

February 27, 1998

PG&E Letter HBL-98-002

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Docket No. 50-133, OL-DPR-7  
Humboldt Bay Power Plant, Unit 3  
Post-Shutdown Decommissioning Activities Report

Dear Commissioners and Staff:

As discussed in PG&E Letter HBL-97-003, dated February 20, 1997, the Humboldt Bay Power Plant, Unit 3 (Unit 3) SAFSTOR Decommissioning Plan (SDP) has been considered to be the Post-Shutdown Decommissioning Activities Report (PSDAR), as well as the Final Safety Analysis Report (FSAR), under the provisions of 10 CFR 50.82. The SDP has effectively served as the Unit 3 PSDAR and FSAR during the SAFSTOR period. However, PG&E plans to remove and replace the existing 250-foot ventilation stack, as well as pursue the feasibility of complete decommissioning of Unit 3. Therefore, making the PSDAR a separate document provides a more effective means to describe planned decommissioning activities.

Pursuant to 10 CFR 50.82(a)(4)(i), PG&E is submitting the enclosed updated PSDAR for Unit 3. In accordance with 10 CFR 50.82, the enclosed PSDAR describes planned Unit 3 decommissioning activities and associated schedule; provides an estimate of expected costs; and discusses reasons for concluding that the environmental impacts associated with site-specific decommissioning activities are bounded by appropriate, previously issued, environmental impact statements.

The SDP will still be considered the FSAR for HBPP. As such, the SDP will be revised prior to August 28, 1998, in accordance with the provisions of 10 CFR 50.71(e)(4) that became effective on August 28, 1996. Applicable updated

PSDAR information contained in the enclosure to this letter will be incorporated, as appropriate, in the revised SDP.

Sincerely,

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PG&E Letter No. HBL-98-002

ENCLOSURE

**POST-SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT**

**HUMBOLDT BAY POWER PLANT, UNIT 3**

**February 1998**

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## 1. INTRODUCTION

The current status of the Humboldt Bay Power Plant, Unit 3 (Unit 3) is safe storage, known as SAFSTOR. PG&E intends to perform a dismantlement activity in 1998 that involves the removal of the existing 250-foot ventilation stack, and its replacement with a much shorter ventilation stack. In addition, PG&E will pursue the feasibility of licensing an ISFSI for the on-site storage of the remaining nuclear fuel as well as the complete decommissioning of Unit 3. As a result, PG&E is submitting this Post-Shutdown Decommissioning Activities Report (PSDAR) in accordance with 10 CFR 50.82 (a)(4)(i). Per the regulation, this PSDAR describes the planned decommissioning activities and associated schedule for Unit 3; provides an estimate of expected costs; and discusses reasons for concluding that the environmental impacts associated with site-specific decommissioning activities are bounded by appropriate, previously issued, environmental impact statements, specifically NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" (Reference 1), and NUREG-1166, "Final Environmental Statement for Decommissioning Humboldt Bay Power Plant, Unit No. 3" (Reference 2).

When the Nuclear Regulatory Commission's (NRC) new Decommissioning Rule became effective on August 28, 1996, it required power reactor licensees who have permanently ceased operation of their facility to submit a PSDAR to the NRC. The new Decommissioning Rule also allowed licensees with an approved decommissioning plan prior to the effective date of the new rule to consider their approved decommissioning plan to be the PSDAR. Because Unit 3 had an NRC-approved SAFSTOR Decommissioning Plan (SDP) prior to the effective date of the new Decommissioning Rule, the SDP was considered to be the Unit 3 PSDAR (Reference 3). In addition, the SDP was also considered to be the Unit 3 Final Safety Analysis Report (FSAR).

The SDP has effectively served as the Unit 3 FSAR and PSDAR during the SAFSTOR period. However, as PG&E plans to proceed with dismantlement of the Unit 3 ventilation stack, and to pursue the feasibility of complete decommissioning of Unit 3, separating the PSDAR from the SDP provides a more effective method to describe planned decommissioning activities.

## 2. BACKGROUND

Unit 3 was operated by PG&E as a 65 MWe natural circulation boiling water reactor (BWR). In addition to Unit 3, two oil and/or natural gas fueled units exist on the plant site and continue to be operated by PG&E. Unit 1 is rated at 52 MWe, and Unit 2 is rated at 53 MWe. Two diesel-fueled gas turbine Mobile Emergency Power Plants (MEPPs), each rated at 15 MWe, are also currently located at the plant and are operated by PG&E.

