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PACIFIC GAS AND ELECTRIC COMPANY

2018 NUCLEAR DECOMMISSIONING COST TRIENNIAL PROCEEDING

PREPARED TESTIMONY
ATTACHMENTS SUPPORTING CHAPTER 1

VOLUME 2

PACIFIC GAS AND ELECTRIC COMPANY
2018 NUCLEAR DECOMMISSIONING COST TRIENNIAL PROCEEDING
PREPARED TESTIMONY

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CHAPTER 1

ATTACHMENT A

INDEPENDENT REVIEW OF
DIABLO CANYON POWER PLANT
DECOMMISSIONING COST ESTIMATE,
HIGH BRIDGE ASSOCIATES, NOVEMBER 2018

Independent Review of
Diablo Canyon Power Plant
Decommissioning Cost Estimate and Schedule

For Pacific Gas & Electric Company

December 2018

Prepared By:

HIGH BRIDGE
ASSOCIATES

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I. Executive Summary

High Bridge Associates, Inc. ("HBA") was retained in September 2018 by Pacific Gas & Electric ("PG&E") to perform an independent review of the Diablo Canyon Power Plant ("DCPP") site-specific decommissioning project execution schedule and selected portions of the project cost estimate prepared in support of the PG&E application in the forthcoming 2018 Nuclear Decommissioning Cost Triennial Proceeding ("NDCTP") before the California Public Utilities Commission ("CPUC").

PG&E requested HBA to focus its independent review to eight (8) primary Focus Areas associated with the DCPP site specific decommissioning project execution schedule and cost estimate.

Focus Area 1: Decommissioning Summary Schedule
Focus Area 2: Decommissioning Security Plan
Focus Area 3: Waste Disposal Costs
Focus Area 4: Reactor Pressure Vessel and Internals Segmentation Schedule
Focus Area 5: Building Demolition Plan
Focus Area 6: System and Area Closure Plan
Focus Area 7: PG&E Oversight Structure
Focus Area 8: Contingency Strategy

The results of HBA's independent review have been captured in this report titled, "***Independent Review of Diablo Canyon Power Plant Decommissioning Cost Estimate and Schedule***" ("HBA Report" or "Report"). This Report includes the results of the HBA analysis for each Focus Area, including concise conclusions and recommendations to address any noted findings.

To complete this focused review and prepare the Report of its findings and recommendations, HBA assembled an Independent Review Team ("HBA IRT" or "IRT") comprised of ten (10) very seasoned subject matter experts with the prerequisite skills and capabilities to effectively review the subject matter in each of the identified Focus Areas. The resumes of the review team members are included in Attachment A. Responsibility to lead each of the eight (8) Focus Areas was assigned to an individual review team member (Focus Area Lead). Each Focus Area Leader tailored the review approach and informational requirements for the subject Focus Area to ensure meeting PG&E's work scope for the review.

The HBA IRT reviewed approximately one-hundred (100) documents provided by PG&E in response to requests for information. A complete list of the documents and materials provided by PG&E and reviewed by the HBA IRT are listed in Attachment B.

The HBA IRT reviewed the documents and materials provided by PG&E to gain a firm understanding of PG&E's approach to its cost and schedule development. Following a systematic process, the HBA IRT identified and validated its observations and formed conclusions regarding strengths and findings in each of the eight (8) Focus Areas. A strength, as used by HBA IRT in this Report is a good or beneficial quality or attribute. Whereas, a finding is considered by the HBA IRT to be a weakness, a lack of quality, a suggestion for improvement, or topic for additional investigation. The detailed analysis and conclusions for each Focus Area are presented in Section IV of the HBA Report.

In Section IV of the Report, the HBA IRT has made several predominant conclusions regarding strengths and findings about the DCPP site-specific decommissioning project execution schedule and selected portions of the project cost estimate.

The four (4) overarching/summary strengths noted by the HBA IRT are:

> The estimated costs represented in the DCE areas the IRT reviewed (minus any contingency allowance for unforeseen costs within the defined project scope of work) were accurate and reasonable within the range of accuracy HBA would expect for this level of site-specific budget estimate (-15% to +30%).
>
> The level of detailed site-specific planning for the myriad of anticipated decommissioning work activities six (6) years in advance of the expected shutdown of DCPP Unit 1 in November 2024 is considered a strength. This detailed site-specific planning is reflected in the various project management plans, schedules, and cost estimates reviewed. Detailed planning improves the quality, usefulness, credibility, and confidence of the schedule and cost estimate.
>
> The utilization of subject matter experts from renowned companies with direct relevant experience in the nuclear facility decommissioning field to develop detailed site-specific plans and estimates for major portions of the work is considered a strength. Simultaneously, PG&E has incorporated applicable relevant experience gained with ongoing decommissioning work at its Humboldt Bay Nuclear Power Plant in Eureka, California, as well as decommissioning of Zion Nuclear Power Station Unit 1 and Unit 2 in Zion, Illinois, a dual-reactor design similar to Diablo Canyon.
>
> The development of very detailed cost estimates and schedules for the building demolition and the system area closure plans, along with performing a detailed analysis of PG&E staffing requirements to provide oversight, operations, and support activities during the discrete decommissioning work that will be performed by experienced subcontractor resources are considered to be strengths. PG&E has designed a flexible staffing plan to ramp-up and ramp-down to meet changing requirements defined by specific key decommissioning project milestones.

The four (4) most significant findings noted by the HBA IRT are:

> The planned overall duration of just over thirteen (13) years for the decommissioning of two (2) units at DCPP from the planned shutdown of Unit 2 (August 2025) to the completion of Final Landscaping, Re-Vegetation, & Demolition, referred to as Site Restoration (December 2038), is atypically long compared to other recently completed or currently planned nuclear plant decommissioning projects resulting in higher total project costs than expected. Unit 1 is planned to be shutdown (November 2024) prior to the shutdown of Unit 2. During this ten (10) month timeframe, PG&E is responsibly planning to limit decommissioning work to avoid impacting Unit 2 operations.
>
> The currently planned average duration of about seven (7) years after shutdown of each unit for cooling and transfer of the spent fuel to dry storage at the on-site Independent Spent Fuel Storage Installation (ISFSI) is atypically long compared to other currently planned nuclear plant decommissioning projects.
>
> The currently planned duration of over six (6) years from unit shutdown to commencement of reactor vessel internals segmentation is atypically long compared to other planned nuclear plant decommissioning projects.
>
> The current plans to use a marine contractor to demolish the East and West Breakwaters would necessitate the use of a jack-barge and in HBA's opinion would not be the most cost-effective approach to accomplishing this demolition. Moreover, demolishing and removing the East and West Breakwaters at the end of the project adds approximately thirteen (13) months to the overall decommissioning project duration.

A complete listing of the more than thirty (30) suggested recommendations offered by the HBA IRT to address these findings and other findings are listed by Focus Area in Section V of the Report. These recommendations are offered as suggestions for PG&E to consider incorporating in its planning efforts going forward to address any noted findings.

II. Introduction and Background

High Bridge Associates, Inc. ("HBA") was retained in September 2018 by Pacific Gas & Electric ("PG&E") to perform an independent review of the Diablo Canyon Power Plant ("DCPP") site-specific decommissioning project execution schedule and selected portions of the project cost estimate prepared in support of the PG&E application in the forthcoming 2018 Nuclear Decommissioning Cost Triennial Proceeding ("NDCTP") before the California Public Utilities Commission ("CPUC").

DCPP is a nuclear fueled electricity-generating facility operated by PG&E in San Luis Obispo County, California. The facility has two (2) units sited on about 900 acres of land along the Pacific Ocean. Unit 1 was commissioned in May 1985 and Unit 2 was commissioned in March 1986. Each unit has a Westinghouse four (4) loop pressurized-water nuclear reactor designed to produce about 1100 MW of electric power. In June 2016, PG&E announced its plans to shut down Unit 1 in November 2024 and Unit 2 in August 2025 when each unit's operating license expires. PG&E plans are to proceed with immediate decommissioning work using the DECON method where the equipment, structures, and portions of the facility and site containing radioactive contaminates are removed or decontaminated to levels permitting termination of the license removing the facility from regulatory control and available for unrestricted use.

The results of HBA's independent review of the DCPP site-specific decommissioning schedule and selected portions of the cost estimate have been captured in this report titled, "***Independent Review of Diablo Canyon Power Plant Decommissioning Cost Estimate and Schedule***" ("HBA Report" or "Report"). This Report includes for each Focus Area the highlights of the HBA IRT analysis, including concise conclusions and recommendations to address any noted findings.

PG&E requested HBA to focus its independent review to the following eight (8) primary Focus Areas associated with the DCPP site specific decommissioning project execution schedule and cost estimate.

Focus Area 1: Decommissioning Summary Schedule
Focus Area 2: Decommissioning Security Plan
Focus Area 3: Waste Disposal Costs
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Focus Area 5: Building Demolition Plan
Focus Area 6: System and Area Closure Plan
Focus Area 7: PG&E Oversight Structure
Focus Area 8: Contingency Strategy

The HBA independent review approach and assumptions are discussed in Section III of the Report. The HBA analysis and conclusions for each Focus Area are presented in Section IV of the Report. Lastly, the HBA recommendations are separately listed in Section V of the Report.

III. Review Approach

HBA is a seasoned Project Management, Project Controls, Estimating, and Engineering consulting and services firm. HBA has broad based experience in the nuclear power electric generation and nuclear facility decommissioning/closure market providing consulting and technical subject matter expert services in the areas of cost estimating, scheduling, cost/schedule reviews, and project assessments. An overview of the vast history of representative independent estimates, analysis and assessments that HBA has completed is included in Attachment A.

HBA assembled an Independent Review Team ("HBA IRT" or "IRT") comprised of ten (10) very seasoned subject matter experts with the prerequisite skills and capabilities to effectively review the subject matter in each of the eight (8) identified Focus Areas. The IRT was led by review team member, Mr. Michael Foley, PE, PMP, CCP under the HBA executive sponsor, Mr. Steve Maehr. Mr. Foley and these review team members have worked together in the past on similar reviews and assessments. Resumes of the review team members are also included in Attachment A.

At the on-set of the independent review HBA requested from PG&E information including the following:

- Site layout and building drawings along with radiological/dose rates within each building
- Project schedule in the maximum available level of detail in Primavera P6 file format
- Basis of estimate documents for each phase of the project and/or estimate package reviewed
- Project organization charts and staffing plans for the Focus Areas to be reviewed
- Project Risk Register and contingency analysis

PG&E fulfilled this request with an initial production of twenty-one (21) documents.

The IRT began the review effort with a kick off meeting to understand the purpose, objectives, scope, and schedule requirements for the review. Subsequently, the IRT reviewed the information available in the PG&E initial document production to understand the detail of the information available. The IRT tailored its technical approach, resource assignments, and schedule to ensure fulfillment of the purpose of the independent review and scope of work. Each of the eight (8) Focus Areas was assigned to a review team member for lead Focus Area review responsibility (Focus Area Lead).

PG&E supplemented the document production with approximately eighty (80) additional documents to address about forty-nine (49) follow-on HBA requests for information. A complete list of the documents and materials provided by PG&E to the HBA IRT are listed in Attachment B. The IRT also complemented its data gathering with some publicly available documentation including prior NDCTPs before the CPUC concerning Diablo Canyon decommissioning.

Each Focus Area Lead evaluated the applicable PG&E provided documents and prepared draft working hypotheses regarding strengths and findings for their respective Focus Area. A strength, as used by HBA IRT in this Report, is a good or beneficial quality or attribute. Whereas, a finding is considered by the HBA IRT to be a weakness, a lack of quality, a suggestion for improvement, or a topic for additional investigation. The working hypotheses were presented to the entire HBA IRT for discussion and refinement. The surviving working hypotheses were presented to and discussed with PG&E representatives on Thursday, October 18, 2018 during a weekly review meeting. The information gathered during the presentation was factored into the HBA IRT analysis and final strengths and findings presented in Section IV of the HBA Report. A complete listing of the more than thirty (30) HBA IRT recommendations to address any noted findings are listed by Focus Area in Section V of the HBA Report. These HBA IRT recommendations are offered as suggestions for PG&E to consider incorporating in its planning efforts going forward to address any noted findings.

IV. Analysis and Conclusions

In this Section IV, the HBA IRT provides its analysis and conclusions of strengths and findings for each of the eight (8) Focus Areas reviewed.

Focus Area 1: Decommissioning Summary Schedule

HBA was asked to perform an independent review of the DCPP Decommissioning Summary Schedule ("DSS") to evaluate the DSS for accuracy and reasonableness. Specific focus was to be on schedule logic, sequencing of major activities, activity durations, and identified major milestones for accuracy and reasonableness. Similar major scopes of work from other decommissioning projects were requested to be utilized as benchmarks for comparison to the logic, sequencing, durations and milestones in the DSS.

