UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

February 9, 2010

Mr. John T. Conway
Senior Vice President-Energy Supply
& Chief Nuclear Officer
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P.O. Box 3
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SUBJECT: NRC INSPECTION REPORT 050-00133/10-001; 072-00027/10-001

Dear Mr. Conway:

An inspection was conducted on January 11-14, 2010, at the Humboldt Bay Power Plant, Unit 3 facility. This inspection reviewed both your Part 50 license for Unit 3 and your Part 72 license for the Independent Spent Fuel Installation (ISFSI). The inspection was an examination of activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. The enclosed report presents the results of this inspection. In summary, the NRC determined that you were conducting decommissioning and spent fuel storage activities in compliance with regulatory and license requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC's Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Mr. Robert Evans, Senior Health Physicist, at (817) 860-8234 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, PhD, Chief
Repository & Spent Fuel Safety Branch

Docket: 050-00133; 072-00027
License: DPR-7; SNM-2514

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NRC Inspection Report 050-00133/10-001; 072-00027/10-001

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	050-00133; 072-00027
License:	DPR-7; SNM-2514
Report:	050-00133/10-001; 072-00027/10-001
Licensee:	Pacific Gas and Electric Company
Facility:	Humboldt Bay Power Plant, Unit 3
Location:	1000 King Salmon Avenue Eureka, California 95503
Dates:	January 11-14, 2010
Inspectors:	Robert Evans, PE, CHP, Senior Health Physicist Repository & Spent Fuel Safety Branch
	J. Vincent Everett, Senior Health Physicist Repository & Spent Fuel Safety Branch
Accompanied By:	Lee Brookhart, Health Physicist Repository & Spent Fuel Safety Branch
	Gerald Schlapper, PhD, CHP, High Level Waste Inspector Repository & Spent Fuel Safety Branch
	D. Blair Spitzberg, PhD, Chief Repository & Spent Fuel Safety Branch
Approved By:	D. Blair Spitzberg, PhD, Chief Repository & Spent Fuel Safety Branch
Attachments:	Supplemental Inspection Information Loaded Hi-Star HB Casks at the Humboldt Bay ISFSI

ENCLOSURE

EXECUTIVE SUMMARY

Humboldt Bay Power Plant, Unit 3
NRC Inspection Report 050-00133/10-001; 072-00027/10-001

This inspection was a routine, announced inspection of the Independent Spent Fuel Storage Installation (ISFSI) and decommissioning activities being conducted at the Humboldt Bay Power Plant, Unit 3 facility. In summary, the licensee was conducting site activities in compliance with regulatory and license requirements.

Operation of an ISFSI

- All spent nuclear fuel was moved to the ISFSI between August 2008 and December 2008 and had been safely stored in underground casks. One additional cask was purchased by the licensee for storage of radioactive components that will be removed from the reactor vessel and the spent fuel pool during future decommissioning efforts of the Humboldt Bay Unit 3 nuclear power plant. The ISFSI facility was well maintained and dose rates around the perimeter were being monitored. Perimeter dose rates measured since the fuel was loaded into the ISFSI have remained at background levels due to the shielding provided by the ISFSI structure and the old age of the spent fuel. Temperature monitoring of each of the vaults holding the spent fuel casks have demonstrated that temperature levels have remained well below limits established for the ISFSI (Section 1).

- On January 9, 2010, just prior to the onsite inspection by the NRC, an earthquake of magnitude 6.5 occurred approximately 26 miles off the coast from the Humboldt Bay site. The earthquake was felt onsite and caused minor damage to onsite structures. No damage was found at the ISFSI. The power for the ISFSI was lost for approximately 3.5 hours due to damage at an offsite location. The onsite back-up power sources functioned as designed to provide power for the ISFSI. Because the event did not cause any damage to the ISFSI, no emergency classification was declared (Section 1).

Review of 10 CFR 72.48 Evaluations

- All safety screenings and evaluations had been performed in accordance with plant procedures. No findings of significance were identified (Section 2).

Maintenance and Surveillance

- The licensee conducted maintenance and surveillance activities in accordance with approved site procedures (Section 3).

Decommissioning Performance and Status Review

- Radioactive postings and boundaries were being maintained in accordance with regulatory requirements. Plant parameters were being maintained in accordance with plant procedures. In response to a number of recent minor decommissioning incidents, the licensee issued a Non-Conformance Report to identify the root and contributory causes of the incidents. The inspectors considered the licensee's efforts to retrain site workers and to take corrective actions to minimize the potential for future incidents

involving decommissioning work as proactive. Occupational exposures for 2009 were well below regulatory limits. Radiation protection worker training was found to be in accordance site procedures and regulatory requirements. The licensee continued to implement programs in accordance with site procedures in an effort to control worker exposures to alpha contamination (Section 4).

Solid Radioactive Waste Management and Transportation of Radioactive Materials

- The licensee conducted radwaste handling and transportation related activities in accordance with procedure and regulatory requirements. (Section 5).

Report Details

Summary of Plant Status-Unit 3

Humboldt Bay Power Plant (HBPP), Unit 3, was being decommissioned by the licensee in accordance with commitments made in its Post-Shutdown Decommissioning Activities Report dated June 30, 2009. The licensee commenced with decommissioning during May 2009. At the time of this inspection, the licensee was in the process of preparing the reactor pressure vessel for flooding. The work included cutting and removing a number of nozzle connections and installing a drain, level indicator, and fill systems. The licensee was also conducting asbestos abatement work in the drywell.

Other work in progress included removal of electrical equipment and low to no contamination piping from the seal oil room, main condenser area, and reactor feed pump room. The licensee continued to prepare for future cutting of alpha contaminated piping by testing the equipment to be used and training the personnel who will conduct the work. In other areas, the licensee continued to construct the future count room building, a 50 by 80 foot structure that will be used to conduct radiological analyses and to provide long-term storage of samples collected in the field. The licensee was also constructing the respirator facility, the location where previously used respirators will be decontaminated, cleaned, and prepared for reuse.

