UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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August 11, 2009

Mr. John T. Conway
Senior Vice President-Energy Supply
& Chief Nuclear Officer
Pacific Gas and Electric Company
P.O. Box 3
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Avila Beach, California 93424

SUBJECT: NRC INSPECTION REPORT 050-00133/09-002

Dear Mr. Conway:

This refers to the inspection conducted on July 13-16, 2009, at the Humboldt Bay Power Plant, Unit 3 facility. This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. 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 inspector determined that you were conducting decommissioning 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) 860-8197.

Sincerely,

/RA/

Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

Docket No.: 050-00133
License No.: DPR-7

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Publicly Avail.	■Yes ☐ No	Sensitive Value:		

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08/02/09	08/10/09		

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00133
License No.:	DPR-7
Report No.:	050-00133/09-002
Licensee:	Pacific Gas and Electric Company
Facility:	Humboldt Bay Power Plant, Unit 3
Location:	1000 King Salmon Avenue Eureka, California 95503
Dates:	July 13-16, 2009
Inspector:	Robert Evans, PE, CHP, Senior Health Physicist Nuclear Materials Safety Branch B
Accompanied By:	Arthur T. Howell III, Director Division of Nuclear Materials Safety
Approved By:	Jack E. Whitten, Chief Nuclear Materials Safety Branch B
Attachment:	Supplemental Inspection Information

ENCLOSURE

EXECUTIVE SUMMARY

Humboldt Bay Power Plant, Unit 3
NRC Inspection Report 050-00133/09-002

This inspection was a routine, announced inspection of decommissioning activities being conducted at the Humboldt Bay Power Plant, Unit 3 facility. In summary, the licensee was conducting decommissioning activities in compliance with regulatory and license requirements.

Safety Reviews, Design Changes, and Modifications

- The licensee's safety review program was conducted in compliance with 10 CFR 50.59 requirements (Section 1).

Maintenance and Surveillance

- The licensee continued to operate and maintain necessary plant equipment in accordance with license and procedure requirements (Section 2).

Decommissioning Performance and Status Review

- The licensee was conducting decommissioning activities with an emphasis on radiological safety. Radiation protection controls had been implemented in accordance with 10 CFR Part 20 requirements (Section 3.2.a).

- The licensee conducted an infrequently performed heavy load test in accordance with work order instructions and with an emphasis on industrial safety (Section 3.2.b).

- The license implemented a cross contamination plan in the new fossil generation facility in accordance with license requirements (Section 3.2.c).

- The licensee's training program was in agreement with Defueled Safety Analysis Report requirements, but at the time of the inspection, the licensee was significantly upgrading the training program to account for the site-specific radiological hazards involving alpha particulate contamination (Section 3.2.d).

Occupational Radiation Exposure

- The licensee implemented an occupational exposure program that effectively monitored the internal and external doses to radiation. No individual exceeded the regulatory limit for total effective dose equivalent exposures during calendar year 2008 (Section 4.2.a).

- During 2009, the licensee began implementing a program for control of worker exposures to alpha particulate contamination. This program supports the concept of As Low As Reasonably Achievable (ALARA) and should help control worker exposures to licensed material (Section 4).

Radioactive Waste Treatment, and Effluent and Environmental Monitoring

- The effluent and environment monitoring programs were in compliance with license requirements. All required samples had been collected, no sample result exceeded applicable limits, and no adverse trends were identified. Annual doses to the public were well below the regulatory limit (Section 5).

Solid Radioactive Waste Management and Transportation of Radioactive Materials

- To support the planned decommissioning activities as described in the Post-Shutdown Decommissioning Activities Report, the licensee developed formal plans for control and shipping of radioactive wastes. These plans provided detailed reviews and assessments of work challenges involving radioactive waste disposals (Section 6).