PG&E provided HBA with a printout of its DSS titled # Level 3 DCPP Sum 11 x 17 and dated 21 Sep 2018. The DSS is a 2-page, high-level Gantt chart representation of the scope of essential work necessary to decommission DCPP Unit 1 and Unit 2. This schedule presentation is done at a level of detail described at level 3 showing major projects with typical activity durations of 6 months to 2 years. The schedule shows the 14-year period from Unit 1 Shutdown in early November 2024 to the completion of Final Landscaping, Re-Vegetation, & Demolition in December 2038, referred to as completion of Site Restoration. The schedule does not show the completion of the transfer of the spent nuclear fuel to the DOE, transfer of the GTCC, or demolition of the on-site Independent Spent Fuel Storage Installation (ISFSI) slated to finish on or about 2071.

HBA reviewed the DCPP DSS for accuracy and reasonableness of schedule logic, sequencing of major activities, activity duration and major milestones. The review was based on comparison of logic, durations and milestones to those from previously performed decommissioning projects with an emphasis on the recent decommissioning of DCPP sister station Zion. Zion is very similar to DCPP in mechanical design of the power block. However, there are many additional structures at DCPP that were not required at Zion, such as the Sea Water Reverse Osmosis Facility and the East and West Breakwaters that protect the intake structure. Moreover, DCPP is a much bigger site in physical dimensions. These differences impact many scopes of work including system and area closure, demolition work, and site restoration. HBA has taken these differences into account in its comparison.

In follow-up, PG&E provided HBA with an electronic copy of the DCPP DSS in its native language Primavera P6 without supporting schedule details because many of the schedule details remained under development. PG&E did provide printouts of various detailed schedules including schedules for the demolition of the auxiliary building, containment building, turbine building and breakwaters; the system and area closure plans for the auxiliary building, containment building, turbine building; and the reactor pressure vessel and internals segmentation.

HBA relied on PG&E provided Project Management Plans (PMPs) that cover the scopes of the summary activities to clarify assumptions, reasoning and requirements which influence the logic and durations shown in the DCPP DSS.

HBA has not reviewed whether the DCPP DSS correctly reflected the various detailed decommissioning schedules provided for select PMPs. Because the fully detailed P6 schedule was not included in this review, verification that the DCPP DSS correctly represents the detailed decommissioning schedules was not performed.

STRENGTHS:

The DCPP DSS is a high-level summary schedule that provides a more detailed view of the scope of work than most summary schedules included in DCE's from other facilities. The development of a summary schedule at level 3 allows their audience to easily understand the scope of work, relationships, and durations. While PG&E has chosen to leave out support activities and level of effort work in favor of showing field work only in the DCPP DSS, this provides additional clarity by not cluttering the DSS with additional information when trying to explain the schedules for the major projects to the audience.

Comprehensive Scope Coverage

The DCPP DSS represents the work covering most of the cost related to the decommissioning of DCPP. All major scopes are organized into major groupings that follow standard industry practice. Each major group is then represented by approximately 10-20 summary activities organized by start date making it easy to follow the logic and understand the scopes of work being presented.

The DCPP DSS also represents the Unit 1, Unit 2 and Common activities as different colors to help clarify the mix of activities. DCPP's units are contained within a single power block that have some common or shared systems. Because of this, the schedules of both units are interconnected and do not stand alone. PG&E's representation of a combined schedule makes this clear.

Critical Path Shown

PG&E correctly uses a longest path analysis to identify and represent the schedule critical path of activities, which is the industry standard. The schedule critical path of activities is highlighted in red on the DCPP DSS making it easy to understand the work activities that PG&E believes leads to the overall duration of approximately 13.3 years after shutdown of Unit 2 (August 2025). Logic lines between critical activities are also included making it easy to follow the series of activities leading to this longest path.

The critical path shown on the DCPP DSS includes planned work activities customarily expected to be on critical path of a nuclear power plant decommissioning schedule, including the Spent Fuel Cooling Period and Containment Demolition. It is clearly labeled and understandable as presented in the DCPP DSS.

Logic and Scopes Easy to Follow

The DCPP DSS contains approximately ten (10) to twenty (20) schedule activities for each of the major scopes of work, organized by their planned start date. These groupings and the organized presentation facilitate understanding the scopes of work and schedule activities, following the inferred relationships. This is very helpful in understanding the relationships between these activities because the relationships can be inferred even though schedule logic/relationship lines are not cluttering the schedule presentation.

Milestones

A schedule milestone is a point in time in the schedule associated with a significant project event. The DCPP DSS shows a series of nine (9) schedule milestones reflecting the completion of major scopes of decommissioning work. The list of milestones presented covers much of the scope of work and appears to be correct other than a few minor items. With a few minor exceptions presented in the minor findings section, these milestones correctly represent the information presented in the DCPP DSS.

FINDINGS:

HBA identified several findings during its review of the DCPP DSS. The most significant finding is the overall fourteen (14) year schedule duration for the decommissioning work from shutdown of Unit 1 to the end of site restoration is longer than the current industry norm. This duration is primarily due to a longer than expected period for fuel cool down and other activities that could be managed so they are off the schedule critical path. HBA has also identified some findings in schedule durations and logic associated with specific scopes of work.

These findings identified by HBA include:

- Overall decommissioning schedule duration is more than the industry norm
- Critical path is not optimal
- Early Demolition is not optimal
- Duration to the start of power block demolition is longer than industry norm

- Reactor Vessel Internals duration is shorter than industry experience
- Final Status Survey is longer than industry norm

Each of these findings are discussed in more detail below.

Overall Schedule Duration

The planned overall duration for the DCPP DSS from the planned shutdown of Unit 1 (November 2024) to the completion of site restoration (December 2038) is about 14.1 years. The planned shutdown of Unit 2 (August 2025) occurs about ten (10) months or eight-tenths (0.8) years after the shutdown of Unit 1. During this planned time between shutdown of Unit 1 and shutdown of Unit 2, PG&E has responsibly limited decommissioning work in order to not disrupt Unit 2 operations. As a result, Unit 2 shutdown more accurately defines the start of the DCPP DSS project critical path (i.e., Shutdown of Unit 2 is on the schedule critical path defining the overall duration for the DCPP DSS. Shutdown of Unit 1 could occur sooner, and the overall decommissioning work could not be finished any earlier.)

For comparative purposes HBA considered the overall duration for the DCPP decommissioning schedule to be about 13.3 years, representing the time between the planned shutdown of Unit 2 (August 2025) and the completion of site restoration (December 2038). This planned overall schedule duration of 13.3 years is several years longer than shortest current schedule estimates for recently planned decommissioning projects (7.4 years). This duration is also longer than the expected actual duration for Zion Station decommissioning period of nine (9) years, excluding the twelve (12) year SAFSTOR period prior to starting active decommissioning (DECON). While site-specific conditions at DCPP may cause its overall schedule duration to be longer than the shortest schedules, it is possible to reduce the length of the overall period of performance. For example, the East and West Breakwater demolition work alone adds thirteen (13) months to the overall project duration.

Shown in Figure IV.1.1 below is a chart comparing DCPP's current planned schedule durations for major decommissioning work activities to similar work activities at thirteen (13) other US PWR decommissioning projects for 1- and 2-unit sites. These thirteen (13) US PWR decommissioning projects include four (4) completed or nearly completed projects; one (1) project in a similar stage of near term planning as DCPP; and eight (8) projects planned significantly farther in the future. HBA has included all these projects in its comparative analysis because the number of completed decommissioning projects is very small. A list of the decommissioning projects and their available attributes used by HBA to develop the data presented in Figure IV.1.1 is included in Attachment C. The range and averages of other decommissioning projects are displayed as light green vertical bars and dark horizontal green bars respectively. DCPP's schedule data is highlighted with red (Unit 1) and yellow (Unit 2) circles over them. Because DCPP is a 2-unit location it is expected to be slightly longer than normal, however because the units are essentially being decommissioned concurrently, overall project durations are not significantly extended.

HBA compared the total duration and duration for four (4) major periods reflected in the DCPP DSS to other similar US PWR decommissioning projects. These four (4) major periods include:

- **Total Duration** – The period from unit shutdown or the start of DECON to the completion of initial site restoration and the commencement of the ISFSI only period. This comparison is done at the site level.
- **Fuel on Pad** – The period from unit shutdown to the completion of the transfer of spent fuel to dry storage at the on-site ISFSI. Note DCPP DSS shows one bar representing both units combined cooling periods to the completion of spent fuel transfer. Each DCPP unit was separated and normalized for comparison to other projects.
- **RPV and Internals** – The period from when field work on reactor vessel internals begins to the completion of the reactor pressure vessel segmentation. DCPP's reactors are represented individually.
- **Power Block Demo** – The period from when both spent fuel transfer to dry storage and RPV Segmentation are complete through the completion of power block demolition. This comparison focuses on the element of demolition that is on the critical path because this affects the overall project schedule and cost.
- **Site Restoration** – The period from the end of power block demo to the completion of initial site restoration and the commencement of the ISFSI only period.

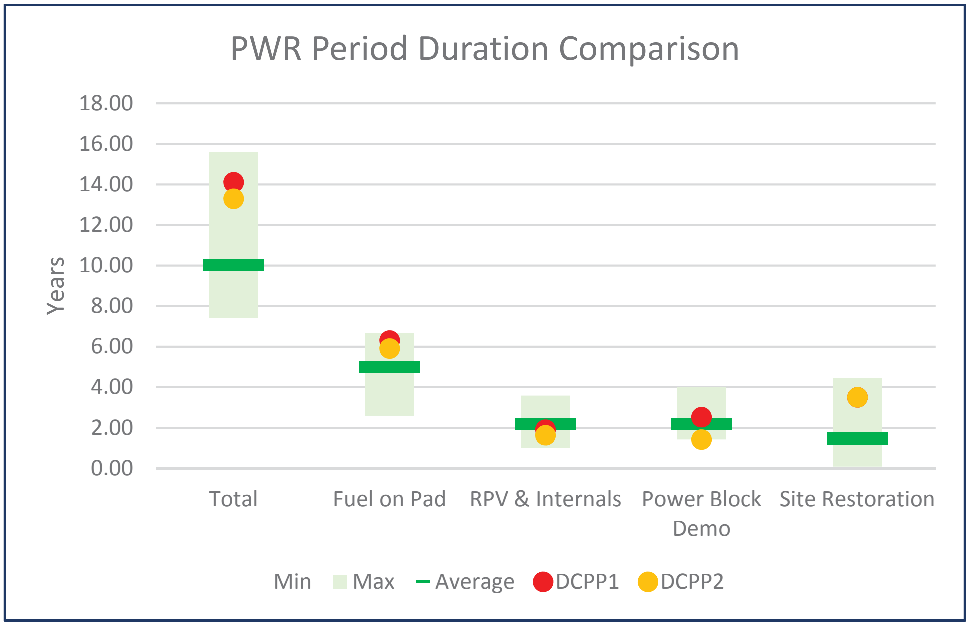

Figure IV.1.1: Period Duration Comparison (US PWRs)

As indicated in the comparison provided above in Figure IV.1.1, DCPP's Total Duration is above average. This above average condition is primarily due to additional time in two (2) of the four (4) major periods examined.

The first major period examined, DCPP's Fuel on Pad period is near the high end of all planned and executed decommissioning schedules. When compared against results from past plants, DCPP is above average. Because of DCPP's unique seismic profile and operating history, HBA does not expect it to be as short as other plants in this comparison. However, decommissioning projects in similar stages of planning to DCPP are several years shorter than DCPP. Additional discussion on the Fuel on Pad period is included later in the section covering durations.

The second major period examined, DCPP's Site Restoration period, is also longer than average. The duration of the Site Restoration period is directly related to the physical size of the site and the number of buildings. DCPP is one of the largest sites in this comparison, meaning it is expected to be above average. However, DCPP's Site Restoration driver is the demolition of the East and West Breakwaters, which is a unique DCPP feature that does not exist at most sites. When the duration of the breakwater demolition work is removed, DCPP's Site Restoration time is reduced to 2.4 years, which is close to the average duration.

The comparison provided in Figure IV.1.1 also shows the DCPP DSS has slightly shorter than average planned durations for the periods associated with RPV & Internals segmentation and Power Block Demolition.