In the near future, the licensee plans to remove, package, and ship the two spent fuel storage racks that are currently stored in the spent fuel pool. The work will include the removal of the racks from the pool and placement of the racks in specially fabricated shipping containers. The racks will subsequently be shipped to an out of state disposal site.

The licensee continued to construct a new power generating plant on site property. Following the construction of the new power generating plant, the licensee plans to commence with the decommissioning of Units 1 and 2 by removing all of the hazardous materials from the structures. The licensee also plans to submit an exemption request to the NRC for alternate disposal of building rubble and soil collected during the demolition of Units 1, 2, and a small portion of Unit 3. If approved by the NRC, the licensee would be allowed to dispose of the waste material at a facility authorized to accept hazardous material with low levels of radioactive contamination.

Summary of Facility Status-ISFSI

The Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI) was loaded with five Hi-Star HB casks between August 2008 and December 2008 containing all the spent nuclear fuel stored onsite at the HBPP. This removes all spent fuel assemblies from the spent fuel pool. A sixth Hi-Star cask was available at the site for eventual use in storing the Greater Than Class C (GTCC) waste associated with future dismantlement activities of the reactor vessel. The GTCC waste will be placed in the ISFSI for temporary storage and eventually transferred to a national permanent repository along with the spent fuel.

1 Operation of an ISFSI (60855)

1.1 Inspection Scope

The Humboldt Bay operational ISFSI inspectors reviewed selected records and conducted interviews with site personnel to verify ISFSI operations were in compliance

with the Humboldt Bay License # 72-27, Amendment 2 and the Final Safety Analysis Report, Revision 2. A tour of the ISFSI was conducted to confirm the facility was being maintained in good physical condition for the safe storage of the spent fuel.

1.2 Observations and Findings

a. Site Tour of the ISFSI

A tour was conducted of the ISFSI area to assess the condition of the ISFSI structures and to verify that the area around the ISFSI was clear of debris and the facility was in good physical condition. No flammable or explosive materials were located inside the ISFSI security fence. Nearby flammable storage tanks within the ISFSI controlled area had been identified and analyzed in the Final Safety Analysis Report (FSAR) Section 2.2.2.2, "Hazards from Fires and Explosives," and Section 8.2.5, "Fire."

Environmental dosimetry was located on each of the four sides of the ISFSI protected area fence. The inspectors conducted radiological surveys using a Thermo Rad Eye survey meter (NRC No. 086968, calibration due date of 03/02/10). Radiological surveys conducted by the NRC inspectors during the tour of the facility confirmed that the location of the dosimeters was appropriate for measuring the environmental dose rates around the facility. Dose rates measured by the NRC during the tour ranged from 7 to 13 μR/hr.

Five Hi-Star HB casks are located at the ISFSI which uses an underground storage concept. The inventory of each cask is provided in Attachment 2 to this report. A sixth cask will eventually be stored at the ISFSI containing GTCC collected during the reactor dismantlement and the clean-up of the spent fuel pool. This cask is expected to be placed in the ISFSI sometime in late 2011.

The ISFSI design provides a port to allow visual observation in the gap between the Hi-Star HB cask and the wall of the ISFSI. A drainage system is provided in the design of the ISFSI to allow any water that may get in the gap to drain out.

b. Radiological Conditions

Radiological monitoring around the ISFSI was provided by thermoluminescent dosimeters (TLDs) placed on each of the four sides of the ISFSI protected area fence and in the owner controlled area as specified by FSAR Section 7.7, "Environmental Monitoring Program." Readings obtained from the TLDs placed on the ISFSI fence during 2009 were reported as non-detectable levels above background.

In addition to the TLDs on the ISFSI fence, the licensee maintained an environmental monitoring program to support the Part 50 license which also provided supporting TLD data for the ISFSI. Environmental TLDs T3, T4, T5 and T6 are located within or near the ISFSI controlled area. Environmental results for these four TLDs were reviewed. Quarterly results for 2008 reflected background radiation levels of 11.6 mR/quarter to 13.4 mR/quarter. This equated to 5.3 to 6.1 μR/hr, which was within reason to the values obtained during the NRC tour of the ISFSI of 7 to 13 μR/hr, when considering the accuracy of the instrument used for the survey. These background values were consistent with the TLD results for 2007 and with the 2008 results from the TLDs maintained offsite by the licensee, which averaged 12.3 to 13.1 mR/quarter. The

licensee had not issued the 2009 environmental report at the time of this inspection, but stated that the 2009 values were consistent with the 2008 background levels. The minimum detectable limit for the TLDs used by the licensee is approximately 10 mR/quarter (5 μR/hr).

The licensee had hired a consulting company to conduct a baseline radiological survey of the ISFSI. Surveys were performed for both gamma and neutron radiation levels in 2008, prior to loading any casks into the ISFSI, then again in March 2009, after the five casks had been loaded into the ISFSI. A report entitled *ISFSI Post Fuel Load Neutron and Gamma Survey at the PG&E Humboldt Bay Power Plant*, was issued December 16, 2009. The purpose of the radiological surveys was to document gamma and neutron radiation levels in the vicinity of the ISFSI, including the public access walkway that passed along the north edge of the Humboldt Bay site property transversing the ISFSI controlled area.

The surveys were conducted using a pressurized ion chamber at 61 locations, including one location offsite. These same locations were used in both the 2008 survey and the 2009 survey. The average gamma dose rates in 2009 were measured as 6.95 ± 0.37 μR/hr. In comparison, the gamma dose rates in 2008, prior to loading, were 6.68 ± 0.39 μR/hr. These surveys showed no significant change in the radiological dose rates in the vicinity of the ISFSI after the spent fuel was moved to the storage locations. Sixteen of the sample locations were directly on the ISFSI concrete pad. These locations showed an average increase after placement of the spent fuel into the ISFSI of 0.67 ± 0.35 μR/hr. This insignificant increase in dose rate can be related to the thick shielding of the Hi-Star HB casks, the shielding due to the concrete ISFSI structure and the steel outer lids, and the age of the fuel, which is now over 30 years after removal from the reactor.

