

14 WASTE CONFINEMENT AND MANAGEMENT EVALUATION

14.1 Conduct of Review

This chapter of the Safety Evaluation Report (SER) evaluates the waste management systems of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). Chapter 6 of the Safety Analysis Report (SAR) provides information about the waste confinement and disposal systems that are a part of the facility. This review specifically focused on radioactive wastes that would be generated by site activities involving the handling and storage of spent nuclear fuel. These activities may produce (1) gaseous wastes, (2) liquid wastes, and (3) solid or solidified wastes during loading and unloading of the multi-purpose cask (MPC). Neither the actual spent nuclear fuel nor the waste generated by the Diablo Canyon Power Plant (DCPP) fall within the scope of this review. The review objectives for this chapter are to determine whether the ISFSI design and procedures provide safe confinement and management of radioactive waste generated, and to determine whether the types and quantities of any radioactive waste generated and radioactive material released to the environment as a result of ISFSI activities comply with regulatory requirements.

14.1.1 Waste Source

A review of the sources of radioactive waste described in Chapter 6 of the SAR included consideration of various sources during the operation of the facility. The review considered how the SAR addresses the following regulatory requirements:

- 10 CFR §72.24(l) requires that information regarding the equipment to be installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations and expected operational occurrences needs to be included in the SAR describing the proposed ISFSI.
- 10 CFR §72.104(a) requires that, during normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ from various sources, including planned discharges of radioactive materials to the environment.
- 10 CFR §72.128(a)(5) requires that spent fuel storage and handling systems must be designed with means to minimize the quantity of radioactive wastes generated.
- 10 CFR §72.128(b) requires that radioactive waste treatment facilities must be provided. Provisions must be made for packing site-generated low-level wastes in a form suitable for storage onsite awaiting transfer to disposal sites.

As described in Chapter 6 of the Diablo Canyon ISFSI SAR (Pacific Gas and Electric Company, 2002), some amounts of liquid, gaseous, and solid radioactive wastes may be generated during loading and decontamination activities before storage.

A small quantity of low-level solid waste may be generated during MPC loading operations and will be processed using the existing DCPD radioactive waste control systems, which are described in Chapter 11 of the DCPD Final Safety Analysis Report Update (Pacific Gas and Electric Company, 2001). Contaminated water from the loaded MPCs is drained back into the spent nuclear fuel pool with no additional processing. Small amounts of liquid wastes may also be generated from transfer cask and MPC decontamination and any contaminated water collected in the cask transfer facility (CTF) sump. Liquid wastes resulting from the decontamination procedure will be collected in the FHB/AB and processed using existing DCPD radioactive waste control systems. Any contaminated water collected in the CTF sump will be disposed of in accordance with the DCPD radioactive waste management program. Potentially contaminated air and helium from the MPC during loading and unloading operations will be collected and processed through the existing plant gaseous radioactive waste system.

The staff concludes that the use of the existing Diablo Canyon power plant facilities for processing solid and liquid wastes generated during fuel loading and decontamination activities related to ISFSI operations satisfies the requirements of 10 CFR §72.128(b). The passive design of ISFSI components minimizes the volume of radioactive waste that could be generated by the operation of the ISFSI. The staff concludes that the Diablo Canyon ISFSI satisfies the requirements of 10 CFR §72.128(a)(5). The details provided in the ISFSI SAR regarding the treatment of the solid, liquid, and gaseous wastes generated satisfy the requirements of 10 CFR §72.24(l).

No radioactive waste material is generated during transfer of spent fuel to the ISFSI pad and during storage at the ISFSI. The dry cask storage system is a passive design requiring no active systems to ensure adequate decay heat removal and to ensure adequate confinement. The system also does not require intrusive periodic maintenance. The passive design minimizes the volume of radioactive waste that could be generated by the operation of the ISFSI.