Critical Path

The schedule critical path with activities highlighted in red on the DCPP DSS has several findings that directly contribute to a longer total project duration than expected. HBA believes the schedule critical path and other decommissioning work can be optimized to result in a shorter overall schedule duration and costs for the decommissioning project. The three (3) primary schedule critical path findings are:

- Reactor Vessel Internal Segmentation is incorrectly marked as part of the critical path
- Reactor Pressure Vessel Segmentation is on the critical path
- Breakwater Demolition is on the critical path

Each of these three (3) primary schedule path findings are discussed in more detail below.

Reactor Vessel Internal (RVI) Segmentation and Removal is not Critical Path

The schedule critical path shown in the DCPP DSS visually identifies several schedule activities that should not be shown as part of the schedule critical path. It is important when representing the schedule critical path, only those activities and their sequence or logic resulting in the actual longest schedule critical path of logic between the start and finish date of the project be so identified. The DCPP DSS visually shows activities that occur before the end of the Spent Fuel Cooling Window as being on the schedule critical path. These activities are not part of the longest path since they appear to have no start constraints yielding significant float before the start of these activities. These activities include *Spent Fuel/GTCC Transfers to ISFSI – Unit 1, RVI Segmentation & Removal - Unit 1, Spent Fuel/GTCC Transfers to ISFSI - Unit 2*, and *RVI Segmentation & Removal - Unit 2.*

Reactor Pressure Vessel (RPV) Segmentation and Removal is on Critical Path

DCPP has planned/sequenced the completion of the Unit 2 Reactor Vessel Internal Segmentation and Removal work to occur simultaneously with the end of the Spent Fuel Cooling Window in order to ensure the removal of and placement of Unit 2 Greater Than Class C (GTCC) waste into dry storage by the time the Unit 2 spent fuel is placed into dry storage. This planned sequencing has left the Unit 2 RPV segmentation and removal work to be completed on the overall schedule critical path after the Spent Fuel Cooling Window. Unit 2 RPV segmentation and removal work should be planned to finish before the Spent Fuel Cooling Window is completed, removing this work from the overall schedule critical path.

If the RPV segmentation and removal work is removed from overall schedule critical path, there would be a shortening of the overall schedule critical path by four (4) months, however this places more of the power block demolition on critical path, which is the industry norm.

East and West Break Water Demolition on Critical Path

The demolition and the disposal of the East and West Breakwaters (“Breakwaters”) is currently shown to be on the DCPP DSS schedule critical path for a period of about thirty-nine (39) months starting in mid-2035. Inclusion of the Breakwaters work on the overall schedule critical path is based on a PG&E assumption that will likely not lead to the best possible price. This assumption appears on page 29 of Plan 31.

> *“for the purposes of levelizing the waste shipments, the demolition of the breakwaters has been deferred in the project’s schedule until such point in time that the power block structures have been demolished.”*

This PG&E assumption and the total expected timeframe *contribute*s to the demolition and disposal of the Breakwaters falling on the overall schedule critical path. HBA believes the demolition and disposal of the Breakwaters could possibly be planned and sequenced to occur earlier and off the overall schedule critical path, resulting in shortening the total project duration by thirteen (13) months, and a cost savings. However, in order to plan the demolition and disposal of the Breakwaters to occur off-critical path and earlier, two (2) additional scopes of work need to be evaluated because of their need for the breakwater to be “in place”. Those two (2) scopes of work are building demolition and Non-Radiological water management.

Demolition of the intake structure requires the Breakwaters to be in place to protect the project from ocean waves. The demolition of the intake structure could potentially be advanced up towards the beginning of the project, soon after the intake structure is no longer needed and taken out of services, eliminating the need for the Breakwaters to remain in place.

The current Decommissioning Cost Estimate is based on the Non-Radiological Water Management plan which utilizes a 3-phase approach for ocean water supply to provide feedwater to the Sea Water Reverse Osmosis (“SWRO”) facility to produce freshwater and to provide means to discharge waste water effluents (including radiological). The first phase will continue to use the intake structure as a water supply until this facility is removed from service. The second phase uses a floating barge protected by the East and West Breakwaters for water supply until demolition of the breakwater begins. The third phase replaces the floating barge pump with an open water pumping system for water supply without the need for protection of the east and west breakwaters. In order to remove the need for a water supply protected by the east and west breakwaters, DCPP should consider installing the open water pumping solution for both phase 2 and phase 3, eliminating the cost for a floating barge.

Installing the open water pumping solution in phase 2 would allow DCPP to advance removal of both East and West Breakwaters before the demolition of the power block. However, the feasibility of doing both East and West Breakwaters before the demolition of the power block is subject to the final planned duration of the Spent Fuel Cooling Window and completion of RVI and RPV segmentation. As the planned duration of the Spent Fuel Cooling Window and completion of RVI and RPV segmentation is shortened, one of the Breakwaters (East or West) could be deferred to after building demolition without increasing the overall duration of the schedule critical path because the duration of a single breakwater is shorter than the other activities in this period. Splitting the demolition of the Breakwaters may result in additional costs of equipment mobilizations and demobilizations, however would most likely provide a cost savings to the total project.

Implementing an alternative such as this would result in several positive and negative cost impacts and should be studied in more detail.

- Shortening the overall duration of the schedule critical path by thirteen (13) months during the site restoration period.
- Reduction of the costs of implementing the barge-based pumping solution.
- Possible additional costs for the operation and maintenance of a more expensive pumping solution during Phase 2.

Further study of implementing this plan is required to determine the feasibility of these recommendations. The following limitations have been identified.

- Duration of the fuel cooling period and RVI segmentation phase could be shortened to a duration that makes this plan unworkable.
- The open water pumping supply solution is currently a conceptual design and parametric estimate level of maturity.
- Permitting of the open water pumping solution within the new time constraints may be difficult and has not been planned.
- Limitations on transportation of waste have not been fully evaluated. This plan requires transportation of waste that overlaps with other demolition activities that may exceed DCPP's waste transportation capabilities.

Expected Critical Path

An optimal decommissioning schedule critical path is one that is managed to reduce the project schedule from the start of decommissioning to the completion of site restoration to its shortest duration which will result in the least total overall project cost. The most common schedule critical path for decommissioning projects generally consists of the following series of activities: *Fuel Cooling & Transfer, Containment Interior Demolition, Containment Bldg Demolition, Final Site Survey, Backfill & Landscaping, and Demobilization*.

PG&E should look at scheduling the major projects so that the total duration of the project is as short as possible, with other work sequenced around the planned schedule critical path activities. HBA believes this will lead to a significantly shorter overall project duration which will in turn reduce costs of level of effort activities by a significant amount. PG&E should challenge their assumptions about the duration after reactor shutdown and defueling until 1.) start of fuel movement to the on-site ISFSI (i.e., Spent Fuel Cooling Period, average ~5.8 years) and 2.) start of reactor vessel internal segmentation and removal (i.e., Reactor Vessel Cooling Period, average ~6 years). Shortening the durations for the period of time after shutdown prior to starting this work may result in a higher direct cost in these projects that would be offset by shortening the total project duration.

There are three (3) areas where HBA believes the decommissioning project schedule could be changed to shorten or reduce the overall project schedule duration and achieve cost savings. These three (3) areas are identified in Table IV.1.1 on the following page.

Proposed Summary Schedule Change	Estimated Schedule Savings	Estimated Cost Savings (in $ millions)	Basis of Estimated Savings	Comments
Reduce Duration of Spent Fuel (SF) Cooling & Transfer Period	2 Year Reduction in SF Cooling & Transfer Period	$213 ($8.89/month)	• Reduction in the SF Cooling duration allows for earlier completion of the transfer of SF to the on-site ISFSI, resulting in earlier security and administrative staff reductions in the 2030-2031 timeframe. • As the SF Cooling & Transfer duration is shortened in length, it is likely that the project will have secondary schedule critical paths and additional costs arise that have not been accounted for in the estimated savings associated with this proposed change.	• Requires completion of RVI and RPV Segmentation to be concurrently accelerated by 2 years to achieve full estimated savings of $213M. • Requires further evaluation to establish optimum achievable SF Cooling and Transfer period.
Remove RPV Segmentation from Critical Path	4 Month Reduction in Project Schedule Critical Path	$18 ($4.45/month)	• Reduction in the duration between completion of SF at ISFSI and commencement of power block demolition will result in additional reduction in administrative staff in the 2032-2034 timeframe. • Removing RPV Segmentation from critical path by advancing the commencement date will likely result in additional costs that have not been accounted for in the estimated savings associated with this proposed change.	• Requires further evaluation to determine optimum start date and finish date for RVI and RPV segmentation. • Requires further evaluation of eliminating any critical path activities after the end of the SF Cooling and Transfer window to allow start of power block demolition.
Remove Breakwater Demolition from Critical Path	13 Month Reduction in Project Schedule Critical Path	$35 ($2.72/month)	• Removing the Breakwaters Demolition from critical path reduces the overall project duration resulting in additional reduction in administrative staff in the 2036-2037 timeframe. • Removing the Breakwaters Demolition from critical path by advancing the commencement date will most likely result in some additional costs not accounted for in the estimated savings associated with this proposed change.	• Requires further evaluation of open water pumping solution along with feasibility of obtaining associated permits in accordance with the optimized schedule. • Requires evaluation of waste handling and transportation limitations to ensure waste management plan can accommodate compounded volume of demolition waste generated during the Breakwater Demolition.

Table IV.1.1: Proposed Summary Schedule Changes

The following schedule critical path graphics provided in Figure IV.1.2, Figure IV.1.3, and Figure IV.1.4 show a comparison of the current project schedule critical path and those elements that are near the schedule critical path. In each of the schedule critical path graphics where applicable, schedule critical path activities are highlighted in red; secondary or near schedule critical path activities are highlighted in yellow; and schedule non-critical path support activities are highlighted in black.

The first schedule critical path graphic in Figure IV.1.2 shows the DCPP DSS current overall schedule critical path leading to just over thirteen (13) years from Unit 2 shutdown (August 2025) to demobilization (December 2038).

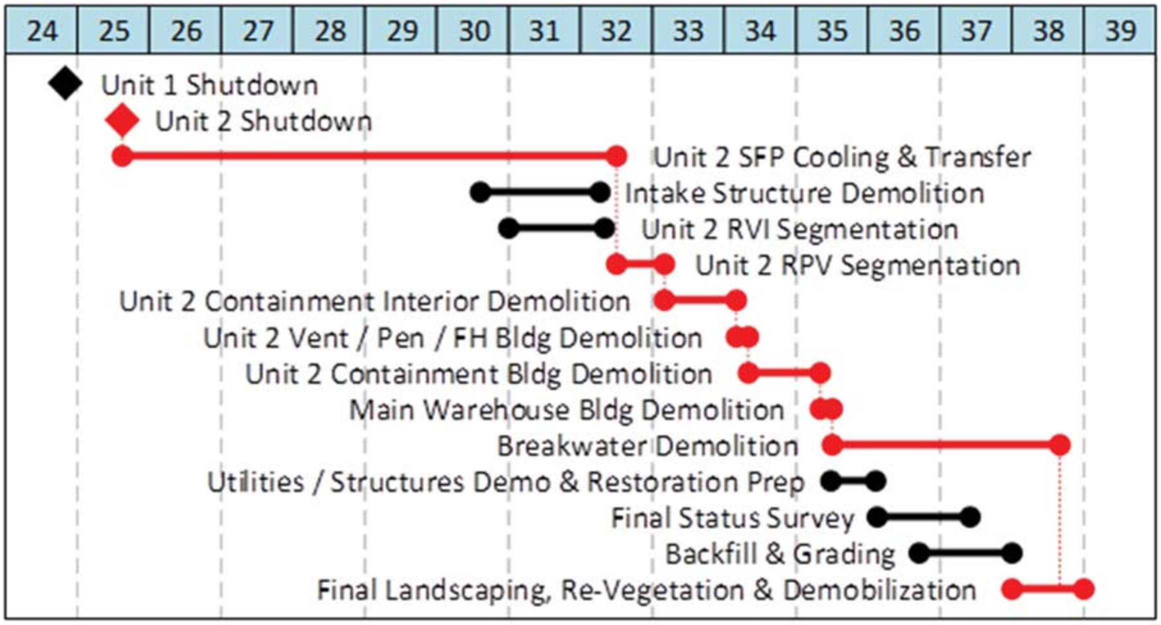

Figure IV.1.2: DSS CURRENT CRITICAL PATH – UNIT 2 SHUTDOWN TO DEMOBILIZATION, (~13.3 YEARS)

The second schedule critical path graphic in Figure IV.1.3 shows a shorter overall schedule duration of twelve (12) years based on current assumptions for advancing reactor vessel segmentation and removing the breakwaters demolition from the schedule critical path.