The neutron measurements were made with the HAWK tissue equivalent proportional counter at six locations. A background neutron dose rate was taken at an offsite location. The minimum detectable neutron dose rate was determined to be approximately 43 microrads per hour. Measured values at the six sites were statistically insignificant compared to the minimum detectable limits of the instrument. When using a quality factor of 8, the minimum detectable limit of the HAWK detector was determined to be approximately 346 μrem/hr.

Ongoing radiological monitoring requirements for the ISFSI are specified in FSAR Section 7.6.3.4, “Area Surveys.” Quarterly surveys of the accessible area of the ISFSI, consisting of contamination surveys and external radiation measurements, are required by Section 7.6.3.4. No requirements are in the license or technical specifications concerning periodic surveys of the ISFSI. In addition, FSAR Section 4.2.3.3.6, “Shielding Design,” establishes a design objective for the vault lid of less than 0.2 mR/hr. Radiation Control Program Procedure RCP-7G, “Routine Survey Program,” had been revised in June 2008 to incorporate the requirement for quarterly surveys. However, this requirement had not been entered into the RP Tickler system, which schedules and tracks periodic radiation protection requirements, including surveys. During the loading of the ISFSI in 2008, external radiation surveys were performed as the casks were loaded into the ISFSI. No contamination surveys were documented. In the first quarter 2009, the post loading surveys conducted and documented in the *ISFSI Post Fuel Load Neutron and Gamma Survey at the PG&E Humboldt Bay Power Plant*, provided the required quarterly survey. However no exposure surveys were performed after that survey and no contamination surveys were performed at any time in 2009. This issue

was identified by the NRC inspectors during this inspection as a deviation from the requirements specified in the FSAR. The licensee conducted an exposure survey and a contamination survey during the week the NRC was onsite and reported only background gamma radiation levels with no contamination found on the ISFSI. As such, this deviation from the FSAR requirement is determined to be minor. The licensee entered the issue into the system application and process notification (SAPN) corrective action program as Condition Reports SAPN #1258157 and SAPN #1258373 to update the RP Tickler system.

c. Emergency Planning

Changes to the licensee's emergency planning program since the last NRC inspection in July 2008 were reviewed. On August 27, 2008, the NRC approved combining the ISFSI Part 72 emergency plan with the reactor Part 50 emergency plan (ADAMS Document ML082110367). The changes incorporated into the new combined emergency plan were reviewed and were verified to have been implemented by the licensee in Revision 0 to Procedure SITE EM PLN, "Site Emergency Plan." Following Revision 0, there were two additional changes to the site emergency plan. Revision 1 had an effective date of March 3, 2009, and Revision 2 had an effective date of December 5, 2009. The inspector verified that these changes had not reduced the effectiveness of the emergency response or plan and were consistent with the requirements in 10CFR Part 50 and 72.

The emergency plan annual drill package for 2009 was reviewed. The licensee conducted a drill involving a security event that affected the entire site. This drill met the requirements of the site emergency plan, Step 8.3. The drill package included a description of the drill that was conducted, a timeline, a synopsis, and a drill critique. An independent individual provided by the Humboldt County Sheriff's Office was on-site as an observer to monitor and evaluate the emergency drill. The inspector concluded that the drill was performed satisfactorily and that deficiencies or areas for improvement were identified, tracked, and corrected through the licensee's quality controlled corrective action program.

The offsite notification call list of Procedure EPIP R-7, "Establishment of the Augmented Emergency Organization and Off-Site Notification," Revision 44 was used by the inspector to verify that the phone numbers of support organizations were current. Eleven offsite agencies' phone numbers were called to ensure the phone number listed by the licensee in the procedure was correct. All phone numbers were found to be current and correct. Of the agencies contacted, the two hospitals' phone numbers (St. Joseph's and Redwood Memorial Hospital) were automated response answering service. During a discussion with one of hospital's administrative staff, a direct emergency room phone number was identified as an alternative to the main hospital number listed in the emergency call list. The licensee initiated Condition Report SAPN # 1258401 to revise the procedure to add the direct emergency room link for the hospital and to contact the second hospital to obtain a direct phone number, if available.

A review was conducted of the licensee's Information Qualification (IQ) Database to verify that the training records for all assigned emergency response personnel were current. Through a discussion with the Licensing Supervisor concerning the IQ Database list, it was concluded that the training qualifications for the emergency coordinators, emergency advisors, and emergency security coordinators were current.

d. Temperature Monitoring

The licensee's FSAR Section 3.3.1.3.2, "Instrumentation," required temperature monitoring of the vault air space for the first six months after loading the final spent fuel cask into the ISFSI to validate heat rejection performance of the casks. Each cask had a temperature monitor located approximately ten inches below the vault surface in the air space between the HI-STAR HB cask and the sides of the concrete vault. Procedure I-SP-500, "ISFSI Surveillances and Monitoring," Revision 1A, was reviewed for compliance with the FSAR temperature monitoring requirement. The procedure had incorporated a requirement to monitor the vault temperatures once a month for a period to exceed the six month minimum period. The cask temperature data showed the highest temperature reading of 113° F during the month of August and a low of 92° F in the month of December. The trend of the temperatures followed the change in ambient temperature due to the seasons. FSAR Table 4.2-10, "Normal Condition Thermal Analysis Results," Revision 2, identified a limiting temperature for the storage system based on a concrete vault temperature of 150° F. The temperatures measured in the vault were well within the FSAR limit. To date, the licensee has chosen to continue monitoring the temperature in the vaults beyond the required six month period as a good practice.

e. Corrective Action Program

The licensee provided a list of the condition reports that had been initiated in the corrective action system since the last inspection. The inspector selected 16 reports of interest for further review out of the approximately one hundred listed. Through discussions with the deputy decommissioning manager and review of the condition reports, the inspector concluded all issues were adequately resolved. No adversely developing trends were identified in the condition reports reviewed.

f. Records and Annual Effluent Report

The licensee complied with 10 CFR 72.44(d) and submitted an annual radiological effluent release report for 2008 on February 23, 2009. The report stated that no radionuclides were released to the environment from liquid or gaseous effluents during the calendar year of 2008.