Unit 3 was granted a construction permit by the Atomic Energy Commission (AEC) on October 17, 1960, and construction began in November 1960. The AEC issued Provisional Operating License No. DPR-7 for Unit 3 in August 1962. Unit 3 achieved initial criticality on February 16, 1963 and began commercial operation in August 1963.

On July 2, 1976, PG&E shut down Unit 3 for an annual refueling, to conduct seismic studies, and implement seismic modifications. Unit 3 remained in a shutdown condition pending completion of ongoing seismic and geologic studies. In December 1980 it became apparent to PG&E that the cost of completing required backfits would likely make it uneconomical to restart the unit. Work was suspended at that time awaiting further guidance regarding backfitting requirements. In 1983, updated economic analyses indicated that restarting Unit 3 would not be economical. Therefore, in June 1983 PG&E announced its intention to decommission the unit.

The fuel was removed from the reactor in January and February 1984 and placed in the spent fuel pool (SFP). The SFP currently contains 390 partially or totally spent assemblies and 18 in-core fission chambers.

During the 13 years of Unit 3 commercial operation, 11 core cycles of operation were completed. Unit 3 operated a total of 7.85 effective full power years.

The NRC issued License Amendment 19 for Unit 3 on July 16, 1985 that modified the plant status to a possess-but-not-operate status. The NRC's Decommissioning Safety Evaluation Report was issued on April 29, 1987 (Reference 4).

The SDP identified PG&E's intention to place Unit 3 in SAFSTOR until 2015 and to enter the dismantlement phase (referred to as DECON) at that time (Reference 5). This decision was made to allow the spent fuel and plant component radioactivity time to decay and to allow the Department of Energy (DOE) adequate time to build a high-level waste repository. However, PG&E intends to proceed with dismantlement of the ventilation stack in 1998 rather than wait until 2015.

### 3. DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES

#### Current Plans

PG&E is currently developing plans for removal of the 250-foot reinforced concrete ventilation stack from Unit 3, and replacing it with a much shorter (approximately 50 feet) metal stack. This activity will be performed in accordance with the requirements of 10CFR50.59.

#### *Ventilation Stack Physical Characteristics and Removal Process*

The ventilation stack exhausts gaseous effluents from the various Unit 3 buildings, including the reactor building. The existing stack is constructed of reinforced concrete. At ground level, the outside diameter is approximately 18 feet with a wall thickness of approximately 1 foot. At the top, the outside diameter is approximately 5 feet with a wall thickness of approximately 6 inches.

The ventilation stack, due to its proximity and height, poses the greatest potential risk to the stored fuel and site personnel during an earthquake exceeding the seismic capability of the 250-foot stack. Accident analyses have been performed that bound the consequences of the ventilation stack falling onto the spent fuel, concluding that the public health and safety would not be affected. Nevertheless, PG&E intends to proceed with dismantling the existing stack to preclude such an event from happening. The base of the stack (approximately 23 feet above ground plus a basement) will remain in place because it does not pose a seismic threat, and it serves as the enclosure for three floors of gas treatment equipment that must remain operational.

It is expected that the stack will be removed in piecemeal fashion, beginning with the exhaust outlet at the top, and proceeding down the stack. The actual removal process will not be known until a qualified contractor is selected in the first quarter of 1998.

As part of the current license for Unit 3, a stack gas monitoring system is required to be operational. This system provides the monitoring and annunciation for both routine and non-routine releases of radioactive noble gases. A comparable stack gas monitoring system will be installed for the new stack to maintain compliance with the current license. Demolition of the existing stack will not begin until the new stack is operational.

One aspect that is of primary concern during removal of the stack is the control of contamination that currently exists on the inside surface of the stack and the below grade piping that connects to the gas treatment equipment. For radiation control,



HBPP personnel will apply protective measures and use standard radiation practices.

Precautions will be instituted to prevent contamination from spreading via ground or airborne pathways. This may include, but not be limited to, the erection of enclosed structures, ventilation systems with filtration and continuous monitoring systems, and the use of radiation protection specialists.