The final schedule critical path graphic in Figure IV.1.4 shows a much more aggressive plan yielding an overall duration of ten (10) years, based on recent experience with much shorter periods for spent fuel cooling and transfer to the on-site ISFSI. HBA believes this aggressive duration is achievable based on challenges to assumptions dealing with the cooling of spent fuel and the reactor vessel internals along with advancing reactor vessel segmentation and breakwater demolition to occur off the schedule primary critical path. It is possible findings not presented in this review and summary schedule may affect the feasibility of these scenarios. HBA was as thorough as possible in its review of the summary schedule and Project Management

Plans that provide the basis for this plan. However, the DCPP DSS is a representation of detailed schedule activities and logic not available to HBA. This more detailed information may identify schedule activities and logic that may result in a longer critical path.

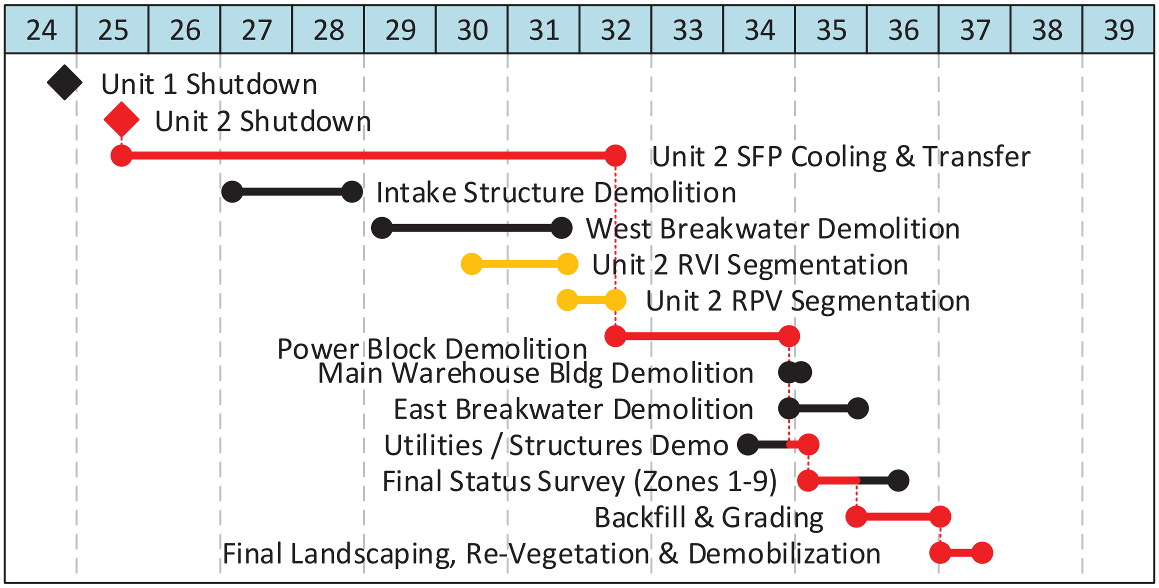

Figure IV.1.3: OPTIMIZED CRITICAL PATH – UNIT 2 SHUTDOWN TO DEMOBILIZATION, (~12 YEARS)

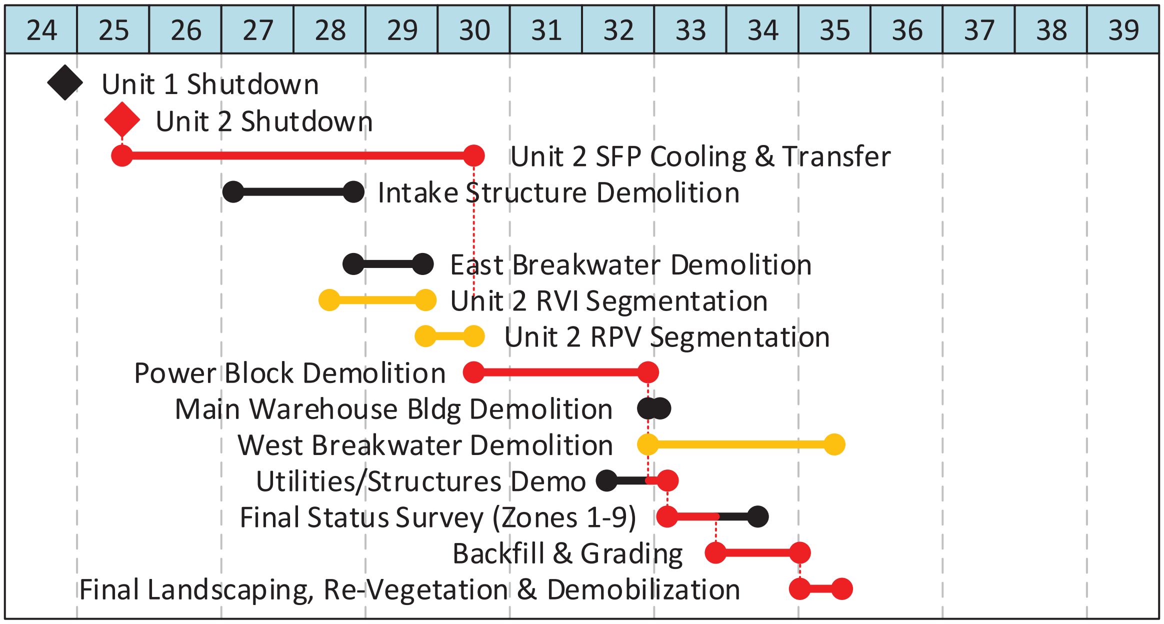

Figure IV.1.4: ACCELERATED CRITICAL PATH – UNIT 2 SHUTDOWN TO DEMOBILIZATION, (~10 YEARS)

This schedule critical path comparison reflects both the recommended logic and the adjustments to duration presented in the following sections. As the schedule critical path is shortened in length, it is likely that the project will have secondary schedule critical paths and may incur additional costs in the form of additional packaging, high contingency requirements, etc. These additional costs should be evaluated with the potential cost savings to be realized at the period of time that the schedule critical path is shortened in order to determine the lowest cost alternative.

Additional Logic Findings

Two (2) additional findings in the DCPP DSS activity logic that do not affect the critical path have been identified. These are:

- Break in Phase 1 and Phase 2 Demolition work
- Use of a single schedule activity for the Spent Fuel Pool Cooling Window

These two (2) additional logic findings are discussed further below.

Break in Phase 1 and Phase 2 Demolition work

The DCPP DSS shows Phase 1-Early Non-Heavy Demolition with a duration of twenty-one (21) months and shows Phase 2-General Non-Heavy Demolition with a duration of forty-five (45) months. Phase 1 and Phase 2 demolition work are separated by approximately forty-nine (49) months. Separating these two (2) demolition phases by forty-nine (49) months will most likely result in two (2) mobilizations/demobilizations of demolition crews and equipment. Refer to the HBA analysis and conclusions regarding Phase I and Phase 2 demolition work presented in Section IV Focus Area 5: Building Demolition Plan.

Single Spent Fuel Cooling Window

While most activities in the DCPP DSS include duplicate activities for work that is the same between Units 1 and 2, the Spent Fuel Cooling Window is only a single activity that encompasses both periods. DCPP contains 2 separate spent fuel pools for storage of spent fuel. The spent fuel in each unit is cooling independently based on different unit shutdown dates. This creates a challenge when reviewing the scopes of work that are linked to this single activity. Activities scheduled based on the cooling period in Unit 1 do not have the activity to which they are logically linked to displayed on the DSS. Because this is a schedule critical activity, the Spent Fuel Cooling Window activity should be represented for each unit individually.

Duration Findings

The following four (4) duration findings have been identified:

- Duration to the beginning of power block demolition is longer than industry norm
- Reactor Vessel Internal Segmentation is shorter than industry experience

- Demolition of the power block is shorter than industry experience
- Final Status Survey scope is duplicated

These four (4) duration findings are discussed in more detail below.

Duration to the Beginning of Power Block Demolition

The planned duration to reach the start of the demolition of the power block is influenced by several activities that could become the schedule critical path. The two biggest drivers of this duration are the Spent Fuel Cooling Window and the segmentation of the RVIs and RPVs. DCPP's summary schedule for the start of power block demolition is currently driven by the Spent Fuel Cooling Window and RPV Segmentation. DCPP has assumed that the duration of the Spent Fuel Cooling Window should be seven (7) years and planned for the completion of segmentation work to coincide with this window. To shorten this period, both activities need to be evaluated concurrently for the impact for any schedule and cost savings. Shortening both of these activities together will result in the reduction of time sensitive costs but may also increase the cost of these activities. As shown in Table IV.1.1, PG&E could reduce the DCE in the range of about $8.9 million for each month the spent fuel cooling period is reduced. Reducing the spent fuel cooling period two (2) years to five (5) years which is more typical of other projects would save in the range of about $213 million in project oversight staffing and security costs.

Spent Fuel Cooling Window

The Spent Fuel Cooling and Transfer to Dry Storage window is the time that is required to allow the spent fuel to cooldown and be transferred to dry storage at the on-site ISFSI. HBA understands the current dry cask storage design basis considers a ten (10) year cooldown period. This ten (10) year cooldown period was challenged in the 2015 NDCTP before the CPUC. PG&E has subsequently determined reducing the duration for the spent fuel cooldown and transfer to dry storage window from ten (10) to seven (7) years is technically feasible with the implementation of a new dry-cask storage design with a higher heat load capacity. Consequently, PG&E used seven (7) years for the duration for the Spent Fuel Cooling and Transfer to Dry Storage window.

Although HBA believes a ten (10) year cooldown period is very conservative, there is currently no approved technical basis to support a shorter period. Due to seismic activity being outside the norm, DCPP cannot utilize the general license casks utilized by most nuclear stations. Therefore, PG&E is currently limited to using site-specific licensed casks with a limited thermal capacity. While HBA accepts this difference, no calculation-based model of cask loading has been presented for HBA to review and therefore HBA cannot establish the validity of this assertion.

The PG&E assumed duration for the Spent Fuel Cooling and Transfer to Dry Storage window of seven (7) years in the DCPP DSS is longer than comparative averages as shown in Figure IV.1.1. HBA experience with other decommissioning plans would indicate that this period could be reduced substantially, however a site-specific technical analysis will be required to support any reductions in the current 10-year cooldown period license basis.

In an attempt to validate the benchmark for PG&E's duration, HBA reviewed an excerpt of PG&E's DCE titled "RFI 24 DCE Section for Spent Nuclear Fuel" which includes a comparison to five (5) other facilities and a comparison to the average of these five (5) facilities. While HBA has also prepared an average of planned and actual durations as a benchmark using a different set of facilities, no plants have actually performed this activity with the same level of pre-planning, preparedness, technology and technical requirements as DCPP. Because a like for like comparison on a population of actual durations cannot be performed, this diminishes the value of any benchmark being used to establish the validity of DCPP's Spent Fuel Cooling Window.

Because HBA was unable to validate the seven (7) year duration through technical review or benchmarking, it is recommended that PG&E pursue further analysis of the required duration for the spent fuel cooling window. In addition, as PG&E states in its analysis, significant cost savings may be possible to achieve if future dry cask technology results in a dry cask design that is capable of supporting a greater heat load than current cask technology allows. Refer to Table IV.1.1-1 for the estimated cost savings for reducing the current duration of the Spent Fuel Cooling and Transfer to Dry Storage window. It is recommended that PG&E engage in conversations with nuclear fuel cask vendors on this topic and remain engaged throughout the entire pre-shutdown period with the goal of further reducing duration for the fuel cooldown period.

RVI and RPV Segmentation Completion

PG&E has assumed a seven (7) year Spent Fuel Cooling and Transfer to Dry Storage Window. Consequently, PG&E has correctly planned to complete both RVI segmentation efforts to finish around the same time. Allowing the Reactor Vessel Internals to cool down as much as possible reduces the number of cuts required and the number of shipping containers required. This reduction lowers the total dose accumulation and the cost of segmentation, which includes cutting labor, packaging, transportation and disposal.

In the DCE write up, PG&E states the waste characterization analysis determined that the optimal time to commence RVI segmentation and packaging is approximately 5.3 years post shutdown.[1] This allows time for adequate radioactive decay of short-lived gamma-emitting radionuclides which will reduce accumulation of worker dose, allows for immediate transportation of waste to

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[1] Section 4.1.1.4. DCE, Reactor Pressure Vessel and Internals Removal and Disposal page 97

licensed off-site waste disposal facilities, optimizes reactor internals segmentation duration by allowing for larger individual pieces, and supports timely reduction in security requirements for areas beyond the Independent Spent Fuel Storage Installation (ISFSI) by ensuring the reactor internals waste classified as GTCC is removed from the containment buildings and placed for storage on the ISFSI pad no later than seven years post shutdown of Unit 2. The waste characterization analysis also concluded that additional delay in commencement of segmentation beyond 5.3 years post shutdown will not result in appreciable further radioactive decay of long-lived gamma-emitting radionuclides until greater than twenty years post shutdown, which is beyond the planned decommissioning duration.