A review of Procedure HBAP E-1, "Retention and Storage of HBPP Unit 3 and ISFSI Records," Revision15A, was conducted to verify that the ISFSI records had been properly stored. As required by Procedure HBAP E-1, ISFSI quality related records had been sent to PG&E Diablo Canyon Power Plant for permanent storage. Step 4.4.1 of Procedure HBAP E-1 defined "lifetime records" as those records that shall be retained for the duration of the Unit 3 SAFSTOR. Records for the ISFSI were identified in a footnote to Step 4.4.1 as records that may be retained beyond the duration of SAFSTOR. Regulation 10 CFR 72.72(a) states that records required by §72.72(a) for spent fuel and reactor related GTCC waste at an ISFSI must be retained for as long as the material is stored and for a period of five years after the material is transferred. The licensee's procedure was not sufficiently clear to ensure this regulation would be met. The licensee initiated Condition Report # 1258403 to revise the procedure to specifically address the retention period for ISFSI records. Since the ISFSI records had been transferred to the PG&E permanent record storage facility, the PG&E Nuclear Power

Generating Procedure AD10.ID1, “Storage and Control of Quality Assurance Records,” Revision 9, was reviewed. This procedure, which would control the long term storage of the ISFSI records, defined lifetime quality assurance records in Section 3.8 as records normally retained for the life of the governing insurance policy plus 10 years. Discussions were held with the Humboldt Bay Licensing Supervisor and the PG&E Supervisor, Document Services concerning how this requirement, as specified in the procedure, implemented the requirement in 10 CFR 72.72(a) to maintain the records for the life of the ISFSI plus 5 years. The licensee determined that additional clarification would be added to the records retention schedule to incorporate specific retention requirements for the ISFSI records consistent with 72.72(a). Condition Report SAPN 50286658 incorporated the requirements to make the modification to the records retention schedule.

g. Earthquake Felt Onsite January 9, 2010

On Saturday, January 9, 2010, at 4:27 p.m. PST, a magnitude 6.5 earthquake occurred approximately 26 miles southwest of the Humboldt Bay site. Several aftershocks occurred with the largest aftershock of 4.4 at 6:21 p.m. This was a strike slip earthquake, typical for this offsite region. No tsunami warnings were issued for the event and no tsunami wave motion was observed at the site.

The initial earthquake was strongly felt at the site with long duration of rolling motion resulting in some items thrown from desks and a book shelf overturned. Onsite power was not affected for the site with the exception of a loss of electrical power to the ISFSI due to an offsite power problem. Backup electrical power was maintained at the ISFSI through its dedicated UPS system until normal electrical power was restored about 3.5 hours later. The fossil units continued to operate through the event. There are no electrical connections between the onsite fossil units and the ISFSI which would allow the ISFSI to switch to the fossil units instead of using the battery powered UPS system.

The licensee implemented Procedure EOP-5, “Earthquake,” Revision 29. This procedure included the requirement to conduct a comprehensive physical inspection of the plant site. The site inspections found several trailers that had moved slightly on their foundations, cracks in various concrete structures, and several small water leaks. All concrete structures were eventually determined to be safe. All water leaks were confirmed to be non-radioactive. Fire protection systems, security systems, ventilation systems and radwaste systems were found to be undamaged. The water level in the spent fuel pool and in the spent fuel pool liner were visually checked and found to be at the same level as prior to the earthquake. The spent fuel pool water level recorder showed slightly under a 1 foot water movement in the pool due to the ground motion. Visual examination of the spent fuel pool area did not find any water that had spilled out of the pool. The refueling building cranes were declared out-of-service as a precaution and arrangements made for an engineering structural survey to be conducted by an outside crane inspection company before the cranes are used. No damage was found at the ISFSI.

No emergency classification was declared for the site. Emergency Procedure EPIP R-6, “Emergency Plan Activation,” Revision 25 lists the emergency action levels for the Humboldt Bay site, including the ISFSI. There are no classifications specific to the occurrence of an earthquake. For an event such as an earthquake, the emergency action level related to on-site hazards would apply. If the earthquake, or any other

natural disaster, causes significant damage or substantially affects ISFSI structures, systems or components, then an Unusual Event would be declared. This earthquake did not cause sufficient damage to meet this definition.

A seismic event recorder was located on-site. The recorder documented the earthquake and recorded the following maximum signals: 0.080 g vertical, 0.3106 g in the north-south plane, and 0.2483 in the east-west plane. In nearby Eureka, California, the seismic monitors at the Eureka Service Center showed the following maximum recordings: 0.0788 g vertical, 0.4085 g longitudinal (north-south) and 0.2769 g translational (east-west). The Unit 3 facility at Humboldt Bay no longer has fuel and does not have a seismic design basis limit. The ISFSI seismic design basis is discussed in Section 2.6.6.3.1, "Design Ground Motions" of the ISFSI FSAR, Revision 2. Tables 2.6-15 through 2.6-17 provide the design limits for the ISFSI of 1.316 g normal, 1.316 g parallel and 1.673 g vertical. The normal direction approximates the north-south plane for the recorders located onsite. The parallel direction approximates the east-west plane. The earthquake on January 9, 2010, was bounded by the design basis values. ISFSI FSAR, Figures 2.6-24 through 2.6-28 provide graphical presentations of numerous seismic events that have occurred around the Humboldt Bay site.

