible location to a member of the public {100 m [328 ft]} for the duration of the loading operation. As shown in Table 7.5-3 of the SAR, for the year in which the ISFSI vault is loaded, the applicant estimates doses from ISFSI loading operations to be 24.5 FSv/yr [2.45 mrem/yr] at the 100-m [328 ft] controlled area boundary and 18.3 FSv/yr [1.83 mrem/yr] for the nearest resident {247 m [810 ft]}.

Contributions to the dose rates from other nuclear fuel-cycle facilities (HBPP Unit 3) located within the region of the proposed ISFSI were taken into account in the total offsite collective dose assessment. As described in Section 7.5.3 and listed in Table 7.5-3 of the SAR, the annual dose from the other uranium fuel cycle operations was estimated as <20 μSv/yr [<2 mrem/yr] at the controlled-site boundary and <1.0 μSv/yr [<0.1 mrem/yr] at the nearest resident location. The combined annual dose from the proposed ISFSI, including vault loading operations in a single year, and other nuclear fuel-cycle facilities was estimated as a maximum of 0.2145 mSv [21.45 mrem] at the controlled-site boundary and 0.0641 mSv [6.41 mrem] to the nearest resident. These dose values are less than the 0.25 mSv/yr [25 mrem/yr] whole-body dose limit specified in 10 CFR §72.104(a). The staff reviewed the applicant's assumptions and analysis of the total off site collective dose presented in the SAR and determined that the assessment provides reasonable assurance that the cumulative effects of the combined operations of the ISFSI and HBPP will not constitute an unreasonable risk to the health and safety of the public, in compliance with 10 CFR §72.104(a) and §72.122(e).

Section 8.1 of the SAR evaluates the HI-STAR HB system and concludes that the system can withstand the applicable off-normal events such that the confinement boundary of the MPC-HB and shielding integrity are not affected. The staff finds the applicant's analyses of off-normal events acceptable and has reasonable assurance that off-normal events will have no radiological impact. Section 8.2 of the SAR demonstrates that the HI-STAR HB system can withstand the analyzed accident events without affecting the design function of the system such that the confinement boundary of the MPC-HB is not affected. Shielding integrity is also maintained in the accident analyses, with the exception of one accident condition. The analysis of a fire accident during transfer operations indicates that the temperature limits of the neutron shield in the overpack would be exceeded. Section 8.2.5.3 of the SAR summarizes the analysis for the complete loss of the neutron shield during transfer and estimates the accident condition dose rate at 100 m to be 4.5 FSv/hr [0.45 mrem/hr]. The applicant assumes full occupancy at the 100-m controlled area boundary for a full 30-day accident recovery period, resulting in a dose of 3.24 mSv [324 mrem]. This dose value is less than the 0.05 Sv [5 rem] whole-body dose limit from any design basis accident specified in 10 CFR §72.106(b). The applicant's accident analyses are reviewed and evaluated in Chapter 15 of this SER.

Based on its review and evaluation of the applicant's offsite dose assessments for the ISFSI and relevant information referenced from the HI-STAR 100 system (Holtec International, 2002), the staff finds the applicant's offsite dose assessments for the Humboldt Bay ISFSI acceptable.

The results of these site-specific assessments and the staff's evaluations of the previously approved HI-STAR 100 system (U.S. Nuclear Regulatory Commission, 2001), as applicable to the HI-STAR HB system, provide reasonable assurance that doses to personnel and members of the public will be maintained ALARA and will meet the requirements of 10 CFR §20.1101(d), §20.1201(a), §20.1301(a), §72.24(e), §72.104(a), and §72.106(b).

11.1.4 Health Physics Program

The Health Physics Program is described in Section 7.6 of the SAR.

11.1.4.1 Organization

The Health Physics Program organization is described in Section 7.6.1 of the SAR and references the organization that will implement the Health Physics Program during ISFSI operations described in the SAR Section 9.1.3 and shown in Figure 9.1-2. The ISFSI organization is evaluated in detail in Section 10.1.1 of this SER. The Radiation Protection Manager is responsible for health physics activities related to ISFSI operations. The Radiation Protection Manager is independent of the Engineering Manager. The Radiation Protection Manager and the Engineering Manager report directly to the Director and Plant Manager. The staff finds that this element of the proposed Radiation Protection Program satisfies 10 CFR §20.1101(a). Once the ISFSI is completed, the applicant intends to decommission HBPP Unit 3 and terminate the 10 CFR Part 50 license. Following this action, the ISFSI organization may be revised, and the applicant has committed to notify NRC concerning any changes to the ISFSI organization prior to terminating the 10 CFR Part 50 license.