HBA believes that PG&E has limited numerical basis for 5.3 years post shutdown to commence RVI segmentation and packaging work. Near term decommissioning projects are planning to begin RVI segmentation in less than one year after shutdown. Starting RVI segmentation earlier than 5.3 years after shutdown would most likely result in a reduction of overall schedule duration and cost. While starting RVI segmentation earlier than 5.3 years may result in additional segmentation and packaging costs, the cost benefit of doing this schedule acceleration in combination with a shorter Spent Fuel Cooling Window is significant and should be evaluated to optimize schedule and cost savings. Refer to Table IV.1.1 for the estimated cost savings in completing the RVI and RPV segmentation work earlier than currently shown in the DCPP DSS.

Reactor Vessel Internals Duration

The schedule duration for RVI segmentation is fifty-four (54) weeks. None of the previously completed RVI segmentation efforts on other decommissioning projects have been completed within that time frame. The Zion Unit 1 and Humboldt Bay RVI segmentation efforts were completed in seventy-eight (78) weeks. That’s the shortest duration that any RVI segmentation project has taken. Zion Unit 2 RVI segmentation, which was the first RVI segmentation effort at Zion, took one hundred thirty (130) weeks. Connecticut Yankee RVI segmentation took a similar duration.

The project plan for each of the Zion RVI segmentation efforts originally contained a schedule duration of fifty-two (52) weeks. However, unanticipated delays caused the duration for each unit to far exceed the original schedule duration. Unanticipated delays encountered during the Unit 2 RVI segmentation effort including failed segmentation cutting tooling, failed hydraulic hoses for cutting equipment, failed temporary supports for the thermal shield when it was being severed from the core barrel, failed rigging during a lower internals lift, and lower than planned component cutting rates resulted in the extended duration identified above for the first RVI segmentation effort. All of those problems, except for the lower cutting rates, were resolved during the Unit 2 RVI segmentation effort, so they did not occur during the Unit 1 RVI segmentation effort. However, even without encountering the same problems as experienced during the Unit 2 work, the Unit 1 RVI segmentation effort required an eighteen (18) month duration to complete. HBA believes the scheduled RVI segmentation duration should be seventy-eight (78) weeks for each unit.

Demolition of the Power Block Duration

The current schedule indicates a duration of thirty (30) months, which appears to be an executable schedule. However, allowing additional time for production loss due to work area constraints, weather impacts, and ongoing maintenance issues related to heavy demolition would be a good concept for further consideration. Utilization of the heavy demolition crew in the execution of Phases 1 and 2 of the non-heavy demolition will allow an earlier start to the heavy demolition, consequently the duration could increase, if needed, without extending the completion date. The light demolition crew and most of their equipment would also be utilized in the heavy demolition phases, assuring optimum personnel and equipment utilization during both light demolition and heavy demolition phases.

Final Status Survey Duplication

The DCPP DSS includes two (2) schedule activities covering most of final status survey that duplicates scope based on the descriptions. These schedule activities appear to show zones 10-13 in both summary activities. The schedule activity labeled for only Zones 10-13 is longer than the following schedule activity, which also appears to include these zones and eight (8) others. The later schedule activity is seven (7) months shorter. It appears that the description of zones of one or both activities is in error. The duration of the activity *Final Status Survey - Zones 1-3 & 5-13* was used for evaluation of the duration.

Summary of changes to the DSS

To clarify how some of the HBA suggested changes affect PG&E’s DCPP DSS, HBA has created two (2) summary schedules that graphically show the scopes of work for which HBA has made recommendations to achieve a more optimal schedule. In each summary schedule critical path activities are highlighted in red; secondary or near schedule critical path activities are highlighted in yellow; and schedule non-critical path support activities are highlighted in black.

The first schedule in Figure IV.1.5 shows PG&E’s Current Summary Schedule requiring just over thirteen (13) years as it appears in the DCPP DSS provided.

The second schedule in Figure IV.1.6 shows the Optimized Summary Schedule reduced to about twelve (12) years. This Optimized Summary Schedule retains the current seven (7) year duration for Unit 2 spent fuel cooling and transfer to the on-site ISFSI, as well as and incorporating certain HBA’s suggestions. HBA suggestions incorporated include a.) advancing the RVI/RPV segmentation to occur off the schedule critical path; b.) advancing the west Breakwaters Demolition to finish concurrently with transfer of the Unit 2 spent fuel to the on-site ISFSI; c.) starting Power Block Demolition immediately after spent fuel transfer to the on-site ISFSI and the completion of RVI/RPV segmentation including increasing the duration; and d.) completing the east Breakwaters Demolition after the finish of Power Block Demolition. Refer to Table IV.1.1 for the estimated cost savings resulting from advancing the RVI and RPV segmentation and removing the Breakwaters Demolition from the schedule critical path.

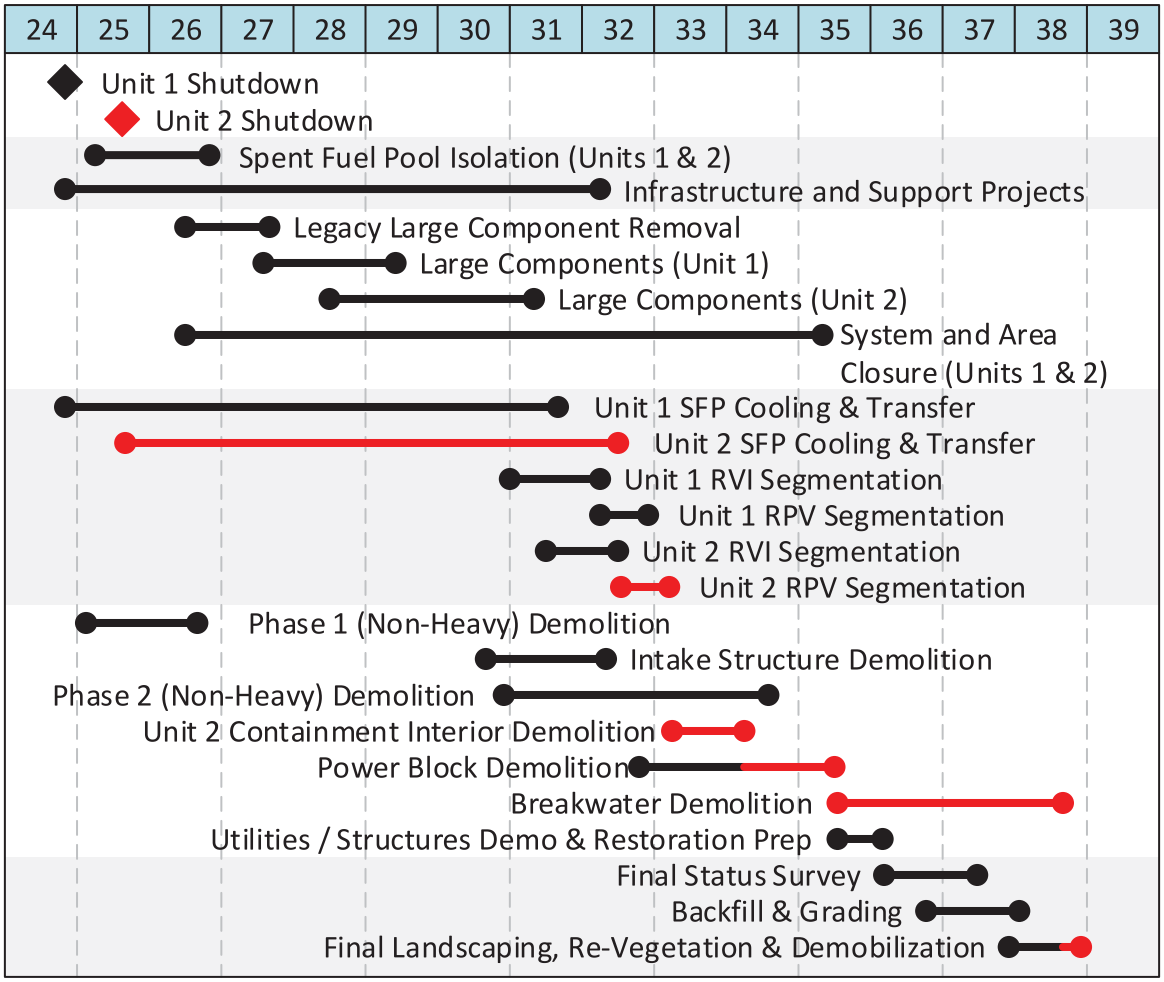

Figure IV.1.5: CURRENT DECOMMISSIONING SUMMARY SCHEDULE (~13.3 YEARS)

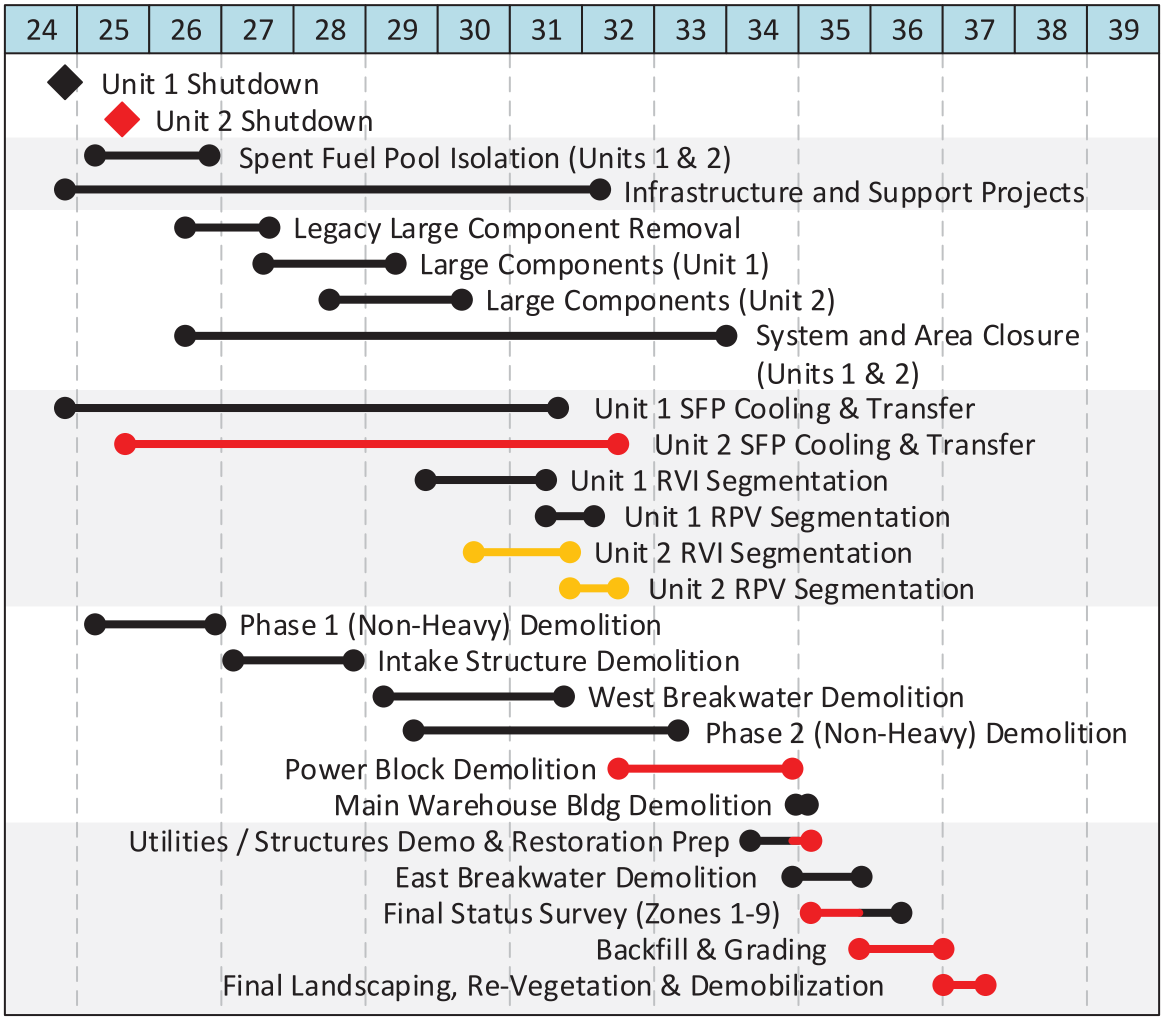

Figure IV.1.6: OPTIMIZED DECOMMISSIONING SUMMARY SCHEDULE (~12 Years)

Other Minor Findings and Errors

During its detailed review, the HBA IRT found four (4) minor errors that do not have a significant impact on the schedule. The findings include:

- Milestone errors
- Missing Milestone for Completion of Reactor Vessel Segmentation
- Galbestos Siding Naming
- Main Warehouse Demolition Description

Each of these minor errors are discussed in more detail below.