1.3 Conclusions

All spent nuclear fuel was moved to the ISFSI between August 2008 and December 2008 and had been safely stored in underground casks. One additional cask was purchased by the licensee for storage of radioactive components that will be removed from the reactor vessel and the spent fuel pool during future decommissioning efforts of the Humboldt Bay Unit 3 nuclear power plant. The ISFSI facility was well maintained and dose rates around the perimeter were being monitored. Perimeter dose rates measured since the fuel was loaded into the ISFSI have remained at background levels due to the shielding provided by the ISFSI structure and the old age of the spent fuel. Temperature monitoring of each of the vaults holding the spent fuel casks have demonstrated that temperature levels have remained well below limits established for the ISFSI.

On January 9, 2010, just prior to the onsite inspection by the NRC, an earthquake of magnitude 6.5 occurred approximately 26 miles off the coast from the Humboldt Bay site. The earthquake was felt onsite and caused minor damage to onsite structures. No damage was found at the ISFSI. The power for the ISFSI was lost for approximately 3.5 hours due to damage at an offsite location. The onsite back-up power sources functioned as designed to provide power for the ISFSI. Because the event did not cause any damage to the ISFSI, no emergency classification was declared.

2 Review of 10 CFR 72.48 Evaluations (60857)

2.1 Inspection Scope

Changes to the facility and procedures since the last inspection in July 2008 were reviewed to determine if the licensee had performed the required evaluations in accordance with the requirements of 10 CFR 72.48.

2.2 Observations and Findings

There were only a few safety screenings performed since July 2008 by the licensee. The safety screenings had been performed in accordance with Procedure HBAP C-19, "Licensing Basis Impact Evaluation," Revision 27A. No significant changes were made to the operational and maintenance programs or to the design of the ISFSI since the last inspection.

Personnel listed in the Information Qualification (IQ) Database approved to perform 72.48 screens/evaluations were compared to the list of personnel who had actually performed screenings/evaluations since the last inspection. All but two individuals that performed screens/evaluations were properly listed in the IQ Database. The two individuals not listed in the IQ Database were identified by the licensee as haven taken the required training but had not been properly listed in the IQ Database. The licensee initiated Condition Report #1258402 to investigate and resolve the database issue.

The licensee reported, as required by 10CFR72.48(d)(2), that two 72.48 evaluations had been conducted and changes had been made to the licensee's FSAR. The inspector reviewed the two 72.48 evaluations numbered 2008-02 and 2008-04 and concluded that both evaluations were found to meet regulatory requirements of §72.48.

2.3 Conclusions

All safety screenings and evaluations had been performed in accordance with plant procedures. No findings of significance were identified.

3 Maintenance and Surveillance (62801)

3.1 Inspection Scope

The inspectors conducted a review of maintenance and surveillance activities to verify if these activities were being conducted in accordance with site procedure requirements.

3.2 Observations and Findings

a. Foaming of Pipes

During early operation of HBPP, significant fuel failures occurred. As a result, transuranic radioactivity was released from the reactor core, resulting in high levels of alpha contamination in portions of internal plant piping and systems. Previous sampling has shown that the most prominent radioisotopes are plutonium-239 and americium-241. HBPP staff are currently developing procedures and engineering controls to limit the airborne contamination when internally contaminated piping is sectioned for removal.

During decommissioning, the licensee will have to cut internally contaminated piping that ranges up to 18-inches in diameter. At the time of the inspection, the licensee was developing a method for inserting expanding foam into pipes to fixate the alpha contamination prior to cutting the pipe. Following the cutting of the pipe, the licensee plans to seal the ends of the pipe. The pipe will then be removed, transferred to a shipping container, and shipped offsite for disposal.

During the onsite inspection, the licensee continued to conduct tests of its pipe foaming and cutting operations. The inspectors witnessed a demonstration of the pipe foaming process. The demonstration was conducted at an offsite training facility. The licensee used clear plastic pipes for testing the foaming process. The plastic pipe was drilled to create a hole for insertion of foam, the foam was sprayed into the pipe in a circular motion, and after sufficient time for the foam to cure, the pipe was cut. The workers conducting the foaming operations followed instructions provided in a site radiation protection procedure. The inspectors reviewed the foaming procedure and discussed the results of the tests with the licensee. The licensee planned to continue testing the foaming process prior to actual use in the plant.

b. Reactor Caisson Sump Sample

The reactor caisson sump was designed to collect floor drain water and groundwater in-leakage. During the inspection, the inspectors observed the licensee collecting samples from the sump. The reactor caisson sump was sampled monthly by the licensee. The licensee collected two samples. One sample was analyzed for gamma-emitting radionuclides, while the second sample was analyzed for tritium radioactivity. The inspectors noted that the licensee's staff collected the two samples in accordance with surveillance procedure requirements.

During the inspection, the licensee analyzed one sample for gamma-emitting radioactivity. The cesium-137 radioactivity was detectable but well below the NRC's effluent concentration limit as specified in 10 CFR Part 20, Appendix B. The cobalt-60 concentration was less than the minimum detectable concentration of the counting equipment. The tritium sample result was not available during the inspection.

