

Pacific Gas and Electric Company
Humboldt Bay Power Plant
Loren D. Sharp
Director and Plant Manager Humboldt Bay Nuclear

1000 King Salmon Avenue
Eureka, CA 95503
707/444-0819

July 19, 2013

10 CFR 50.82

PG&E Letter HBL-13-002



ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Docket No. 50-133, License No. DPR-7
Humboldt Bay Power Plant, Unit 3
Post-Shutdown Decommissioning Activities Report, Revision 4

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.82(a)(7), Pacific Gas and Electric Company (PG&E) is submitting the enclosed Revision 4 to the Post-Shutdown Decommissioning Activities Report (PSDAR) for Humboldt Bay Power Plant, Unit 3. PSDAR Revision 4 reflects a change in decommissioning activity status since PSDAR Revision 3 was submitted to the NRC on June 30, 2009 in PG&E Letter HBL-09-009. The PSDAR has been revised to include significant changes in the scope, cost estimate and schedule of decommissioning activities since Revision 3 was submitted. The most notable change is the addition of activities associated with the removal of the caisson and canal remediation to ultimately facilitate site release. The changes are pervasive throughout the PSDAR and are, therefore, not identified with revision bars.

In accordance with 10 CFR 50.82(a)(4)(i), the enclosed PSDAR continues to describe planned Unit 3 decommissioning activities and associated schedule, provide an estimate of expected costs, and discuss reasons for concluding that the environmental impacts associated with site-specific decommissioning activities are bounded by appropriate, previously issued, environmental impact statements.

PG&E makes no regulatory commitments (as defined by NEI 99-04) in this letter.

If you wish to discuss the information in the Enclosure, please contact Mr. David Sokolsky at (415) 973-5024.

Sincerely,

A handwritten signature in black ink that reads 'Loren D. Sharp'.

Loren D. Sharp

FSME20
FSME

Document Control Desk
July 19, 2013
Page 2

PG&E Letter HBL-13-002

Enclosure

cc/enc: John B. Hickman, NRC Project Manager
Arthur T. Howell, III, Regional Administrator, NRC Region IV
Gonzalo L. Perez, California Department of Public Health
Gerald A. Schlapper, NRC Region IV
Humboldt Distribution

POST SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT

HUMBOLDT BAY POWER PLANT, UNIT 3

Revision 4

July 2013

TABLE OF CONTENTS

<u>Section Title</u>	<u>Page No.</u>
1.0 INTRODUCTION	1
2.0 BACKGROUND	2
3.0 DESCRIPTION AND SCHEDULE OF PLANNED DECOMMISSIONING ACTIVITIES	3
4.0 ESTIMATE OF EXPECTED DECOMMISSIONING COSTS	4
5.0 ENVIRONMENTAL IMPACTS	6
6.0 REFERENCES	8
ATTACHMENT A - DECOMMISSIONING SCHEDULE	9

1.0 INTRODUCTION

Pacific Gas and Electric Company (PG&E) submitted the initial Humboldt Bay Power Plant (HBPP), Unit 3, Post-Shutdown Decommissioning Activities Report (PSDAR) to the Nuclear Regulatory Commission (NRC) on February 27, 1998, in accordance with 10 CFR 50.82 (a)(4)(i). PG&E is submitting Revision 4 to the PSDAR in accordance with 10 CFR 50.82 (a)(7) to include significant changes in the scope, cost estimate and schedule of decommissioning activities since Revision 3 was submitted on June 30, 2009. The most notable change is the addition of activities associated with the removal of the caisson and canal remediation to ultimately facilitate site release. The changes to the PSDAR, Revision 4 are pervasive throughout the PSDAR and are, therefore, not identified with revision bars.

On December 11, 2008, PG&E completed the transfer of spent fuel from the HBPP Unit 3 Spent Fuel Pool (SFP) into the Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI). As a result, PG&E began decontamination and dismantlement of Unit 3. PSDAR Section 3.0 describes planned and ongoing decommissioning activities, and Attachment A provides a more detailed decommissioning schedule.

Previous revisions of the PSDAR discussed 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" (FGEIS) (Reference 1) and NUREG-1166, "Final Environmental Statement for Decommissioning Humboldt Bay Power Plant, Unit No. 3" (Reference 2). In November 2002, the FGEIS was superseded by NUREG-0586, Supplement 1, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," (GEIS) (Reference 3). PG&E has reviewed the GEIS and continues to conclude that the environmental impacts associated with site-specific decommissioning activities are bounded by appropriate, previously issued, environmental impact statements.