### *Planning*

In anticipation of ventilation stack removal and replacement, preparations are being undertaken that will include the following general types of activities:

- Design and procure equipment and facilities to support ventilation stack removal and replacement.
- Prepare dose estimates for ventilation stack removal and replacement.
- Evaluate disposal options for ventilation stack removal.
- Determine the most effective decontamination methods.
- Install required temporary services.

### *Waste Removal*

The existing SAFSTOR waste management program will be used for the ventilation stack removal and replacement. The waste management program addresses waste forms including radiological, hazardous and mixed. The program provides an efficient means whereby these waste forms can be collected, stored, processed, packaged, transported, and disposed.

Low-level waste will be processed in accordance with plant procedures and existing commercial options for subsequent transportation and disposal at licensed facilities. After shipment offsite, wastes may be incinerated, compacted, buried or otherwise processed by authorized and licensed contractors as appropriate.

Generation of mixed waste will be minimized. However, if mixed wastes are generated, they will be managed according to all applicable federal and state regulations and will be consistent with NRC handling, storage, and transportation regulations. Mixed wastes from Unit 3 will be transported only by authorized and licensed transporters and shipped only to authorized and licensed facilities. Processes to render the mixed wastes non-hazardous will be evaluated if technology, resources, and approved processes are available.

### *Decontamination*

PG&E is currently evaluating the most economical and efficient method to decontaminate and dispose of the ventilation stack. Contaminated portions of the ventilation stack may be decontaminated onsite, or they may be removed and sent to an offsite processing facility or to a low-level radioactive waste disposal facility. If decontamination is performed onsite, specific decontamination methods and procedures will be developed prior to beginning decontamination activities. Any decontamination method used will involve standard processes, and the resulting waste will be disposed of in accordance with plant procedures and applicable regulations.

Several different techniques can be employed in decontamination of surfaces. These include wiping, washing, vacuuming, grit blasting, and high pressure water jets. Typically, removal of concrete will be performed using a method that controls the removal depth to minimize the waste volume produced (e.g., scabbling, scarifying).

Some decontamination methods require airborne contamination control and waste processing systems to be used as necessary to control and monitor any releases of contamination. While decontamination is being performed, engineering controls will be used to minimize the need for respiratory protection control measures. Application of coatings and wiping are typical methods for stabilizing or removing loose surface contamination. Decontamination methods will be selected to maximize efficiency and minimize wastes.

The decontamination methods described above are the most practical and widely used at this time. However, as new decontamination technologies are developed, they will be considered and used if appropriate.

#### *Processing and Disposal Site Locations*

Currently, there are several facilities available for processing waste materials to achieve volume reduction prior to disposal, and/or for disposal of low-level radioactive waste. These locations include Chem Nuclear in Barnwell, South Carolina; Envirocare in South Clive, Utah; Hake in Memphis, Tennessee; and US Ecology in Oak Ridge, Tennessee. A low-level radioactive waste facility is currently being planned for the Southwestern Compact in Ward Valley, California, but this facility will not be available in time for disposal of the ventilation stack.

#### Future Plans

During and following removal and replacement of the ventilation stack, PG&E will evaluate the feasibility of licensing an ISFSI for the on-site storage of the remaining nuclear fuel as well as the complete decommissioning of Unit 3. To accomplish Unit 3 decommissioning, PG&E must first obtain NRC approval for the design and license of an Independent Spent Fuel Storage Installation (ISFSI) to provide onsite

dry cask storage of the spent fuel, and also receive authorization from the California Public Utilities Commission (CPUC) to include the cost of the ISFSI design and construction in the decommissioning trust fund. If both NRC and CPUC approvals are granted, and if otherwise appropriate, PG&E may then proceed to construct an ISFSI, transfer the spent fuel from the SFP to the ISFSI, and perform the complete decommissioning of all remaining Unit 3 structures, systems and components (SSCs). If PG&E is unsuccessful in obtaining either NRC or CPUC approval, Unit 3 will remain in SAFSTOR until a licensed DOE high level waste repository becomes available. In either case, PG&E will inform the NRC regarding our plans for complete decommissioning and license termination.