Milestone Errors

The name of the milestone *Transfer to ISFSI Planning and Procurement* is unclear. It is a completion Milestone that appears to start the activity *Pre-SNF and GTCC Transfer Readiness Scope*.

The Milestone for Building Demolition appears to have missed the completion of activity #84 *Final Site Area & Bldg Demolitions.* The title of these activities should be clarified so that there is no longer any confusion in the descriptions.

Missing Milestone for Completion of Reactor Vessel Segmentation

A milestone is not included for the completion of Reactor Vessel Segmentation work. This is one of the most significant scopes of work on site, so is normally included in the milestone list. As DCPP has two (2) reactors, it would normally include one milestone for segmentation of each reactor vessel. Along with transfer of the spent nuclear fuel to the on-site ISFSI, this will allow the audience to quickly see when there is a significant reduction in risk associated with the power block.

Galbestos Siding Naming

The use of Galbestos Siding's brand name that leads to some lack of clarity to readers that are not familiar with this specific product name. Use of a more generic description which contains the word Asbestos or ACM would lead to more clearly communicating the difficulty of this work to an unfamiliar audience.

Main Warehouse Demolition Description

A schedule activity for the Main Warehouse Demolition is shown to be on the current schedule critical path. It is understood that PG&E plans to repurpose the Main Warehouse to serve as the radiological waste processing facility and will not be demolished until all radiological waste has been removed from DCPP. In order to clearly explain the reason for scheduling the removal of the main warehouse at the end of the demolition schedule, it would be helpful to include the intended use of the main warehouse during decommissioning to the description of this activity.

Focus Area 2: Decommissioning Security Plan

HBA was requested to evaluate the decommissioning security schedule from post Unit 2 shutdown (26 AUG 2025) through the completion of the transfer of the spent nuclear fuel to the Department of Energy (“DOE”).

PG&E presented its security plans for DCPP after shutdown and during decommissioning in the Site Security Modifications for Diablo Canyon Power Plant during Decommissioning Project Management Plan (Plan 35). Plan 35 identifies the planned security related modifications and security staffing changes to occur between permanent shutdown and the transfer of the spent nuclear fuel to the DOE.

HBA focused on the schedule as it relates to the proposed decommissioning security modifications and estimated security staffing levels against the current and proposed Physical Security Plan (“PSP”) to maintain an effective defensive strategy.

HBA Focus Area 2 Team Lead for Security traveled to DCPP between 10/28/18 to 10/30/18 and met with the PG&E Security Strategy Expert and the PG&E Decommissioning Manager responsible for security to discuss and review relevant decommissioning plans and documents, to include: Plan 35, the PSP, Target Sets/component, and any security regulatory commitments. The focus was to understand PG&E’s security strategy during decommissioning and to identify any possible opportunities to reduce cost/staffing and minimize security risk throughout the decommissioning schedule.

PG&E’s plans for DCPP security staffing is based on the required number of security posts necessary to protect DCPP during the decommissioning of Unit 1, Unit 2 and operation of the on-site ISFSI, transfer of the spent fuel to the DOE and termination of the NRC license. In plan 35, PG&E defines the required site security posts and site security staffing requirements using the following four (4) periods defined by key NRC identified decommissioning milestones.

- **Period 0 – Initial Shutdown**: This period starts when Unit 1 is shut down (4-NOV-2024) and defueled with Unit 2 operational and ends when Unit 2 is shut down and defueled (26 AUG-2025). The duration of Period 0 is approximately ten (10) months.

- **Period 1 - Wet Storage During Zirc Fire Window:** This period starts when Unit 2 is shut down and defueled (26-AUG-2025) with the Unit 1 and Unit 2 spent fuel stored in the spent fuel pools. The period ends when the spent fuel from both units has sufficiently cooled to a temperature where the probability of a zirc-fire accident is very low (26-FEB 2027). The duration of Period 1 is approximately eighteen (18) months. Period 1 is further broken down into Period 1a and Period 1b. Period 1a is a six (6) month period starting with Unit 2 is shutdown and defueled (26-AUG-2025) and ends after NRC exemptions granted for devitalization of the control room (FEB 2026), allowing a reduction in site security forces protecting certain interior positions. Period 1b is a twelve (12) month period beginning after the Period 1a NRC exemptions are implemented (FEB 2026) and ends when the spent fuel from both units has sufficiently cooled to a temperature at which the probability of a zirc-fire accident is very low (26-FEB 2027).

- **Period 2 - Wet Storage Post Zirc Fire Window:** This period starts after spent fuel is stored in the spent fuel pools; however, the probability of a zirc-fire accident is very low (26-FEB 2027) and ends when all the spent fuel and GTCC waste is moved to dry storage at the on-site ISFSI (24-JUN 2032). The duration of Period 2 is approximately sixty-four (64) months. The entire wet storage duration from Unit 1 shutdown until all Unit 1 and Unit 2 spent fuel is in dry storage is approximately eighty-four (84) months.

- **Period 3 - Dry Storage:** This period starts when all spent fuel and GTCC is stored at the on-site ISFSI (24-JUN 2032) and ends when all the spent fuel and GTCC is transferred off-site to DOE (2067). The duration of Period 3 is approximately thirty-five (35) years.

PG&E has identified nine (9) modifications totaling approximately $11.1 million (w/o contingency) to the DCPP physical protection system. These modifications are scheduled to be implemented after the shutdown of Unit 1 between November 2024 and February 2027. These modifications when implemented are expected to increase security efficiencies allowing a reduction in security staff and overall security costs.

- Install a 45-degree angled “kicker” to the existing north and west side of the Main Protected Area (PA) fence.
- Reconfigure the delay fence inside of the protected area to facilitate decommissioning efforts pertaining to vehicle traffic.
- Backfill the intake and discharge tunnels with dirt or concrete for protected/non-traversable pathways.
- Install delay cages/gates for the personnel and roll-up doors leading into the Turbine Building, Auxiliary Building, and Fuel Handling Building.
- Remove the 140’ pedestrian bridge and associated commodities between the Administration Building and the Turbine Building.
- Remove overhead transmission lines that are de-energized.
- Remove the sheet metal siding skin from the Unit 1 and Unit 2 Buttresses to improve line of sight and enhance the ability to detect and neutralize potential security threats.
- Construct and install 4 fighting positions (2 per unit); each with a sliding gun port.
- Seal six (6) doorways (3 per unit) which will not be used during decommissioning.

In addition, PG&E also evaluated relocating the Main Warehouse outside of the Main Protected Area boundary, estimated to cost approximately $4 million. PG&E deleted this modification because it would not likely result in more efficient security operations or a reduction in security staffing.

PG&E's security posts and security staffing projections in full-time-equivalents (FTEs) to comply with DCPP protective strategy, and California labor laws are shown in Table IV.2.1 below.

DCPP Milestones	DCPP Period	Period Time Frame	Security Posts	Security Staffing (FTEs)	Duration (~ months)
Pre-Unit 1 Shutdown	N/A	Pre-02-NOV-2024	Unpublished Safeguards Information	272	N/A
Unit 1 Shutdown/Defueled with Unit 2 Operational, no plant modifications or regulatory approvals	0	02-NOV-2024 to 26-AUG 2025	Unpublished Safeguards Information	272	10
Unit 1 and Unit 2 Shutdown and defueled, no plant mods or regulatory approvals	1a	26-AUG-2025 to 02-FEB-2026	52	289 (+17)	6
Unit 1 and Unit 2 Shutdown and defueled, no plant mods, and with regulatory approvals	1b	02-FEB-2026 to 26-FEB 2027	51	283 (-6)	12
Unit 1 & 2 Shutdown and defueled, with plant mods and regulatory approvals	2	26-FEB-2027-24-JUNE-2032	39	207 (-76)	64
Stand Alone ISFSI	3	24-JUN 2032 to 2067	6	29 (-178)	420

Table IV.2.1: Security Posts and Staffing Forecast

PG&E's security staffing forecast is based on the number of security posts necessary to protect DCPP during decommissioning and operations of the ISFSI. Each security post requires 5.5 FTEs for continuous coverage. (24 hours/day, 7 days/ week) and 1.5 FTEs for each 12-hour shift. In addition, the State of California labor laws require an additional 1 relief post assigned to every four (4) security posts to account for personnel breaks. PG&E describes its methodology to estimate the necessary staffing for each security post in Plan 35.

Through comprehensive discussions and strategy reviews HBA determined the level of detail and planning supporting DCPP security cost estimate exceeded expectations in their due diligence in confirming staffing level requirements for each period of the decommissioning process. During the decommissioning process, target sets no longer requiring protection will be eliminated. However, an increase in compensatory measures will be necessary to protect against new vulnerabilities that did not exist when both Unit 1 and Unit 2 were operational. Also, staffing levels will need to be adjusted to align with the implementation of the security related plant modifications and changes to the protective strategy as decommissioning progresses.

To ensure regulatory compliance yet minimize costs, DCPP Security evaluted a myriad of security options, conducted extensive table top exercises, and contracted a 3rd party industry SME in strategy development to identify security options and possible reduction in staffing from its current levels. PG&E also utilized 3D software to assess security risk and optimize planned security effectiveness.

PG&E initiated 10CFR 50.54(p) to reduce three (3) security posts, establishing a zero margin for error threshold then subsequently failed an annual Force on Force (FOF) exercise. In one instance, PG&E evaluated a single security post for elimination and conducted over 60 limited scope (live) FOF exercises, exhausting any doubt that the removal would not decrease the PSP effectiveness. However, the risk factor determined the security post was necessary and could not be removed. Each security post, area and modification in Plan 35 have been evaluated and received equivalent persistence and attention to detail to arrive at their conclusions, to include appropriate staffing reductions in Period 2 and 3 with in Plan 35.

STRENGTHS:

PG&E has carefully evaluated various alternatives to comply with regulatory requirements for security during decommissioning. PG&E's analyses to evaluate/identify staffing level increase or decrease opportunities using limited scope FOF drills, 3rd party SME's analysis, and AVERT modeling results is commendable.

PG&E expectations to maintain the existing security force of 272 FTEs during period 0 through Unit 2 Shutdown on 26-AUG 2025 when decommissioning activities are limited to ensure no impact on Unit 2 operations is reasonable.

PG&E inclusion of approximately $11.1 million in costs (w/o contingency) for implementing nine (9) modifications to optimize security staffing requirements is reasonable.

PG&E expectations to increase the security force seventeen (17) FTEs (i.e., 272 to 289 FTEs) during Period 1a (approximately 6 months with no plant modifications and no NRC regulatory approvals) to account for compensatory measures necessary to protect against new security vulnerabilities that did not exist with both units operational (e.g., new openings in structures to facilitate equipment removal and draining piping that was previously filled with water) is reasonable.

PG&E's expectations to meet California State laws by utilizing an additional fifty-five (55) FTEs during Period 0 through Period 1 along with an additional thirty-eight (38) FTEs during Period 2 is reasonable.

The bounding conditions between Period 1a and Period 1b are defined/explained for a decrease in security force staffing six (6) FTEs (i.e., 289 to 283 FTEs) with NRC regulatory approvals (e.g. devitalization of the control room) is reasonable.

PG&E expectation to reduce staffing seventy-six (76) FTEs during Period 1b through Period 2 (i.e., 283 to 207 FTEs) when the nine (9) listed plant modifications and exemptions are implemented is reasonable.

PG&E's security force reduction of one-hundred-seventy-eight (178) FTEs (i.e., 207 to 29 FTEs) after the transfer of all spent full to dry storage at the on-site ISFSI is reasonable.

FINDINGS:

The predominate security-related cost driver is attributed to estimated two-hundred seven (207) FTEs in security staffing during the sixty-four (64) month duration for Period 2 until all the spent fuel is in dry storage at the on-site ISFSI. Reducing the duration of Period 2 would save approximately $2.4 million per month in security costs alone. This estimated security cost savings is included in the estimated cost savings of $8.89M/month shown in Table IV.1.1 for reducing the duration of the spent fuel cooling and transfer period.