The inspectors also reviewed the licensee's trend reports for the reactor caisson sump samples. Groundwater in-leakage into the reactor caisson is routed to this sump for collection and disposal. These trend reports indicated that some tritium is present in the groundwater, possibly due to contaminated concrete located underneath the plant, but the tritium concentrations were well below the maximum contaminant level established by the U.S. Environmental Protection Agency for tritium in drinking water. Several samples, collected during early 2008, exhibited elevated concentrations of radioactive material above the respective action levels, but these results were attributed to radioactive rust particles in the sampled fluid. At that time, the licensee cleaned the caisson sump. In recent months, the cobalt-60 and cesium-137 concentrations have remained below the licensee's action level.

c. Monthly Fire Pump Test

The inspectors observed the performance of a monthly fire pump surveillance test, specifically, the monthly surveillance of Fire Pump No. 3. The surveillance was conducted using the instructions provided in surveillance test procedure STP 3.20.4, "No. 3 Fire Pump Monthly Test." This procedure was approved on December 3, 2009. The inspectors verified that the surveillance test was conducted as directed using calibrated equipment. The operator who conducted the test followed the instructions provided in the surveillance test procedure STP 3.20.4. The results of the test were acceptable, meaning that the fire pump continued to remain operable for use in an emergency situation. The inspector also verified that the local fire extinguisher had been maintenance checked within the previous year. The inspector noted that two fire

protection system components were out of service, but both components were tagged as inoperable--the No. 2 Diesel Fire Pump Controller and the Fire Header Low Pressure Alarm. Condition Reports (SAPN) had been written to track these out-of-service items (SAPN 1247400 dated 8/15/2008 for the No. 2 Controller and SAPN 1250762 dated 3/19/2009 for the Low Pressure Alarm).

3.3 Conclusions

The licensee conducted maintenance and surveillance activities in accordance with approved site procedures.

4 Decommissioning Performance and Status Review (71801)

4.1 Inspection Scope

The inspector evaluated whether the licensee and its contracted workforce were conducting decommissioning activities in accordance with license and regulatory requirements.

4.2 Observations and Findings

a. Site Tours

The inspectors toured the fuel handling building, Unit 3 control room, and the other radiologically restricted areas of the facility. Radiological postings were clearly visible, and postings met the requirements of 10 CFR Part 20. Housekeeping was being controlled in these areas. During the site tours, the inspectors conducted radiological surveys to verify the accuracy of radiation area postings using a Ludlum Model 2401-EC2 survey meter (NRC No. 016294G, calibrated due date of 01/04/11). The inspectors did not identify any radiation areas that were incorrectly posted by the licensee.

The inspectors observed plant parameters during the inspection and compared these parameters to procedural and licensed requirements. The licensee continued to maintain spent fuel pool water level and liner level within the required limits. The licensee also continued to operate the spent fuel pool support equipment in accordance with procedural instructions. Since the last inspection, the licensee placed the stack particulate alpha monitoring system into operation. The inspectors noted that the monitor appeared to be fully functional, and the set-points of the monitor were in agreement with the values established in a site technical basis document.

b. Decommissioning Performance

In recent months, the licensee experienced a number of minor incidents that impacted site decommissioning. Although none of the incidents were violations of NRC regulations or reportable to the NRC, the licensee elected to issue a stand-down order during mid-October 2009. Decommissioning work was halted to allow for review of the work control processes and worker understanding of these processes. In addition, the licensee issued a Non-Conformance Report (NCR) to thoroughly investigate this potentially negative trend. The stand-down order was lifted during early November 2009. The inspectors conducted a follow-up review of the NCR during this inspection.

Non-Conformance Report HB3-09-QC-N001 was requested by the plant manager during late-October 2009. This report was requested, in part, to identify and document the root and contributory causes of the various decommissioning incidents that have occurred in recent months. The incidences included accidental cutting of in-service system pipes and wires, and performing work without the proper work order instructions. Although the report was not complete at the time of the inspection, the preliminary root causes were attributed to inadequate training and worker decisions to take independent actions despite barriers being present. Follow up training was conducted which emphasized the need for adherence to work instructions, to develop a questioning attitude, and to refresh workers about management's expectations.

The inspectors discussed the NCR conclusions with licensee management who believed that the culture of the workforce had shifted, and the licensee expected fewer decommissioning work related incidents to occur in the future. The licensee believed that craft workers and field supervisors now have a greater awareness of the complexities involved with decommissioning. At the time of the inspection, a number of action items remained open, and the licensee was still trending the performance of the workers. The NCR remains open pending management conclusion that the work was being conducted in accordance with management expectations. The inspectors concluded that the licensee's decisions to issue a stand-down order and to retrain the staff were proactive actions on the part of licensee management.

c. Occupational Exposures

The inspectors reviewed the preliminary occupational dose records for 2009 and the licensee's estimates for future decommissioning. During 2009, the licensee estimated that the total dose to site workers was about 600 millirems. This dose was only an estimate pending receipt of the dosimeter results for the fourth quarter of calendar year 2009. Also, the licensee reported that no individual received a measurable internal exposure during 2009. The licensee's records indicate that 470 lapel air samplers were issued during 2009, but none of the air filter sample results indicated an assigned dose. In summary, the licensee's records indicate that occupational exposures were well below the regulatory limit of 5 rems per person.

The licensee recently estimated the potential occupational exposures for the remainder of decommissioning. The licensee estimated that the total collective dose would be about 208 rems. Most of the dose was expected to be received during removal of radioactive plant equipment such as the reactor pressure vessel and system heat exchangers. The project that had the potential for the most dose during 2010 appears to be the preparation work associated with the removal of the reactor pressure vessel. The NRC will continue to monitor the licensee's As Low As Reasonably Achievable program to ensure that the licensee continues to track and control occupational exposures.

d. Site Training Program

The inspectors reviewed the licensee's training program for compliance with the requirements of 10 CFR 19.12, the Defueled Safety Analysis Report, and site procedures. Site decommissioning will require the removal and movement of highly alpha contaminated material to an area where the material can be surveyed and packaged for transportation and disposal. Proper training of the radiation workers is

required to ensure compliance with 10 CFR 19.12 and licensee commitments as described in Defueled Safety Analysis Report Section 4.2.1.