In accordance with 10 CFR 50.82 (a)(4)(i), this PSDAR describes the planned decommissioning activities and associated schedule for Unit 3, and provides an estimate of expected costs.

2.0 BACKGROUND

Unit 3 was operated by PG&E as a 65 MWe natural circulation boiling water reactor (BWR). In addition to Unit 3, two natural gas and/or oil fueled units, Units 1 and 2, existed on the plant site but are now dismantled and decommissioned. Unit 1 was rated at 52 MWe, and Unit 2 was rated at 53 MWe. Two diesel-fueled gas turbine Mobile Emergency Power Plants, each rated at 15 MWe were also decommissioned in 2011. Units 1 and 2 were replaced by a new generation facility called the Humboldt Bay Generating Station (HBGS), adjacent to HBPP Unit 3. PG&E constructed HBGS during 2009 and 2010, and commenced commercial operation in September of 2010. PG&E completed dismantlement and decommissioned Units 1 and 2 in August of 2011. The space previously occupied by Units 1 and 2 is being used as a lay-down area for the completion of Unit 3 decommissioning.

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 shutdown Unit 3 for an annual refueling and 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 confirmed that restarting Unit 3 would not be economical. Therefore, in June 1983, PG&E announced its intention to decommission Unit 3.

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 Unit 3 License expires in 2015.

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 fuel was removed from the reactor in January and February 1984, and placed in the SFP. The spent nuclear fuel was transferred to the Humboldt Bay ISFSI in 2008 and will remain stored in the ISFSI until the Department of Energy assumes control of the fuel. The ISFSI license, issued by the NRC on November 17, 2005, expires in 2025.

3.0 DESCRIPTION AND SCHEDULE OF PLANNED DECOMMISSIONING ACTIVITIES

Over the past four years, the majority of decommissioning work has been installation of site infrastructure and removal of systems and components, known as Plant System Removal Phase. In this phase, PG&E established a self-perform arrangement in which PG&E provided direct supervision of a contracted work force performing work on a Time-and-Material basis or on a Cost-Plus basis. This phase is now largely completed. PG&E is currently transitioning from a self-perform to direct oversight of a large civil works contractor, commensurate with the change in nature of the work. Most of the remaining scope of work that will be performed under the new contractor will be actual cost plus earned percentage of fix fee.

HBPP Unit 3 decommissioning is transitioning from the Plant System Removal Phase, where work scope was dynamic with significant uncertainty, to the Civil Works Projects Phase, where work scope is well defined, and the remaining decommissioning work has been analyzed and then described in well-defined Civil Works Projects. These Civil Works Projects include Turbine Building Demolition which is underway under an existing contract, Nuclear Facilities Demolition and Excavation (including the caisson), Intake and Discharge Canal Remediation, Office Facility Demobilization, and Final Site Restoration.

PG&E has scheduled the remainder of the decommissioning of the HBPP Unit 3 site over a period of approximately seven years finishing in 2019. PG&E has developed a critical path method to reflect long range planning and coordination for the project. Decommissioning of the reactor and refueling building, including removal of the reactor caisson and spent fuel pool, drives the current critical path for the project.

Attachment A provides a schedule of planned decommissioning activities depicting current forecast and target completion dates for major work areas. This schedule incorporates assumptions for planned activities that are reflected in the latest bids received to complete the remainder of the project and target finish dates based upon improvements in two key areas: (1) integration of the drywell liner and activated concrete removal with removal of the caisson and (2) performing longer saw cutting operations beyond the normal work day to segment the reactor vessel pressure vessel. PG&E will continue to inform the NRC of significant schedule changes in accordance with 10 CFR 50.82 (a)(7).

4.0 ESTIMATE OF EXPECTED DECOMMISSIONING COSTS

PG&E has prepared a site-specific Decommissioning Project Report (DPR) (Reference 5) for decommissioning the HBPP Unit 3 to identify the cost and schedule to complete decommissioning and license termination of HBPP Unit 3. The DPR incorporates the site specific decommissioning tasks and detailed plans which have been identified as a result of the ongoing implementation of the decommissioning effort. The projected total cost to decommission HBPP Unit 3, including costs spent to date and a 10% to 25% line item contingency applied to remaining work depending on the degree of difficulty, is estimated to be approximately \$982.4 million (2011 dollars). The DPR assumes the removal of identified contaminated and activated plant components and structural materials, and that decommissioning will be accomplished within the 60-year period required by current Nuclear Regulatory Commission (NRC) regulations. The DPR assumes that the spent fuel remains in storage at the site until such time that the transfer to a United States Department of Energy (DOE) facility can be completed.