Focus Area 3: Waste Disposal Costs

HBA was requested to provide an estimated total cost for disposal for waste type and classification expected during decommissioning of DCPP using the PG&E provided waste volume tables listing eleven (11) waste types.

The two (2) PG&E provided waste volume tables for DCPP decommissioning waste have been populated and are shown in Figure IV.3.1. At the top of Figure IV.3.1 is a table of HBA proposed base waste disposal unit rates ($/cubic foot) for each of the eleven (11) waste types based on the expected disposal location. At the bottom of Figure IV.3.1 is a table of estimated disposal costs for each of the eleven (11) waste types using the PG&E estimated waste volumes (cubic feet) and the HBA proposed base disposal unit rates ($/cubic foot).

The waste disposal unit price data was derived from various sources and recent industry experience.

Waste with detectable levels of radioactivity is classified as radioactive waste. The waste classification for radioactive waste ultimately determines whether waste is acceptable for shallow land burial in an NRC- or state-licensed facility. The four (4) primary levels of nuclear waste classes identified by 10 CFR Section 61.55 based on radionuclide concentration limits are:

- **Class A:** waste containing the lowest concentration of short-lived and long-lived radionuclides. Examples include personal protective clothing, instruments, tools, and some medical wastes. Also, waste containing any other radionuclides left unspecified by 10 CFR 61.55 is classified as A.

- **Class B:** is an intermediate waste classification that primarily applies to waste containing either short-lived radionuclides exclusively, or a mixture of short-lived and long-lived radionuclides in which the Long-lived concentration is less than 10% of the Class C concentration limit for long-lived radionuclides.

- **Class C:** wastes containing long-lived or short-lived radionuclides (or mixtures of both) at the highest concentration limit suitable for shallow land burial. Examples include ion exchange resins and filter materials used to treat reactor cooling water and activated metals (metal exposed to a neutron flux — irradiation — that creates a radioactive isotope from the original metal).

- **Greater than Class C (“GTCC”):** waste generally not acceptable for near-surface disposal. Greater than Class C wastes from nuclear power plants include irradiated metal components from reactors such as core shrouds, support plates, and core barrels, as well as filters and resins from reactor operations and decommissioning.

Waste that has no detectable levels of radioactivity should be classified as clean waste. Clean waste is exempt from regulatory control for radiation protection purposes.

The NRC has licensed four (4) low-level waste disposal facilities.

- **EnergySolutions Barnwell Operations, located in Barnwell, South Carolina**
  Currently, Barnwell accepts waste from the Atlantic compact states (Connecticut, New Jersey, and South Carolina). Barnwell is licensed by the State of South Carolina to dispose of Class A, B, and C waste.

- **U.S. Ecology, located in Richland, Washington**
  Richland accepts waste from the Northwest and Rocky Mountain compacts. Richland is licensed by the State of Washington to dispose of Class A, B, and C waste.

- **EnergySolutions Clive Operations, located in Clive, Utah**
  Clive accepts waste from all regions of the United States. Clive is licensed by the State of Utah for Class A waste only.

- **Waste Control Specialists (WCS), LLC, located near Andrews, Texas**
  WCS is licensed by the State of Texas to dispose of Class A, B, and C waste. WCS accepts waste from the Texas Compact generators i.e., Vermont and Texas. Outside generators may be accepted with permission from the Compact at rates agreed to at the time of disposal for non-Compact waste generators. The Texas Compact Commission on March 23, 2012 approved amendments to rules allowing the import of non-Compact generated radioactive waste for disposal. The Texas Commission on Environmental Quality (“TCEQ”) promulgated regulations on maximum pricing for WCS operations for compact and non-Compact generators, for both start-up years and steady-state operations.

The Southwest Compact, of which California is a part, does not have disposal agreements with any of the four (4) NRC licensed facilities, and does not currently have an in-Compact disposal facility available. Additionally, PG&E is not a member of the Texas Compact and therefore disposal rates at WCS for Texas Compact members are not available to PG&E.

The HBA proposed base rates for disposal of low-level waste were generally developed from average waste disposal rate estimates of other reactor decommissioning projects by radioactive waste type that were estimated between 2015 and 2017. All waste disposal rates were indexed to 2017 pricing. Waste disposal rates include Class B&C rates, Large component rates, low-level Class A Rates, and compactible/non-compactible Class A rates. Public information pertaining to Texas State regulatory maximum rates for WCS were indexed to 2017 and were used to help classify waste rate information and provide an upper price boundary for individual rates. The HBA proposed base rates were applied against the PG&E provided waste quantities without any contingency.

Provided below are more detailed explanations for each of the HBA proposed base waste disposal unit rates shown in the table at the top of Figure IV.3.1.

- **Non-Detect: Metal – Recycle**

  This classification contains metal waste with no detectable levels of radioactivity that will be recycled at an out-of-state metal waste recycling facility. Price of residual value of steel recovered from the clean area demolition of the plant is based on the current national scrap price of $ 0.05875/lb (Oct-18 price) and a working face scrap metal density of 32 lbs/cubic foot.

- **Non-Detect: Concrete/Asphalt – Recycle**

  This classification contains concrete and/or asphalt waste with no detectable levels of radioactivity that will be recycled at an out-of-state asphalt recycling facility. The recycle price is dependent upon the fill needs of the recycler at the time of demolition and cannot be determined. To capture this potential cost, the recycle rate is based on a worst-case scenario of out of state disposal, at an industrial solid waste landfill, at a rate of $60/ton and at a rubble density of 85 lbs/cubic foot. An opportunity is included in the Risk Register to eliminate this cost if a recycler can be found.

- **Non-Detect: Concrete/Asphalt**

  This classification contains concrete and/or asphalt waste with no detectable levels of radioactivity that will be disposed at an out-of-state solid waste landfill. The disposal rate for this out of state disposal is calculated from a disposal rate of $60/ton and at a rubble density of 85 lbs/cubic foot.

  Concrete and asphalt rubble deemed to be clean waste and not designated for re-use on site can be sent to a municipal waste landfill out of state. The disposal rate is based on a published 2017 survey of western landfills. The tipping fee (disposal rate) per ton is $60/ton. This rate may be increased by the facility to offset the negative public connotations generated by the acceptance of nuclear plant debris. This is a high value out-of-scope risk item and should be added to the project risk register.

- **LARW 20.2002: Metal/Concrete/Asphalt**

  This classification consists of Class A metal, concrete, or asphalt waste containing some residual, very low activity for which extensive controls of 10 CFR 61.55 are not needed to ensure protection of public health and safety and the environment. Waste classified as LARW 20.2002 can be disposed of in near surface landfill type facilities with limited regulatory control. Such landfill type facilities may also contain other non-radioactive hazardous waste materials. Typical waste types of 20.2002 include soil and rubble with low levels of activity concentration. This category of waste provides opportunity for cost reductions if decommissioning efforts produce waste meeting these criteria. Tennessee has developed a Bulk Survey for Release (BSFR) program to permit use of specified landfills for this type of waste. The cost presented in the disposal rate is based on historical rates indexed to 2017, from other projects utilizing BSFR facilities.

- **Class A: Metal/Concrete/Asphalt**

  This classification consists of metal, concrete, asphalt waste containing the lowest concentration of short-lived and long-lived radionuclides. The low-level landfill located in Clive, UT can accept Class A waste from all regions of the United States. The disposal rates were calculated from 2015 rates previously received directly from Clive and indexed to 2017 pricing.

- **Class B&C: Resins/Other**

  This classification consists of sealed radioactive sources, filters, and resins containing either short-lived radionuclides exclusively, or a mixture of short-lived and long-lived radionuclides in which the long-lived concentration is less than 10% of the Class C concentration limit for long-lived radionuclides. The disposal rates were calculated using an average rate data from estimated reactor B&C wastes destined for WCS and that were estimated in 2016 and 2017 and indexed to 2017 pricing.

- **Other Regulated Wastes: Debris & Soil**

  This classification consists of regulated non-detectable hazardous waste generally in the form of debris and soil. The low-level landfill located in Clive, UT can accept regulated wastes meeting their waste acceptance criteria following treatment at Clive, if treatment is required. The rates were calculated from 2015 rates previously received directly from Clive and indexed to 2017 pricing.

- **Class A: Large Components**

  This classification consists of large components containing the lowest concentration of short-lived and long-lived radionuclides. The low-level landfill located in Clive, UT can accept Class A Large Component waste from all regions of the United States. The rates were calculated from 2015 rates previously received directly from Clive and indexed to 2017 pricing.

- **Class A: Activated Metal – Reactor & Internals**

  This classification consists of reactor and internals containing the lowest concentration of short-lived and long-lived radionuclides. The low-level landfill located in Clive, UT can accept Class A oversized activated metal waste from all regions of the United States. The rates were calculated from 2015 rates previously received directly from Clive and indexed to 2017 pricing.

- **Class B&C: Activated Metal – Reactor & Internals**

  This classification includes reactor components containing either short-lived radionuclides exclusively, or a mixture of short-lived and long-lived radionuclides in which the long-lived concentration is less than 10% of the Class C concentration limit for long-lived radionuclides. The disposal rates were calculated using an average rate data from estimated reactor B&C wastes destined for WCS and that were estimated in 2016 and 2017 and indexed to 2017 pricing.

- **Class A: Misc. Metal/Concrete/Dry Active Waste**

  This classification consists of trash or mildly radioactive contaminated metal, concrete, and dry active waste such as contamination control clothing and cleaning wipes. The rates were calculated from 2015 rates previously received directly from Clive and indexed to 2017 pricing.

Any GTCC classified waste will be packaged and stored on-site at the ISFSI along with the spent nuclear fuel. GTCC waste will be ultimately be relocated to an acceptable disposal facility at the time the spent nuclear fuel is transferred to the DOE. PG&E has included an allowance in the DCE for packaging, storage and disposal of GTCC waste. HBA did not evaluate the PG&E allowance for packaging, storage and disposal of any GTCC waste.

FINDINGS:

HBA did not identify any weaknesses with the waste disposal costs. HBA does recommend for PG&E to provide proper consideration and evaluation for any risk events outside the project scope that may result in an unplanned increase in overall waste disposal costs such as interruptions by interested intervenors delaying transportation and unexpected landfill access restrictions/closures.

HBA Proposed Waste Disposal Base Unit Rates (Dollars/cubic foot)

		Base Disposal Rate				
Classification	**Physical Type**	**WCS (Andrews, TX)**	**Clive, Utah**	**Bulk Survey For Release (BSFR) TN**	**Out of State**	**Scrap Recycle**
Non-Detect	Metal - Recycle					-$1.88
Non-Detect	Concrete / Asphalt - Recycle				$2.55	
Non-Detect	Concrete / Asphalt				$2.55	
LARW 20.2002	Metal / Concrete / Asphalt			$25.60		
Class A	Metal / Concrete / Asphalt		$67.46			
Class B&C	Resins / Other	$3,067.75				
Other Regulated Wastes	Debris & Soil		$61.34			
Class A	Large Components		$306.83			
Class A	Activated Metal - Reactor & Internals		$117.82			
Class B & C	Activated Metal - Reactor & Internals	$7,241.00				
Class A	Misc. Metal / Concrete / Dry Active Waste		$67.46			

Estimated Waste Disposal Costs (Dollars)

			Total Disposal Cost				
Classification	**Physical Type**	**Volume (ft^3)**	**WCS (Andrews, TX)**	**Clive, Utah**	**Bulk Survey For Release (BSFR) TN**	**Out of State**	**Site E**
Non-Detect	Metal - Recycle	803,123					-$1,509,871
Non-Detect	Concrete / Asphalt - Recycle	1,098,584				$2,801,389	
Non-Detect	Concrete / Asphalt - Disposal	9,925,004				$25,308,760	
LARW 20.2002	Metal / Concrete / Asphalt	5,019,379			$128,496,102		
Class A	Metal / Concrete / Asphalt	2,885,408		$194,649,624			
Class B&C	Resins / Other	1,070	$3,282,489				
Other Regulated Wastes	Debris & Soil	856,572		$52,542,126			
Class A	Large Components	174,326		$53,488,447			
Class A	Activated Metal - Reactor & Internals	18,616		$2,193,337			
Class B & C	Activated Metal - Reactor & Internals	7,440	$53,873,040				
Class A	Misc. Metal / Concrete / Dry Active Waste	66,367		$4,477,118			

(All cost figures shown are in 2017 Dollars)

Figure IV.3.1: HBA Proposed Waste Disposal Base Unit Rates and Estimated Waste Disposal Costs

Focus Area 4: Reactor Pressure Vessel and Internals Segmentation Schedule

HBA was requested to evaluate the reactor pressure vessel and internals removal and disposal schedule with emphasis on the reasonableness and appropriateness of discrete schedule activity durations.