11.1.4.2 Equipment, Instrumentation, and Facilities

The equipment, instrumentation, and facilities pertinent to the ISFSI Health Physics Program are described in Section 7.6.2 of the SAR. The ISFSI is located within the Humboldt Bay owner-controlled area, and the applicant has full authority to control all activities within the ISFSI and owner-controlled area boundaries. Equipment, instrumentation, and facilities described in Sections 7.6.2.1, 7.6.2.2, and 7.6.2.3 of the SAR will be used for ISFSI operations and radiation surveys, in accordance with the policies and procedures described in Section 7.6.3 of the SAR. Prior to termination of the 10 CFR Part 50 SAFSTOR license of the HBPP, the health physics equipment, instrumentation, and facilities of the HBPP will be provided for use during the preoperations phase of the ISFSI. The applicant's description of the Health Physics Program provided in Section 7.6 of the SAR will be applicable to ISFSI operations during and after the 10 CFR Part 50 license termination. The applicant proposes to use a contracted, offsite facility for this program that will be governed by the ISFSI QA program described in Chapter 11 of the SAR. The staff finds, based on the program description in the SAR, that the requirements of 10 CFR §20.1101(a) will be met.

The Environmental Monitoring Program will be applied to ISFSI operations as described in Section 7.7 of the SAR. Additional TLDs will be used to determine dose rates at the restricted area and owner-controlled area boundaries. There will be no additional effluent monitoring because no radioactive effluents are expected during ISFSI operations. The staff finds that compliance with the dose limits specified in 10 CFR §72.104(a) will be demonstrated through

the Environmental Monitoring Program using direct radiation measurements, thereby meeting the requirements of 10 CFR §20.1501(a)(1).

11.1.4.3 Policies and Procedures

The policies and procedures pertinent to the ISFSI Health Physics Program are described in Section 7.6.3 of the SAR. The Health Physics Program at the Humboldt Bay ISFSI will be implemented in accordance with the applicant's program directives, administrative procedures, and working-level procedures, which will be revised as needed to address ISFSI operations prior to operation of the ISFSI. The operation and use of radiation monitoring equipment will be described in written procedures consistent with the requirements of 10 CFR §20.1101(a), §20.1101(b), and §20.1101(c). The staff finds that the Health Physics Program policies and procedures described by the applicant in Section 7.6.3 of the SAR are acceptable and provide reasonable assurance that the requirements of 10 CFR §20.1101(a-c) are met.

11.2 Evaluation Findings

Based on the review of information in the SAR and its supporting documentation, the staff makes the following findings regarding the Radiation Protection Program for the proposed ISFSI:

- The design and operating procedures of the Humboldt Bay ISFSI provide acceptable means for controlling and limiting occupational radiation exposures within the limits given in 10 CFR §20.1201(a) and for meeting the objective of maintaining exposures ALARA.

- The SAR and other documentation submitted in support of the application are acceptable and provide reasonable assurance that the activities authorized by the license can be conducted without endangering the health and safety of the public, in compliance with 10 CFR §20.1301(a), §20.1301(b), and §20.1301(e).

- The proposed Humboldt Bay ISFSI is to be on the same site as the Humboldt Bay Power Plant. The cumulative effects of the combined operations of these facilities will not constitute an unreasonable risk to the health and safety of the public, in compliance with 10 CFR §72.122(e).

- The SAR provides analyses showing that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limits given in 10 CFR §72.104(a-c) and §72.106(b).

- The design of the Humboldt Bay ISFSI provides suitable shielding and confinement for radiation protection under normal and accident conditions, in compliance with 10 CFR §72.126(a), §72.126(c)(2), §72.126(d), and §72.128(a)(2).

- The staff finds that the Health Physics Program, as described by the applicant, satisfies the requirements of 10 CFR §20.1101(a–c), §20.1302(a), §20.1406, and §20.1501(a)(1).

11.3 References

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Pacific Gas and Electric Company. *Humboldt Bay Independent Spent Fuel Storage Installation Safety Analysis Report, Amendment 1*. Docket No. 72-27. Avila Beach, CA: Pacific Gas and Electric Company. 2004a.

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U.S. Nuclear Regulatory Commission. Regulatory Guide 8.10, *Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Reasonably Achievable*. Rev 1-R. Washington, DC: U.S. Nuclear Regulatory Commission. 1975.

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