Report Details

Summary of Plant Status

At the time of the inspection, Humboldt Bay Power Plant (HBPP), Unit 3, was being decommissioned in accordance with commitments specified in the Post-Shutdown Decommissioning Activities Report (PSDAR) dated June 30, 2009. The licensee commenced with decommissioning during May 2009. Since May 2009, the licensee has removed the Unit 3 transformers and generator exciter.

In the near future, the licensee plans to remove the generator, seal oil exciter switchgear, and reactor feed pump room equipment. The licensee may also conduct a radiological survey and study of the reactor vessel, in part, to ascertain the various options for its removal and disposal. Also during the inspection, the licensee continued to construct a new power generating plant on the site property. Following construction of the new power generating plant, the licensee plans to commence with decommissioning of Units 1 and 2.

1 Safety Reviews, Design Changes, and Modifications (37801)

1.1 Inspection Scope

The inspector conducted reviews of the licensee's design change program to ensure compliance with the requirements of 10 CFR 50.59.

1.2 Observations and Findings

The licensee conducted one 10 CFR 50.59 safety evaluation during 2009. Evaluation 09-01 eliminated a previously analyzed accident scenario. The evaluation deleted the spent fuel pool (SFP) rupture scenario from the Defueled Safety Analysis Report (DSAR). Rupture of the SFP was possible based on a seismic event or heavy load drop. To prevent a heavy load drop accident, plant procedures previously prohibited the movement of loads greater than 10 tons over the SFP.

The spent fuel was removed from the SFP by December 2008. The licensee conducted the analysis using the NRC sponsored computer code RESRAD-OFFSITE to verify that the remaining radioactive material would result in minimal offsite dose in the event of a rupture of the SFP. Following its approval, this change now allows the licensee to move heavy loads over the SFP as part of decommissioning activities.

During the inspection, representatives of the licensee stated that several documents would be updated in the near future including the DSAR. These documents will be updated, in part, to account for the impacts and hazards of alpha contamination.

1.3 Conclusions

The licensee's safety review program was conducted in compliance with 10 CFR 50.59 requirements.

2 Maintenance and Surveillance (62801)

2.1 Inspection Scope

The inspector conducted a review of the equipment that remained in service to support plant operations, and the inspector observed the performance of selected maintenance and surveillance activities.

2.2 Observations and Findings

At the time of the inspection, the licensee continued to maintain selected plant systems. The components that will remain in service included the plant alarm system, seismograph, stack gas flow monitor, liquid radwaste monitor, radwaste system components, ventilation equipment, SFP support equipment, instrument air, service air, and electrical controls. The licensee also continued to operate various in-plant radiation monitors; however, these monitors are scheduled for permanent removal in the near future.

The inspector compared operating plant parameters to the procedure limits specified in the license. All parameters reviewed by the inspector were found to be within the allowed range. For example, the SFP water level was being maintained in the range stipulated by plant procedures. In summary, the licensee operated the remaining equipment in accordance with procedure requirements.

The inspector observed the performance of three maintenance and surveillance tests:

- Discharge canal sample station back flush
- Stack particulate monitor sampling
- Quarterly ventilation system test in the refueling building

In summary, the tests observed by the inspector were completed satisfactorily, and the operators/technicians appeared knowledgeable of the tasks being conducted.

2.3 Conclusions

The licensee continued to operate and maintain necessary plant equipment in accordance with and procedure requirements specified in the license.

3 Decommissioning Performance and Status Review (71801)

3.1 Inspection Scope

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

3.2 Observations and Findings

a. Site Tours

The inspector toured the fuel handling building, Unit 3 control room, and the other radiologically restricted areas of the facility. Radiological postings were clearly visible, and the postings met the requirements of 10 CFR Part 20. Housekeeping was being controlled in these areas. During the site tours, the inspector conducted radiological surveys to verify the accuracy of radiation area postings. The inspector did not identify any radiation area that was incorrectly posted by the licensee.

b. Heavy Load Lift

During the inspection, the licensee conducted a 125-percent load test of the main 75-ton crane located within the refueling building. The licensee conducted the test to certify the 75-ton crane to be able to lift a 90-ton load. The load that was lifted during the test consisted of the shield plug and various free weights. The weight of the lift was determined by calculation versus direct measurement. A State of California inspector was present during the load test.