The inspectors discussed radiation worker training with individuals from the radiation protection and training departments. The inspectors noted that the radiation worker training program had been significantly updated to include emphasis on the alpha hazards present at the site. Presentation slides, instructor notes, and examination question banks were reviewed. The two and one-half day instructor-led course was offered weekly and was required for all incoming radiation workers. Computer-based training was used in the past but has been phased out. Learning objectives were specified for each module and a test bank with at least two questions per objective has been developed. After passing the written exam, the individual must successfully complete a job performance measure for donning and doffing personal protective equipment. With supervisor/management approval, those who fail the course are allowed to retake the course. Based on the training material reviewed, a systematic approach to training was being used by the licensee. The inspector reviewed qualification of the radiation worker training instructors and found them to be in accordance with site procedures. Workers observed during plant tours appeared to comply with the requirements as outlined in site procedures and as presented in the training lectures.

e. Control of Exposures to Alpha Contamination

The inspectors conducted a review of the licensee's plans to control occupational exposures to alpha contamination. The licensee has taken extensive action to control worker exposure to alpha contamination. These actions include upgrading the access control point, respiratory protection program, air monitoring equipment, and worker training programs.

Previously, the licensee had two access control points into the restricted area, the Unit 3 control room and a trailer located on the northern boundary of the restricted area. The licensee elected to relocate the northern boundary access control point into a newer, larger trailer. This access control point was still under construction during the inspection. After this new access control point is placed into service, the licensee will discontinue access through the control room. In addition, the licensee is expected to begin using a new electronic dosimetry system in the near future to track worker doses on a daily basis.

The licensee continued to upgrade its respiratory protection program. The respiratory protection decontamination station was being constructed, and the licensee was in the process of updating the implementing procedure. At the time of the inspection, the licensee had about 110 respirators of various sizes and roughly 50 people qualified to wear the respirators. The licensee plans to use powered air purifying respirators that have a protection factor of 1000. The inspectors discussed the status of the respiratory protection program with the radiation protection supervisor responsible for the program. The inspectors concluded that the licensee's respiratory protection program was in compliance with site procedures, although the implementing procedure still has to be updated.

In recent weeks, the licensee placed its stack particulate alpha monitoring system into service. The system monitors the plant ventilation outlet and consists of both a

radioactive particulate filter and real-time alpha monitoring system. The inspectors reviewed the operating instructions and technical basis document and observed the operation of the equipment. The inspectors noted that the monitor set-points were established to ensure compliance with Offsite Dose Calculation Manual requirements. The licensee appeared to have installed and was operating the monitor in accordance with the vendor instructions. The inspectors noted that the licensee had disabled the radon subtraction function, thus, the monitor readings were measurements of gross alpha contamination levels in the air, including naturally occurring radioactive materials. The inspectors considered this action to be conservative on the part of the licensee.

The stack particulate sample filters are an indicator of overall plant airborne conditions and a record of material being released out the stack into the environment. Standard ANSI/HPS N13.1-1999, “Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities,” establishes the guidelines and criteria for particulate sampling and transport. This standard requires use of U.S. Environmental Protection Agency approved methods for the measurement of gas flow rate. HBPP contractors used these approved methods to evaluate sampling nozzle location to ensure that the requirements for a representative sample are met. The licensee supplied the inspectors with documentation which confirmed that the shrouded sample probe met the requirements specified in the ANSI Standard.

Because of the potential for internal exposures to alpha contamination, the inspectors reviewed the licensee’s program for monitoring internal doses. As a result of the characteristics of the radioactive material, internal exposures to alpha contamination could contribute significantly to worker dose. Regulation 10 CFR 20.1502(b) specifies the criteria for individual monitoring of internal occupational dose, while regulation 10 CFR 20.1204 specifies acceptable approaches for assessing compliance with occupational dose equivalent limits. Evaluation of internal deposition of radioactive material at HBPP is outlined in the licensee’s radiation protection procedure RCP-2D, "Evaluation of Internal Deposition of Radioactive Material" (Revision 31, effective 11-11-09), while methods for collecting and shipping bioassay samples are specified in procedure RCP-2E, "Bioassay Sample Collection and Shipping" (Revision 0, effective 10-28-05).

Procedure RCP-2D details the methods used to assess dose from internal radioactivity based on bioassay data and airborne sampling results. The procedure acknowledges that bioassay data is preferable to derived air concentration-hour exposure data as bioassay data is a more direct measure of the quantity of radioactive material in a body. However, it is also noted that when exposed to low levels of airborne as would be characteristic of chronic exposures, bioassay sample results may not be detectable by the counting equipment. Thus, the inspectors understood that the derived air concentration-hour exposure data based on breathing zone lapel air sample results may be more appropriate for use in the event of a dose assessment.

The evaluation procedure and radiation worker training state that radioactive material may enter the body through the pathways of inhalation, ingestion, absorption or via injection/ wounds. However, during discussions with radiation protection management, it was noted that due to the possibility of a wound during decommissioning activities, expanded discussion of the wound route of exposure would be appropriate in site procedures. The licensee issued a SAPN to research the need to modify its procedure to account for intakes through the wound pathway.

4.3 Conclusions

Radioactive postings and boundaries were being maintained in accordance with regulatory requirements. Plant parameters were being maintained in accordance with plant procedures. In response to a number of recent minor decommissioning incidents, the licensee issued an NCR to identify the root and contributory causes of the incidents. The inspectors considered the licensee's efforts to retrain site workers and to take corrective actions to minimize the potential for future incidents involving decommissioning work as proactive. Occupational exposures for 2009 were well below regulatory limits. Radiation protection worker training was found to be in accordance site procedures and regulatory requirements. The licensee continued to implement programs in accordance with site procedures in an effort to control worker exposures to alpha contamination.

5 Solid Radioactive Waste Management and Transportation of Radioactive Materials (86750)

5.1 Inspection Scope

The inspectors reviewed the licensee's plans for characterizing and shipping the radioactive wastes that will be generated during site decommissioning.