### *ISFSI Option*

While the ventilation stack is being dismantled and replaced, PG&E will proceed with pursuing the design and licensing of an ISFSI within the site boundary to provide dry cask storage of the spent fuel. PG&E will perform siting studies and evaluate seismic and other environmental conditions that must be addressed for the design, licensing and construction of the ISFSI. PG&E will select and work with dry cask storage system vendors to prepare the application for an ISFSI license. Upon receipt of NRC and CPUC approvals for the construction and funding of the ISFSI, and receipt of permits from other required regulatory agencies, e.g. California Coastal Commission, PG&E could then proceed with ISFSI construction if it determines that an ISFSI is appropriate.

Unit 3 will remain in SAFSTOR throughout the licensing and construction of the ISFSI. Some dismantlement activities may occur while Unit 3 is in SAFSTOR if they are deemed cost-effective and will not interfere with the safe storage of the spent fuel in the SFP.

#### 4. SCHEDULE OF PLANNED DECOMMISSIONING ACTIVITIES

PG&E plans to dismantle the existing ventilation stack during 1998. The new replacement stack will be placed in operation prior to dismantlement of the existing stack. PG&E intends to perform pre-dismantlement activities, e.g., develop work packages and procedures, from March through May, and to begin physical work activities in June. PG&E expects to complete ventilation stack dismantlement by October 1998.

PG&E is currently identifying seismic and other environmental conditions which must be addressed for the design and construction of the ISFSI. Evaluations of dry cask storage system vendors are ongoing. PG&E anticipates a CPUC decision by 1999 regarding use of the trust fund for ISFSI licensing and construction. PG&E plans to submit an ISFSI license application to the NRC if and when the CPUC makes a favorable decision authorizing use of the trust fund. Construction of the ISFSI will not begin until the NRC approves the ISFSI application, and permits have been received from other required regulatory agencies, e.g. California Coastal Commission.

Some additional dismantlement activities may occur while Unit 3 is in SAFSTOR, if they are deemed cost-effective and will not interfere with the safe storage of the spent fuel in the SFP. If so, PG&E will notify the NRC, identify those activities, and provide a schedule when they will occur. If otherwise appropriate, complete decommissioning of Unit 3 could begin following completion of spent fuel transfer to the ISFSI. At that time, PG&E will provide a schedule and description of the complete decommissioning activities. Currently, PG&E anticipates a four-year complete dismantlement period.

As stated in Section 3 of this PSDAR and as noted above, complete decommissioning following replacement of the ventilation stack will only occur if PG&E successfully obtains NRC and CPUC approvals for constructing and funding an ISFSI at HBPP. If PG&E is unable to obtain and fund an ISFSI license, Unit 3 will remain in SAFSTOR until a licensed DOE high level waste repository becomes available. The date for a DOE high level waste repository is uncertain at this time.

## 5. ESTIMATE OF EXPECTED DECOMMISSIONING COSTS

10 CFR 50.82 (a)(4)(i) requires the PSDAR to include an estimate of expected costs for decommissioning activities. Based on engineering cost estimates and a site-specific decommissioning cost estimate provided by TLG Services, Inc., PG&E estimates total costs for the ventilation stack replacement to be \$4,500,000.

For the eventual complete decommissioning of Unit 3, PG&E contracted TLG Services, Inc., to prepare a site-specific decommissioning cost estimate in 1997. The TLG Services, Inc., cost estimate (1) includes all Unit 3 decommissioning activities, (2) includes construction and operation of an ISFSI, and (3) assumes the decommissioning process starts in 1998 (Reference 6). Based on this estimate, PG&E expects the cost to decommission Unit 3 to be \$210 million, in 1997 dollars.

The cost estimate of \$210 million exceeds the current market value of the decommissioning trust fund, which was \$156 million as of December 31, 1996. Based on previous cost estimates, trust funds were collected from 1987 through 1991, and the trust fund was determined to be fully funded at that time.

To remedy the current under-funded situation, PG&E requested CPUC concurrence for tax treatment of the decommissioning trust fund that would allow tax benefits to flow back into the trust fund, thereby providing additional funding for decommissioning work. If PG&E obtains the necessary approvals for the construction of an ISFSI, decommissioning trust fund contributions of approximately \$3.3 million per year over a five-year period (1999-2003) would be needed. The additional trust fund contributions plus the tax treatment of the trust fund should be sufficient to fully fund the Unit 3 ISFSI and subsequent decommissioning.