Since this activity was an infrequently performed evolution, a special pre-job briefing was conducted. The test was then conducted using instructions provided in a work order. The test included a lift and hold to ensure that the crane breaks worked as designed. The crane was also moved in each of the four major compass directions, although the crane movement was constrained by the location of the SFP. In accordance with the work order, the licensee elected to avoid lifting the heavy load over the SFP.

In summary, the load test was completed in a satisfactory manner, and industrial safety was evident during all portions of the test. The load test certification has a four year recertification interval, although annual crane inspections will still be required to keep the certification current.

c. Cross-Contamination Plan

License Condition 2.C.4 specifies that a cross-contamination prevention and monitoring plan be maintained for the location of the new fossil generation facility. The inspector reviewed the licensee's implementation of its cross contamination plan. Site procedure C-220, Cross Contamination Prevention and Monitoring Plan (Plan), provides the instructions for the program. The inspector noted that the Plan provided an adequate overview of the survey program, but the Plan lacked specificity for the implementation of the cross-contamination prevention and monitoring program. The Plan referenced a radiation protection procedure for implementation details, but when examined by the inspector this secondary procedure had not fully incorporated the requirements of the Plan. During the inspection, a licensee representative stated that the procedure would be updated in the near future.

Despite the procedure limitation, the licensee conducted an initial radiological survey as required by the cross contamination plan. The survey was conducted during early July 2009. The radiological survey results obtained indicated that all measurements taken were indistinguishable from background levels. These survey results suggest that the licensee has effectively implemented the requirements of the cross contamination plan.

d. Site Training Program

The inspector reviewed the training program for compliance with 10 CFR 19.12 and DSAR requirements. Section 4.2.1 of the DSAR provides the training requirements. The training programs include general employee training, program-specific training, and respiratory protection training. Details of the training program are included in HBPP procedures B-2, General Training Requirements for On-Site Personnel, and B-200, Radiation Protection Training Program. The inspector noted that the licensee was in the process of significantly updating the training program to account for the radiological hazards that are present at the site.

At the time of the inspection, general employee and industrial safety training was provided by the site training department. Function-specific training was provided by the various departments such as radiation protection, security, and emergency preparedness departments. General employee training consisted of computer based training, formal classroom lectures, videotapes, handouts, and an examination.

The radiation protection staff was revising its program-specific training to include the hazards of alpha contamination. The licensee recently created a new, offsite training center that included mockups. The mockups will be used to train workers in the protocols of foaming, cutting, and sealing pipes that may contain alpha contamination. The mockups included glove boxes and tents that will be used to help control the spread of contamination.

The training certifications of selected instructors were reviewed. The inspector determined that the instructors were certified to teach specific classes. The inspector reviewed selected class records and confirmed that the instructors associated with the requisite training classes were qualified to teach the classes at the time the class was given. The licensee maintained an informal list of all classes and the primary instructors for those classes. Based on a random review, the inspector determined that the instructors were certified for the courses that were assigned to them.

The inspector reviewed the respiratory protection training program with the applicable supervisor. The training consisted of computer-based training, a medical physical, and a fit test. At the time of the inspection, the fit test program was suspended pending receipt of new masks for fit testing. Previous fit test failures were attributed to improper sealing of the probe that penetrated the test respirator. The supervisor expects the fit test program to be full operational prior to commencement of work activities involving alpha contamination.