5.2 Observations and Findings

The inspectors reviewed the licensee's programs for handling, packaging, and shipping radioactive wastes. Specifically, the inspectors reviewed one shipping paper, one non-hazardous material manifest, and the container inspection and loading procedures.

The licensee developed container loading instructions to control the loading of wastes into the intermodals for shipment to a radioactive waste disposal site. In general, contaminated metal, soil, concrete rubble and dry active wastes are allowed to be placed in the intermodals for disposal. The instructions included restrictions on hazardous materials, such as asbestos, and the overall weight limit of the intermodal. The inspectors also reviewed the licensee's program for conducting container inspections and for using the containers. For example, the procedure provided loose contamination limits that were in compliance with U.S. Department of Transportation regulations. Also, the licensee had established a protocol for repairing damaged containers.

Shipping papers are required by U.S. Department of Transportation regulations (49 CFR 172, Subpart C). The inspectors reviewed one representative shipping paper for an intermodal. This intermodal contained soil, concrete, and dry active waste. The intermodal was shipped with these low specific activity wastes during December 2009. The shipping paper package included a bill of lading, uniform low level radioactive waste manifest, emergency response instructions with telephone number, exclusive use shipment instructions, an outgoing shipment radiation survey, and a container survey. The inspector concluded that the shipping paper and radiation levels met regulatory requirements.

The fuel oil storage tank was recently sectioned, packaged, and shipped as non-hazardous waste. The licensee conducted radiological surveys of the tank walls and concluded that the radionuclide of concern (cesium-137) was indistinguishable from

background levels. After the survey but prior to shipment, the licensee developed a technical basis document which concluded that the tank's surface contamination levels were indistinguishable from background levels. The licensee subsequently shipped the tank wall panels in 13 intermodal containers as non-hazardous waste. The intermodals were shipped to a regulated disposal facility in Idaho. The inspectors determined that the shipping paperwork was acceptable for this type of shipment.

5.3 Conclusions

The licensee conducted radwaste handling and transportation related activities in accordance with procedure and regulatory requirements.

6 Exit Meeting

The inspectors reviewed the scope and findings of the inspection during an exit meeting that was conducted at the conclusion of the onsite inspection on January 14, 2010. The licensee did not identify as proprietary any information provided to, or reviewed, by the inspectors.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

J. Albers, Radiation Protection Manager
B. Barley, Radiation Protection Planning
M. Celletti, Training Coordinator
J. Chadwick, Radiation Protection Operations Supervisor
A. Cordone, Decommissioning Projects Superintendent
J. Davis, Radiation Protection Engineer
C. Elliot, ALARA Radiation Protection Technician
G. Field, ALARA Radiation Protection Technician
N. Gaudiuso, Document Services Supervisor
J. Griffin, Licensing Engineer
L. Hardwick, Unit 3 SAFSTOR Supervisor
J. Maffessaniti, Trainer
M. McLaren, Senior Seismologist
L. Pulley, Deputy Decommissioning Manager
K. Rod, Decommissioning Manager
P. Roller, Director and Nuclear Plant Manager
T. Sanders, Site Services Manager
S. Schlerf, Radiation Protection Foreman
M. Scott, Radwaste Packaging/Planning Engineer
B. Sicotte, Quality Control Supervisor
M. Smith, Engineering Manager
R. Snyder, Radwaste Supervisor
D. Sokolsky, Licensing Supervisor
R. Sorensen, Emergency Planning
M. Stein, Radiation Protection Supervisor
B. Stephens, Work Week Manager
D. Suchar, Safety Supervisor

INSPECTION PROCEDURES USED

IP 62801 Maintenance and Surveillance
IP 60857 Review of 10 CFR 72.48 Evaluations
IP 60855 Operations of an ISFSI
IP 71801 Decommissioning Performance and Status Review
IP 86750 Solid Radioactive Waste Management and Transportation of Radioactive Materials

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

CFR	Code of Federal Regulations
FSAR	Final Safety Analysis Report
GTCC	Greater Than Class C waste
HBPP	Humboldt Bay Power Plant
IP	Inspection Procedure
IQ	Information Qualification Database
ISFSI	Independent Spent fuel Storage Installation
µR/hr	microRoentgens per hour
µrem/hr	microrems per hour
µR/quarter	microRoentgens per calendar quarter
mR/hr	milliRoentgens per hour
NCR	Non-Conformance Report
SAPN	System Application and Process Notification (condition reports)
TLD	thermoluminescent dosimetry

LOADED HI-STAR HB CASKS AT THE HUMBOLDT BAY ISFSI

LOADING ORDER	CASK #	DATE PLACED ON PAD	HEAT LOAD (Kw)	BURN-UP MWd/MTU	FUEL ENRICHMENT	DOSE (Person-Rem)
1	10	08/15/08	1.91	21,264	2.52	0.207
2	8	09/03/08	1.91	20,633	2.52	0.103
3	11	09/24/08	1.91	22,377	2.52	0.105
4	9	10/20/08	1.91	22,876	2.52	0.111
5	12	12/11/08	1.91	20,853	2.52	0.097

NOTES:

(1) The Humboldt Bay campaign loaded all fuel into five Hi-Star HB casks, serial numbers 8 through 12

(2) Heat load (Kw) is the sum of the heat load values for all 80 spent fuel assemblies in the cask

(3) Burn-up is the value for the spent fuel assembly with the highest individual burn-up. Average burn-up for all five casks is 14,774

(4) Fuel enrichment is the spent fuel assembly with the highest individual enrichment % of U-235. Minimum enrichment is 2.08% and average enrichment for all the fuel in all five casks is 2.35%

(5) Dose for loading all five casks was 0.623 person-rem. Breakdown per individual cask is a best estimate.