## 6. ENVIRONMENTAL IMPACTS

10 CFR 50.82 (a)(4)(i) requires the PSDAR to include "a discussion that provides the reasons for concluding that the environmental impacts associated with the site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements." For the eventual complete decommissioning of Unit 3, including the ventilation stack, the following discussion provides reasons for drawing the above conclusion, based on:

- NUREG-1166, "Final Environmental Statement for Decommissioning Humboldt Bay Power Plant, Unit No. 3," and
- NUREG-0586, "Final Generic Environmental Impact Statement (FGEIS) on Decommissioning Nuclear Facilities."

PG&E originally assessed the environmental impact of Unit 3 decommissioning in the Unit 3 Environmental Report, dated July 30, 1984 (Reference 7). The NRC response to the Environmental Report is documented in NUREG-1166, dated April 1987.

The FGEIS assesses decommissioning a typical ("referenced") 1155 MWe BWR that operated throughout its 40-year operating life. The FGEIS concludes that (1) decommissioning of such a facility is not an imminent health and safety problem, (2) radiation dose to the public due to decommissioning activities should be very small, and (3) radiation dose to decommissioning workers should be well within the occupational exposure limits. By comparison, Unit 3 is a 65 MWe BWR that operated for only 13 years and accumulated only 7.85 effective full power years of reactor operation. Therefore, the environmental impacts of decommissioning Unit 3 should be much smaller in comparison to the "referenced" plant analyzed in the FGEIS.

Occupational activities for the removal and replacement of the ventilation stack should result in an occupational dose of approximately 0.5 person-rem. The FGEIS does not provide dose assessments for individual structures. However, all occupational activities during the complete decommissioning of Unit 3 are expected to result in an occupational dose total less than FGEIS levels, as described below.

The total occupational dose for complete decommissioning Unit 3, following 15 years of SAFSTOR, is expected to be approximately 354 person-rem. This total occupational dose estimate was obtained by adding the following three doses: (1) occupational doses received from placing Unit 3 in SAFSTOR and maintaining Unit 3 in SAFSTOR through 1997 total 161 person-rem, (2) all occupational activities required for the actual decommissioning of Unit 3 are expected to result in an occupational dose of approximately 180 person-rem, and (3) occupational dose due

to truck shipments are expected to be 13 person-rem. The total occupational dose estimate of 354 person-rem is bounded by the appropriate FGEIS exposure estimates for the "referenced" BWR.

Total public dose from decommissioning Unit 3, following 15 years of SAFSTOR, is estimated to be approximately 2 person-rem. This estimate is bounded by the appropriate FGEIS exposure estimates for the "referenced" BWR.

PG&E concludes that Unit 3 decommissioning, including the ventilation stack replacement, will be accomplished with no significant adverse environmental impacts, because:

- No Unit 3 site-specific factors would alter the conclusions of the FGEIS.
- There are no unique aspects of the plant or decommissioning techniques to be used that would invalidate the conclusions reached in the FGEIS.
- Delaying the dismantlement of Unit 3 following 15 years of SAFSTOR has resulted in considerable radioactivity decay with resultant reduced dose rates and lower occupational radiation exposure.
- Public and occupational doses are bounded by FGEIS levels.

## 7. REFERENCES

1. NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," dated August 1988.
2. NUREG-1166, "Final Environmental Statement for Decommissioning Humboldt Bay Power Plant, Unit No. 3," dated April 1987.
3. PG&E Letter HBL-97-003, submitted to the NRC regarding Application of New Decommissioning Rule, dated February 20, 1997.
4. Humboldt Bay Power Plant, Unit No. 3 Decommissioning, Safety Evaluation Report, dated April 29, 1987.
5. SAFSTOR Decommissioning Plan for the Humboldt Bay Power Plant, Unit No. 3, Revision 1, dated July 1994.
6. TLG Services, Inc. Letter P01-1238-9707, regarding Decommissioning Cost Estimates for Humboldt Bay Power Plant Unit 3, dated December 4, 1997
7. Environmental Report, Attachment 6 to PG&E's application to decommission HBPP, dated July 30, 1984.