14.1.2 Off-Gas Treatment and Ventilation

The staff's review of the Diablo Canyon ISFSI SAR regarding off-gas treatment and ventilation considered how the SAR addresses the following regulatory requirements:

- 10 CFR §72.104(a) requires that, during normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ from various sources, including planned discharges of radioactive materials to the environment.
- 10 CFR §72.122 (h)(3) requires that ventilation systems and off-gas systems must be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions.
- 10 CFR §72.126(d) requires that the ISFSI must be designed to provide means to limit to levels as low as is reasonably achievable the release of radioactive materials in effluents during normal operations; and control the release of

radioactive materials under accident conditions. Analyses must be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in §72.104. Analyses of design basis accidents must be made to show that releases to the general environment will be within the exposure limits given in §72.106. Systems designed to monitor the release of radioactive materials must have means for calibration and testing their operability.

As described in the ISFSI SAR, the MPC is designed to endure normal, off-normal and accident conditions of storage with maximum decay heat loads without loss of confinement. Permanent area radiation and airborne radioactivity monitors are not needed at the Diablo Canyon ISFSI because the storage system is passive. During fuel loading, existing spent fuel pool instrumentation will monitor for any releases of airborne radioactivity. These monitors are designed to automatically change the building ventilation exhaust system from normal to emergency mode upon detection of radiation levels above preset alarm levels. During fuel loading and closure of the MPC, potentially contaminated air will be collected and processed through the gaseous radioactive waste system. This contaminated vented gas would be redirected and processed using existing plant facilities and procedures subject to the requirements of the DCPD 10 CFR Part 50 license. The MPC confinement boundary ensures that there will be no release of radioactive materials after the MPC is seal-welded. Therefore, no radioactive wastes are produced by the HI-STORM 100 System while the fuel is in storage, nor during transfer between the FHB/AB, the CTF, and the storage pads.

The staff concludes that the applicant has provided sufficient design features and controls to ensure the confinement of airborne radioactive particulate materials during normal and off-normal conditions in compliance with 10 CFR §72.122(h)(3). In addition, the staff concludes that the proposed design and operation of the ISFSI satisfies the requirements of 10 CFR §72.104(a) and §72.126(d). Because no effluents are expected under normal or accident conditions, the requirements of 10 CFR §72.126(c)(1), regarding measurement and dilution of effluents, are considered not applicable.

14.1.3 Liquid Waste Treatment and Retention

The staff's review of the ISFSI SAR regarding liquid waste treatment and retention considered how the SAR addresses the following regulatory requirements:

- 10 CFR §72.104(a) requires that, during normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ from various sources, including planned discharges of radioactive materials to the environment.
- 10 CFR §72.128(b) requires that radioactive waste treatment facilities must be provided. Provisions must be made for packing site-generated low-level wastes in a form suitable for storage onsite awaiting transfer to disposal sites.

Contaminated water from the loaded MPCs is drained back into the spent nuclear fuel pool with

no additional processing. Liquid wastes are also generated from transfer cask and MPC decontamination and any contaminated water collected in the CTF sump. These liquid wastes would be processed using existing DCPD radioactive waste control systems and procedures as described in the DCPD FSAR Update.

The staff finds that no special liquid radioactive waste treatment and retention systems are needed at the ISFSI. The applicant has identified and described an appropriate method for treating the contaminated liquids, if needed. Therefore, the staff finds that the requirements of 10 CFR §72.128(b) are satisfied. Use of the DCPD facilities, subject to the provisions of 10 CFR Part 50, to process radioactive waste generated during all phases of ISFSI operation satisfies the requirements of 10 CFR §72.128(b).

14.1.4 Solid Wastes

The review of the SAR regarding solid waste treatment considered how the SAR addresses the following regulatory requirements:

- 10 CFR §72.104(a) requires that, during normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ from various sources, including planned discharges of radioactive materials to the environment.
- 10 CFR §72.128(b) requires that radioactive waste treatment facilities must be provided. Provisions must be made for the packing of site-generated low-level wastes in a form suitable for storage onsite awaiting transfer to disposal sites.