The inspector also discussed the applicable respiratory protection procedure with the radiation protection supervisor. The inspector noted that the procedure had been updated to account for the new fit testing protocol and special respiratory cleaning and sampling requirements that must be implemented because of alpha contamination. The supervisor expected the fit testing procedure to be updated prior to commencement of work involving alpha contamination. Finally, the licensee plans to construct a new glove box for cleaning alpha-contaminated respirators, and the licensee plans to provide special training to workers who will wash and maintain the respirators.

3.3 Conclusions

The licensee was conducting decommissioning activities with an emphasis on radiological safety. Radiation protection controls had been implemented in accordance with 10 CFR Part 20 requirements. The licensee conducted an infrequently performed heavy load test on the 75-ton crane in accordance with work order instructions and with an emphasis on industrial safety. The license implemented a cross contamination plan in the new fossil generation facility in accordance with license requirements. The licensee's training program was in agreement with DSAR requirements, but at the time of the inspection, the licensee was significantly upgrading the training program to account for the site-specific radiological hazards involving alpha particulate contamination.

4 Occupational Radiation Exposure (83750)

4.1 Inspection Scope

The inspector reviewed occupational radiation exposures to verify compliance with 10 CFR Part 20 limitations. The inspector also reviewed the implementation of the licensee's As Low As Reasonably Achievable (ALARA) program.

4.2 Observations and Findings

a. Occupational Exposures

Occupational radiation exposures consisted of both external and internal exposures. The licensee monitored and maintained records of Unit 3 exposures. The inspector reviewed the occupational exposure records for calendar year 2008. During 2008, 267 thermoluminescent dosimeters were issued to individuals to measure external gamma doses. The combined total effective dose equivalent for all individuals with a measurable gamma dose was about 2.05 person-rems. During 2008, the work projects with the highest dose potential included cleaning of the SFP, offloading of the fuel, and shipping of radioactive resins.

The highest total effective dose equivalent exposure recorded during 2008 to one individual was 121 millirems. The highest committed effective dose equivalent exposure was 27 millirems, a dose that was assigned to two individuals. The regulatory limit for total effective dose equivalents, a combination of deep dose equivalent and committed effective dose equivalent, is 5,000 millirems. In summary, site doses during 2008 were well below the regulatory limit.

To help monitor for internal doses, the licensee conducted bioassay sampling. Bioassay sampling included entrance, exit, annual, and event-based whole body counting. No positive whole-body counts were attributed to plant events during 2008, and to the date of this inspection in 2009.

The inspector reviewed the licensee's ALARA program for future work activities. During interviews, the licensee's staff predicted the work activities planned during 2009 that had the greatest potential for doses to individuals would be the reactor vessel characterization study (if conducted) and turbine-generator decommissioning. The licensee estimated that the decommissioning of Unit 3 would result in a total combined

dose of approximately 208 person-rems. The projects with the highest dose potential include decommissioning of the reactor vessel, SFP, shutdown and cleanup heat exchangers, and area vaults.

b. Control of Exposures to Alpha Contamination

The inspector conducted a review of the licensee's plans to control occupational exposures to alpha contamination. The site has a unique radiological hazard due to alpha particulate contamination. Early fuel failures resulted in the internal contamination of plant systems with fission products and transuranic radionuclides. The alpha particulate hazard has increased over time from the decay of plutonium-241, while the gamma radiation hazards have decreased due to the decay of cobalt-60 and cesium-137.

The licensee plans to commence work that has the potential for exposures to alpha particulate contamination during October 2009. In response, the licensee developed a radiation protection procedure for performing and evaluating alpha particulate contamination postings and surveys. In addition, the procedure provides new controls for alpha zones. The implementation of this new procedure should help minimize the potential for worker exposures to alpha contamination.

To help assess the alpha contamination hazard inside of plant piping, the licensee recently collected a number of 'coupon' samples from various locations including the turbine and feedwater piping. These samples were submitted to an offsite laboratory for analysis. The results of these samples will be used, in part, to help characterize the material for waste disposal and for transportation.