The major cost contributors to the remaining decommissioning cost are (1) changes to the scope of the planned decommissioning work, including removal of the reactor caisson, intake and discharge canal remediation, elimination of NPDES permitted discharges after 2013 of collected, treated, stored liquids from Unit 3 and an assumed five-year extension of the time spent fuel will be stored on site, and (2) higher pricing from competitive bids received from the industry, staffing (labor plus per diem), safety and field oversight of removal of alpha contaminated plant systems and components, spent fuel storage, final site surveys, tools and equipment, and the disposition of waste generated in the decontamination and demolition of HBPP Unit 3. The estimate is based on several key assumptions, including regulatory requirements, estimating methodology, contingency requirements, and site restoration requirements.

In March 2009, PG&E authorized the preparation by a vendor of a cost study for decommissioning HBPP Unit 3. The methodology used to develop the 2009 cost estimates followed the basic approach originally presented in the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (T.S. LaGuardia et al., AIF/NESP-036, May 1986.) This reference describes a unit factor method for determining decommissioning activity costs. The DPR uses a different methodology: specific bid pricing and experience gained by PG&E after four years of full-scale decommissioning. The new DPR methodology has resulted in cost increases.

The cost estimate for the remaining work at HBPP Unit 3 is based on industry pricing in lieu of a budgetary cost estimate. The cost estimates shown in the table below are backed by competitive bids and four years of successful decommissioning.

SUMMARY OF REMAINING DECOMMISSIONING COST CONTRIBUTORS
(Thousands, 2011 Dollars)

Cost Category	Percentage %	Amount \$
General Staffing (Excludes Caisson)	14	100,167
Remainder of Plant Systems	8	56,693
Site Infrastructure	0	2,074
Specific Project (Excludes Disposal/Caisson/Canal)	14	104,254
Waste Disposal (Excludes Caisson/Canals)	10	74,011
Small Value Contracts	5	36,042
Spent Fuel Management	9	62,608
Contingency (Excludes Caisson/Canals)	6	46,552
Caisson (including Disposal & Contingency)	26	191,627
Canal Remediation (including Disposal & Contingency)	7	47,408
Common Site Support-Caisson and Canals	1	6,196
TOTAL	100	727,633

The recent additional scope (e.g. caisson removal and canal remediation) of decommissioning activities significantly increase the estimated cost of HBPP decommissioning by approximately \$245M. Therefore, the increase in the scope of decommissioning activities results in an increase to the estimated remaining cost of HBPP decommissioning to \$727.6M. PG&E has recently requested the California Public Utilities Commission (CPUC) to approve funds to address the increase in the estimate.

Financial Background:

- 2012 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) was filed with the CPUC on December 21, 2012
- Trust disbursements are current based on scope approved in the 2009 NDCTP
- 2012 NDCTP added the caisson removal scope of work. This scope of work cannot be requested for disbursement from the HBPP Decommissioning Trust(s) until this scope is approved in a decision from the CPUC.

PG&E submits annual decommissioning funding assurance reports to the NRC in accordance with the requirements of 10 CFR 50.75(f). Updates to decommissioning cost estimates and decommissioning trust fund balances are documented in these reports, the latest of which was submitted on April 1, 2013 (Reference 6). PG&E will revise future annual Decommissioning Funding reports for HBPP Unit 3 to reflect CPUC outcomes regarding decommissioning costs for HBPP Unit 3 in accordance with 10 CFR 50.75(f).

5.0 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 site-specific decommissioning activities will be bounded by appropriate previously issued environmental impact statements." 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.

Later, PG&E assessed the environmental impact of Unit 3 decommissioning based on NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities" (FGEIS) dated August 1988. More recently, the NRC evaluated the environmental impacts of decommissioning nuclear facilities, including HBPP, in NUREG-0586, GEIS, Supplement 1, dated November 2002. The Supplement updates information from the 1988 FGEIS regarding technological advances in decommissioning activities and changes in NRC regulations. The environmental impacts described in the Supplement supersede those described in the 1988 FGEIS. As a result, PG&E has re-assessed the environmental impact of Unit 3 decommissioning based on NUREG-0586, Supplement 1.