A small quantity of low-level solid waste may be generated during MPC loading operations. The solid waste may include disposable anticontamination garments, paper, rags, tools, and such, which will be processed using the existing DCPD radioactive waste control systems as described in the DCPD FSAR Update. Use of the DCPD facilities, subject to the provisions of 10 CFR Part 50, to process radioactive waste generated during all phases of ISFSI operation satisfies the requirements of 10 CFR §72.128(b) and §72.104(a).

14.1.5 Radiological Impact of Normal Operations

Based on the staff's assessment of welded cask enclosures, as stated in NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," Chapter 7 Section V.2, the MPC, which is the confinement system for the HI-STORM 100 System, provides reasonable assurance that no effluents will be released during normal, off-normal, or accident conditions and, therefore, requires no monitoring of the MPC for leakage. The seal weld will be inspected and tested in accordance with the requirements in Section 8.1.5 of the HI-STORM 100 System Final Safety Analysis Report (FSAR). These requirements were reviewed during the certification of the HI-STORM 100 System and were found to be acceptable by the staff. The staff finds the applicant's proposal to provide no monitoring of the confinement barrier for the HI-STORM 100 System acceptable because the casks will be loaded, welded, inspected, and tested in accordance with appropriate procedures.

Section 8.2.7 of the ISFSI SAR (Pacific Gas and Electric Company, 2002) evaluates the potential consequences of leakage because of a confinement boundary accident. The potential consequences of this postulated accident are determined by assuming that 100 percent of the cladding for the fuel rods have ruptured and the MPC pressure boundary has been breached. The staff previously determined that the methodology used to assess this postulated accident is acceptable and that there are no consequences that affect the public health and safety, based on the fuel specifications and loading conditions as defined in the HI-STORM 100 System Certificate of Compliance and SER (U.S. Nuclear Regulatory Commission, 2002a,b). The proposed Diablo Canyon ISFSI Technical Specifications will incorporate similar limitations on fuel characteristics and loading conditions such that the staff's previous conclusions are also applicable for the Diablo Canyon ISFSI.

14.2 Evaluation Findings

The staff made the following findings regarding waste confinement and management of the Diablo Canyon ISFSI:

- The Diablo Canyon ISFSI SAR adequately describes acceptable features of the ISFSI design and operating modes that reduce, to the extent practical, the radioactive waste volume generated by the installation in compliance with 10 CFR §72.24(f) and 72.128(a)(5).
- Use of DCP facilities approved under the provisions of the DCP 10 CFR Part 50 license for processing solid and liquid wastes generated during loading and decontamination activities related to ISFSI operations satisfies the requirements of 10 CFR §72.128(b).
- The design of the ISFSI provides acceptable means to limit the release of radioactive materials in effluents during normal operation to levels as low as reasonably achievable and to control the release of radioactive materials under accident conditions in compliance with 10 CFR §72.126(d) and §72.104(a).
- The waste confinement and management activities described in the Diablo Canyon ISFSI SAR support a conclusion that the activities authorized by the license can be conducted without endangering the health and safety of the public in compliance with 10 CFR §72.40(a)(13).

14.3 References

Pacific Gas and Electric Company. *Diablo Canyon Independent Spent Fuel Storage Installation Safety Analysis Report, Amendment 1*. Avila Beach, CA: Pacific Gas and Electric Company. 2002.

Pacific Gas and Electric Company. *Diablo Canyon Power Plant Units 1 & 2 Final Safety Analysis Report Update, Revision 14*. Avila Beach, CA: Pacific Gas and Electric Company. November 2001.

U.S. Nuclear Regulatory Commission. *10 CFR Part 72 Certificate of Compliance No. 1014, Amendment 0, for the HI-STORM 100 Cask System*. Docket No. 72-1014. Washington, DC: U.S. Nuclear Regulatory Commission. 2000a.

U.S. Nuclear Regulatory Commission. *Holtec International HI-STORM 100 Cask System Safety Evaluation Report*. Docket No. 72-1014. Washington, DC: U.S. Nuclear Regulatory Commission. 2000b.

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