The licensee plans to conduct the cutting of alpha contaminated pipes within glove boxes or containment tents. The use of glove boxes and tents is expected to reduce the potential for worker exposures to loose alpha contamination. In addition, the licensee plans to inject foam material into the pipes to fixate the alpha contamination during cutting operations. Site workers that enter a contaminated area will be required to wear lapel air samplers to help the licensee assess worker exposures to radioactive particulate contamination.

During the inspection, the licensee was in the process of upgrading its training program for workers that will be potentially exposed to alpha contamination. Industry experts were being used to upgrade the lesson plan and to teach the class to site workers. All workers are expected to be retrained prior to commencement of work activities involving alpha contamination. In addition, the licensee established a mock-up facility to support training of workers that will be cutting and handling the alpha-contaminated piping. These training enhancements are expected to help reduce the potential for inhalation or ingestion of alpha contamination.

Routine whole-body counts are generally ineffective for identifying uptakes of alpha contamination. The licensee plans to implement an enhanced bioassay program that will include collection of urine and fecal samples for monitoring of internally deposited alpha-emitting radionuclides.

The licensee has been procuring new equipment to conduct real-time monitoring of alpha contamination. The licensee recently placed into service a number of continuous

air monitors that monitor for alpha contamination in addition to beta-gamma contamination. Further, the licensee plans to install an alpha detecting monitor in the plant ventilation stack. This monitor was expected to be installed during September 2009, prior to start of decommissioning work involving alpha contamination.

4.3 Conclusions

The licensee implemented an occupational exposure program that effectively monitored the internal and external doses to radiation. No individual exceeded the regulatory limit for total effective dose equivalent exposures during calendar year 2008. During 2009, the licensee began implementing a program for control of worker exposures to alpha particulate contamination. This program supports the concept of ALARA and should help control worker exposures to licensed material.

5 Radioactive Waste Treatment, and Effluent and Environmental Monitoring

5.1 Inspection Scope

The inspector reviewed the licensee's program to control, monitor, and quantify releases of radioactive materials to the environment in liquid, gaseous, and particulate forms.

5.2 Observations and Findings

The inspector reviewed the Annual Radioactive Effluent Release Report for 2008 dated March 26, 2009, and the Annual Radiological Environmental Monitoring Report for 2008 dated April 30, 2009. The inspector compared the results presented in these reports to the requirements provided in site procedures and the Offsite Dose Calculation Manual. In summary, all required samples had been collected, and no sample result exceeded a licensed or regulatory limit. No adverse trends were apparent. The inspector identified several report errors, and the licensee agreed to update the reports during the next routine submittals.

The inspector compared the effluent and environmental monitoring results to the public dose limits specified in 10 CFR 20.1301. In summary, the records indicate that the public dose limits were not exceeded. The licensee's results suggest a maximum public dose of less than one millirem for 2008 with an annual regulatory limit of 100 millirems.

5.3 Conclusions

The effluent and environment monitoring programs were in compliance with license requirements. All required samples had been collected, no sample result exceeded applicable limits, and no adverse trends were identified. Annual doses to the public were well below the regulatory limit.

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

6.1 Inspection Scope

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

6.2 Observations and Findings

The PSDAR provides a description and schedule of planned decommissioning activities. To support decommissioning, the licensee recently developed two plans, a Waste Management and Disposal Plan and a Transportation Plan. These plans were developed, in part, to identify the challenges for waste management and to identify potential options for these challenges. The unique challenges include:

- Control of the limited amount of area available for waste handling operations
- Establishment of temporary waste storage areas inside and outside of site structures
- Control of alpha contaminated material
- Removal of contaminated concrete and soils below the water table
- Removal of contaminated sediment from the intake and discharge canals

As explained in the PSDAR, the licensee has to decide whether to segment the reactor pressure vessel and its internals or to dispose of the vessel as a single item.