The occupational dose for complete decommissioning of Unit 3, following 23 years of SAFSTOR, considers: (1) occupational dose received from placing Unit 3 in SAFSTOR and maintaining Unit 3 in SAFSTOR through 2008, (2) dose from all occupational activities required for the actual decommissioning of Unit 3, and (3) occupational dose due to truck shipments. The occupational dose for Unit 3 decommissioning will meet the regulatory standards in 10 CFR 20 and is, therefore, bounded by the criteria in the GEIS.

Public dose from decommissioning Unit 3, following 23 years of SAFSTOR, considers direct exposure and gaseous and liquid effluents. Direct exposure and effluents in gaseous and liquid discharges are not expected to exceed the design objectives of 10 CFR 50, Appendix I, nor the dose and effluent concentration limits in 10 CFR 20 and 40 CFR 190. Therefore, the public dose from Unit 3 decommissioning, including the activities associated with caisson removal and canal remediation, is bounded by the criteria in the GEIS.

At the time that HBPP Unit 3 entered commercial service in 1963, the nuclear fuel assemblies used stainless steel as the fuel rod cladding. The stainless steel-clad fuel experienced gross cladding failures during operation. These failures were severe enough that radioactive fuel was released from the cladding and dispersed throughout numerous plant systems, contaminating these systems with alpha emitting radionuclides, i.e., transuranic elements.

HBPP completed the transition from stainless steel to zircaloy assemblies in 1969.

Over the SAFSTOR period, as beta and gamma emitting radionuclides have decayed, alpha has become a more dominant factor in dose contribution. Because alpha causes more severe biological damage when internal exposure occurs, the potential radiological dose consequences are likewise more severe. This issue leads to a unique, plant-specific concern that exists for HBPP decommissioning and is not discussed in the GEIS.

The alpha issue was discussed in PSDAR Revision 3. It was also described in two previous PG&E decommissioning funding assurance report submittals to the NRC: (1) PG&E Letter HBL-03-002, dated March 27, 2003, Enclosure 5 (Reference 8), and (2) PG&E Letter HBL-07-002, dated March 30, 2007, Enclosure 3 (Reference 9). These enclosures contain cost studies developed by TLG Services, Inc. and state "The extent of the alpha contamination will require additional radiological controls and will reduce the efficiency of component removal activities." HBPP will continue to implement appropriate best management practices and mitigating measures so that the alpha issue will comply with NRC expectations and the conclusions on radiological environmental impacts reached in the GEIS.

PG&E evaluated the addition of activities associated with the removal of the caisson and canal remediation to determine if the additional activities remain bounded by the environmental impacts previously completed and determined that the impacts are bounded by an existing environmental impact statement. (References 10, 11 and 12)

Based on the above discussions, PG&E continues to conclude that Unit 3 decommissioning will be accomplished with no significant adverse environmental impacts, and because:

- By implementing appropriate best management practices and mitigating measures to minimize the impacts of decommissioning activities, there are no unique aspects of the plant or decommissioning techniques that would invalidate or alter the conclusions of the GEIS.
- Delaying the dismantlement of Unit 3 following 23 years of SAFSTOR has resulted in considerable radioactivity decay with resultant reduced external dose rates and lower occupational deep dose equivalent exposure.
- Public and occupational doses are bounded by the GEIS criteria.
- Radiation dose to the public will be minimal.
- Decommissioning does not constitute an imminent health or safety problem and will generally have a positive environmental impact.