The licensee estimates that the total volume of contaminated material to be removed from the site is about 660 thousand cubic feet. The material includes soils, building rubble, and equipment. The vast majority of the waste material generated will most likely be classified as Class A wastes for disposal at an out-of-state disposal site. The wastes will be sorted based on disposal and shipping classification. The licensee also plans to use radioactive waste processors to consolidate the wastes for disposal. The use of waste processors may allow the licensee to reduce the volume of wastes disposed.

In response to the above challenges, the Waste Management and Disposal Plan provide recommended flow paths for the movement of equipment from the location of dismantlement to the location of packaging for shipment. This plan also provides a recommended list of work areas for decommissioning. For example, the main condenser is considered one such work area. The plan also describes the potential classification of the waste streams such as Class A bulk wastes and Class A general wastes.

In general, field crews will remove the equipment from a given area and will relocate the equipment near the waste containers. The waste handling and packaging crews will package the waste equipment, and the shipping and transportation crews will ship the material for disposal. Based on the current work schedule, most wastes will be shipped during the 2013-2014 time frame. The bulk of the wastes will consist mostly of soils and building debris.

At the time of the inspection, the licensee was developing a system and area characterization plan. This plan will help establish the definitions of the various waste streams and help establish the waste profiles for disposal and shipment. The waste profiles have to be completed and approved prior to the actual shipment of the waste materials.

As explained in the Transportation Plan, the licensee estimates that it will ship approximately 1500 shipments to the out-of-state waste disposal site. Challenges to

transportation include the locations of the staging areas needed to support decommissioning. Because of the limited amount of space available, the licensee is expected to tightly control the movement, handling, and storage of waste containers.

A second transportation challenge is the location of the site. The site has limited access to alternate modes of transportation. There are no rail or barge access points in the immediate area of the site, so practically all wastes may have to be shipped by truck to the disposal site. In addition, there are no easy, direct routes to the disposal site. Further, the licensee will have to comply with length restrictions on the local highways.

At the time of the inspection, the licensee was in the process of adding staff to the radwaste packaging and transportation groups. Procedures were being upgraded to provide step-by-step instructions for the work that will be performed. The licensee was in the process of procuring intermodal containers for shipment of the wastes. The licensee was also reviewing its options for shipping large components.

The licensee was reviewing its protocols for shipment of other types of waste streams, including oil and asbestos wastes, for disposal. For example, the licensee was considering its options for disposal of the fuel oil storage tank, turbine lube oil, and exciter. These components may be disposed in an alternate manner, as allowed by 10 CFR 20.2002. An alternate disposal methodology was being considered because of the low radiological hazards associated with these materials.

6.3 Conclusions

To support the planned decommissioning activities as described in the PSDAR, the licensee developed formal plans for control and shipping of radioactive wastes. These plans provided detailed reviews and assessments of work challenges involving radioactive waste disposals.

7 Exit Meeting

The inspector reviewed the scope and findings of the inspection during an exit meeting that was conducted at the conclusion of the onsite inspection on July 16, 2009. The licensee did not identify as proprietary any information provided to, or reviewed, by the inspector.

SUPPLEMENTAL INSPECTION INFORMATION

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J. Davis, Radiation Protection Engineer
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M. Smith, Engineering Manager
R. Snyder, Radwaste Supervisor
D. Sokolsky, Licensing Supervisor
M. Stein, Radiation Protection Supervisor, Bartlett
B. Stephens, Work Week Manager

INSPECTION PROCEDURES USED

IP 37801 Safety Reviews, Design Changes, and Modifications
IP 62801 Maintenance and Surveillance
IP 71801 Decommissioning Status
IP 83750 Occupational Radiation Exposure
IP 84750 Radioactive Waste Treatment, and Effluent and Environmental Monitoring
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

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
DSAR	Defueled Safety Analysis Report
HBPP	Humboldt Bay Power Plant
IP	Inspection Procedure
PSDAR	Post Shutdown Decommissioning Activities Report
SFP	Spent Fuel Pool