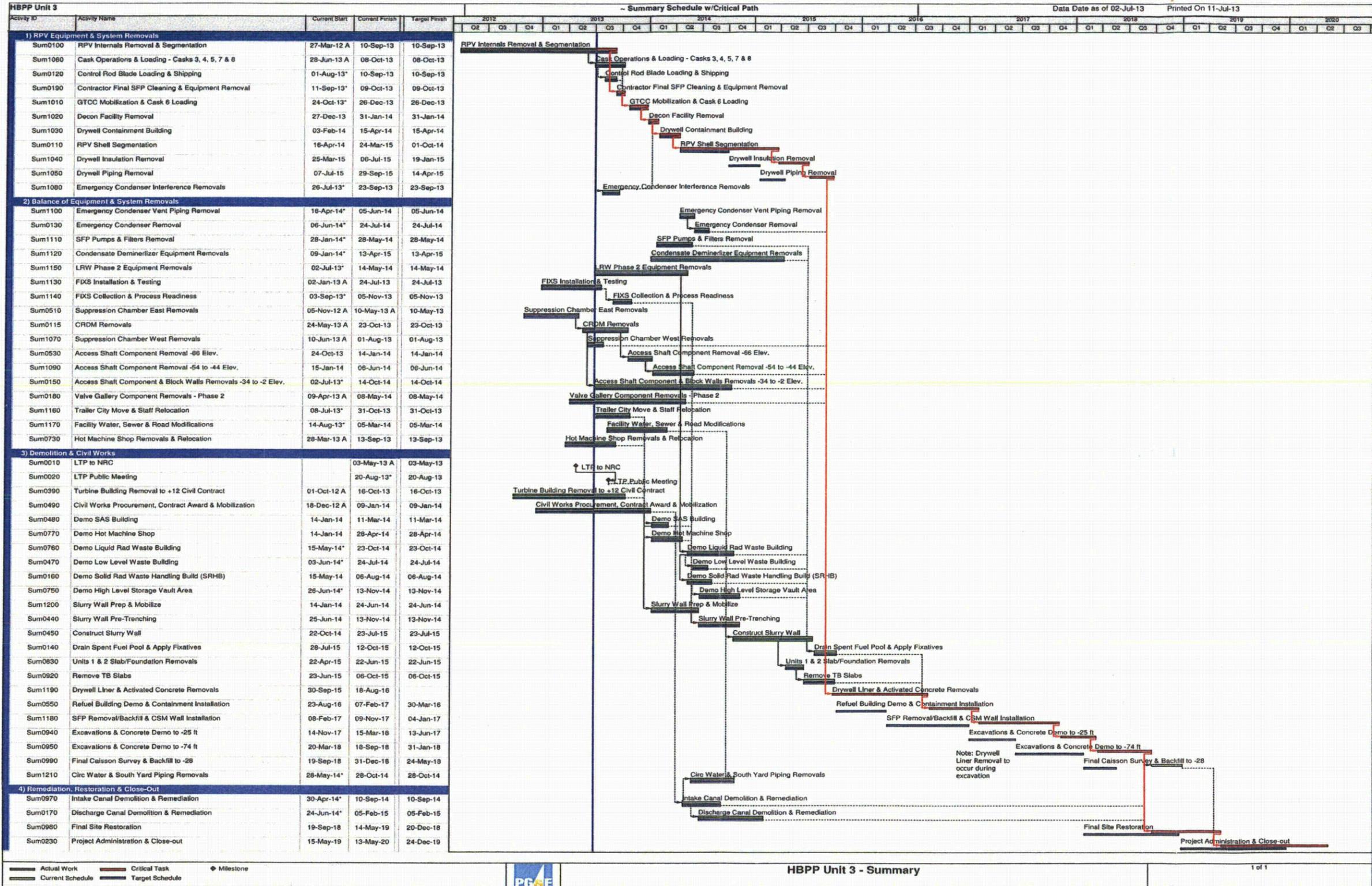
6.0 REFERENCES

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. NUREG-0586, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," Supplement 1, dated November 2002.
4. NRC Safety Evaluation Report, Humboldt Bay Power Plant, Unit No. 3 Decommissioning, dated April 29, 1987.
5. Pacific Gas and Electric Company Nuclear Decommissioning Cost Triennial Proceeding 2012, Application 12-12-012, Decommissioning Project Report for the Humboldt Bay Power Plant Unit 3, dated December 2012.
6. PG&E Letter HBL-13-003, "Decommissioning Funding Report for Humboldt Bay Power Plant Unit 3," submitted to the NRC, dated April 1, 2013.
7. Environmental Report, Attachment 6 to PG&E's application to decommission HBPP, dated July 30, 1984.
8. PG&E Letter HBL-03-002, "Decommissioning Funding Reports for Diablo Canyon Power Plants Units 1 and 2 and Humboldt Bay Power Plant Unit 3," submitted to the NRC, dated March 27, 2003.
9. PG&E Letter HBL-07-002, "Decommissioning Funding Report for Humboldt Bay Power Plant Unit 3," submitted to the NRC, dated March 30, 2007.
10. Radiological Environmental Impact Screen, prepared by Jack Chadwick, dated July 16, 2013
11. Non-Radiological Environmental Impact Screen, prepared by Anton Jaegel, dated July 9, 2013
12. Environmental Impact Evaluation, prepared by Anton Jaegel, dated July 9, 2013

ATTACHMENT A

HUMBOLDT BAY POWER PLANT UNIT 3

DECOMMISSIONING SCHEDULE



HBPP Unit 3 - Summary

1 of 1