The Diablo Canyon Decommissioning Project (“DCDP”) Reactor Pressure Vessel and Internals Removal and Disposal Plan (Plan 27 or RPV Plan) sets forth the recommended approach, sequence and estimated cost to remove and dispose the Reactor Pressure Vessel (“RPV”) and Reactor Vessel Internals (“RVI”) from Diablo Canyon Power Plant (“DCPP”) Units 1 & 2. The project plan and the detailed executable baseline schedule were reviewed for reasonableness and appropriateness of the overall project, as well as for individual discreet activities.

The DCDP RPV Plan is based on and is very similar to the plan used for the segmentation of the reactor vessels and internals at Zion Station, which is a sister station to DCPP. Hence, the DCDP RPV Plan is based on utilization of proven segmentation tooling and techniques. The DCDP RPV Plan identifies facility modifications that must be in place prior to the commencement of segmentation activities. The DCDP RPV Plan project plan also addresses the disposal of the waste, which was not included in the segmentation project plan for Zion.

STRENGTHS:

With its close relationship to the segmentation plan used at Zion, the DCDP RPV Plan contains several inherent areas of strength. Those strengths include, but are not limited to, the following:

- Segmentation tooling is proven to be successful
- Segmentation techniques are proven to be successful
- Adequate time is allotted for design, fabrication, and testing of the segmentation tooling
- Laydown space requirements addressed
- Polar crane maintenance and inspection activities addressed
- Facility modifications required prior to commencement of segmentation activities addressed
- Coordination with other project plans

Each of these strengths is discussed in more detail below.

Segmentation Tooling

The DCDP RPV Plan includes the use of proven segmentation tooling successfully deployed at Zion, such as the Primary Segmentation Station (PSS) for size reduction along with the Bolt Milling

Tool ("BMT") and Former attachment Severing Tool ("FaST"). The FaST was developed during the Zion decommissioning project as an improvement on the original former severing tool called the "BeaST".

<u>Segmentation Techniques</u>

The DCDP RPV Plan incorporates successful segmentation techniques used at Zion, including thermal cutting for the vessel.

<u>Tooling Design, Fabrication and Testing</u>

The DCDP RPV Plan allows seventeen (17) months for mechanical tooling design, fabrication and testing from "Notice to Proceed" to "Internals Tooling Mobilization Complete" on site. That is approximately five (5) more months than the RPV segmentation contractor was allowed at Zion. The Zion decommissioning project allowed only twelve (12) months for tooling design, testing and fabrication. The Zion project experienced significant delays in the RVI segmentation work for Unit 2 (the first reactor segmented) due to failure of tooling, in particular, failure of the former severing tool known as the BeaST, which had to be replaced with a new tool design, as discussed above. The DCDP RPV Plan allowing an extra five (5) months for the tooling design, testing and fabrication is considered a strength because it should minimize the probability of a tooling design failure.

<u>Laydown Space Requirements</u>

The DCDP RPV Plan provides a specific minimum requirement (5000 square feet) for laydown area on the refueling floor. That provides clear direction to the project team regarding how much equipment must be removed prior to mobilization of the RPV segmentation team. To satisfy this laydown area requirement will most likely require removal of the fan coolers and ductwork on the refueling floor. Removal of those coolers would represent an improvement over the working conditions at Zion where a large electrical penetration support structure and four of the five fan cooler intake ducts were left in place on the refueling floor, which had a negative impact on reactor segmentation productivity.

<u>Polar Crane Maintenance and Inspections</u>

The DCDP RPV Plan addresses polar crane inspection and maintenance activities. Performing scheduled daily, quarterly and annual inspections will serve to minimize schedule delays caused by the crane malfunctioning. During decommissioning, the polar cranes will be used on a much more frequent basis than they routinely are used during plant operations, leading to crane components failing. Performing all of the scheduled inspections on the polar crane will minimize the occurrence of malfunctions and schedule interruptions.

<u>Facility Modifications</u>

The DCDP RPV Plan addresses facility modifications required prior to commencement of RPV internals segmentation activity. In addition to the need to clear space on the refueling floor as discussed above, the plan correctly identifies the need to verify the load carrying capacity of all structural components involved in the removal and transport of the waste generated by the RPV segmentation activity. It is highly probable some structural components will need to be modified in order to support the loads associated with disposal. Waiting to do the structural analysis and modifications until RPV segmentation activities have begun, would jeopardize the ability to meet the schedule.

<u>Coordination with Other Project Plans</u>

The DCDP RPV Plan integrates the activities associated with other project plans, such as the System and Area Closure Plan (Plan 02) and the Large Component Removal Plan (Plan 30). The System and Area Closure Plan activities include clearing equipment from the refueling floor to provide room for reactor segmentation activities, as well as removing spent fuel racks from the Unit 1 Spent Fuel Pool to provide room for storing waste generated by reactor internals segmentation activity. Completion of the Large Component Removal Plan activities allows the Polar Crane to be available throughout the course of the reactor segmentation activities. The coordination with the other project plans is considered a strength.

FINDINGS:

The DCDP RPV Plan and schedule are based on and very similar to the RPV and RVI segmentation plan and schedule developed for the Zion RPV and RVI segmentation work. As discussed above, the DCDP RPV Plan correctly addresses the change made at Zion for the tool used to detach the former plates from the reactor. However, the DCDP RPV Plan does not address other developments that unexpectedly delayed the segmentation of the Zion reactor internals. Additionally, the waste transport activities were not included in the Zion RPV Plan. Two (2) key findings in the DCDP RPV Plan include:

- Overly optimistic duration for internals segmentation
- Overly optimistic duration for rail shipments to WCS

Each of these findings is discussed in more detail below.

<u>Schedule Duration for DCDP RPV Internals Segmentation is Overly Optimistic</u>

The primary finding is present in the schedule duration for the DCDP RPV internals segmentation work. The DCDP RPV Plan allows approximately twelve (12) months for the segmentation of the reactor internals for each unit. The original planned schedule duration prepared for Zion RPV internals segmentation work was also approximately twelve (12) months. The actual duration for the Zion RPV internals segmentation work for each reactor was significantly greater. The Zion Unit 2 RPV was the first RPV internals to be segmented. The Zion Unit 2 RPV internals segmentation work required more than two and a half (2-1/2) years to complete due to a variety of unexpected problems. The Zion Unit 1 RPV reactor internals segmentation work was completed in a little over one and half (1-1/2) years. The one (1) year schedule duration improvement in the Zion Unit 1 RPV internals segmentation work was primarily attributable to lessons learned during segmentation of the Zion Unit 2 RPV internals, including the use of the FaST tool for all the Unit 1 former plate separation work.

The unexpected delays experienced during the Unit 2 Zion RPV segmentation work were the result of several different issues. The inadequacy of the BeaST to function efficiently was described above. Additional issues causing unanticipated delays in timely completion of RPV internals segmentation include but are not limited to the following: 1) failure of tooling components, such as hydraulic hoses; 2) inadequate design of thermal shield temporary support structure; 3) remotely operated segmentation equipment operator inefficiencies; 4) biological contamination of the reactor cavity water; and 5) rigging failure during movement of lower internals.

The Zion Unit 1 RPV internals segmentation work effectively avoided the issues experienced during the Zion Unit 2 RPV internals segmentation effort as a result of lessons learned and solutions developed during the Zion Unit 2 work. However, despite avoiding the significant unexpected delays experienced during the Zion Unit 2 work, the Zion Unit 1 RPV internals segmentation work still required an eighteen (18) month duration. The original planned schedule for completing the Zion RPV internal segmentation work in twelve (12) months was overly optimistic regarding the actual durations required for segmenting the various reactor internal components. These schedule delay issues were only identified after starting the actual reactor vessel internal segmentation work. Hence, it is reasonable to assume DCDP actual RPV internals segmentation work will require more than the currently planned schedule duration of twelve (12) months. It is reasonable to expect the DCDP reactor internals segmentation work for each unit will not take less than eighteen (18) months based on recent experience incurred during the reactor internals segmentation work at Zion.

Schedule Duration for Rail Shipments of RPV Waste is Overly Optimistic

The primary finding is present in the four (4) week schedule duration for transporting RPV waste to the Waste Control Specialists (WCS) facility in Texas is too short.

The Waste Handling, Transportation and Disposal section of the DCDP RPV Plan and schedule provides a detailed list of activities associated with loading, transporting and offloading rail cars of waste to the WCS facility in Texas and returning the rail cars to the Pismo Beach railyard. The planned round-trip duration for the rail car round trip was four (4) weeks.

The actual round-trip durations for rail shipments from Zion to the Energy Solutions (ES) waste facility in Clive, Utah, routinely took between five (5) and six (6) weeks.

The distance between Zion and Clive, Utah, is approximately two hundred ten (210) miles greater than the distance between Pismo Beach and Andrews, Texas. This additional distance can conservatively be assumed to add one (1) day to the duration of travel in each direction. Subtracting the additional two (2) days of round trip would still result in a conservative duration of the DCPP waste shipments to WCS being at least five (5) weeks, one (1) week greater than the planned duration scheduled for the DCDP work.

The most likely contributor to this discrepancy in the DCDP transportation schedule is the planned out-going duration of four (4) days for the train to travel from Pismo Beach to Andrews, Texas. The schedule has an eight (8) day duration for the return trip. Revising the duration for the outgoing trip from Pismo Beach to Andrews from the current schedule duration of four (4) days to a revised duration of eight (8) days to match the return trip scheduled duration would result in a round trip duration of five weeks. Switching of waste-loaded rail cars to different trains by the chosen railroad at intermediate railyards between Pismo Beach and Andrews is a likely source for increasing the transport duration from four (4) days to eight (8) days. If DCPP desires to maintain a four (4) week round trip duration, it is recommended that utilization of dedicated trains and a sufficient number of train cars be pursued.

Focus Area 5: Building Demolition Plan

HBA was asked to evaluate the building demolition detail schedule for reasonableness and appropriateness in accordance with the Building Demolition Plan. Specific focus was directed to be on the discrete schedule activities associated with demolition of the Unit 1 and Unit 2 Turbine Buildings, Auxiliary Buildings, Containment Buildings and the East and West Breakwaters. Additionally, HBA was asked to evaluate the associated labor hours, and costs for the equipment, materials, labor and other costs.

This Diablo Canyon Decommissioning Project (DCDP) Building Demolition Plan (PMP-031 Plan) sets forth the recommended approach, sequence and estimated cost to demolish the Diablo Canyon Power Plant ("DCPP") Units 1 & 2 in total. The project plan and the detailed baseline schedule were reviewed for reasonableness and appropriateness of the overall project, as well as for discreet activities associated with Units 1 and 2 Turbine Building, Auxiliary Building (including Fuel Handling Buildings), Containment Buildings, and the East and West Breakwaters.

BUILDING DEMOLITION SCHEDULE

The DCDP Building Demolition Plan is very similar to the plan used for the Demolition Plan at Zion Station and the Team Holtec Draft Demolition Plan written for the decommissioning of San Onofre Nuclear Generating Station ("SONGS"). Consequently, the DCDP Building Demolition Plan is generally based on ideas and approaches to demolition that have been well thought out and worked successfully at other decommissioning projects.

STRENGTHS:

The DCDP Demolition Plan contains several areas of strength which include, but are not limited to, the following:

- Categorizing buildings according to their level of radiation contamination
- Acknowledgement of the need for a "Light / Clean" Demolition Team and a "Heavy / Contaminated" Demolition Team
- Acknowledgement of the many permits required for the decommissioning of the DCPP
- Laydown space requirements addressed
- Polar crane maintenance and inspection / recertification activities addressed
- Facility structural integrity verifications by a California licensed structural engineer required prior to commencement of demolition activities addressed

Each of these strengths is discussed in more detail below.

Building Categorization

The DCDP Demolition Plan includes the categorization of all buildings / structures at DCDP. Category 1 structures will require minimal or no preparatory operations prior to the beginning of demolition activities with systems removal in accordance with the System and Area Closure Plan and the removal of hazardous and / or regulated materials in accordance with the Decontamination Plan. Category 2 structures will require a significant amount of preparatory operations prior to the start of demolition activities with systems removal in accordance with the Systems and area Closure Plan and the removal of hazardous and / or regulated materials in accordance with the Decontamination Plan. Category 3 structures include the intake structure, discharge structure, turbine buildings, auxiliary / fuel handling buildings, and the containment buildings.

Classification of Demolition Teams – Light / Clean and Heavy / Contaminated

Demolition at DCDP will be completed in two phases – early and late with two different teams equipped with different sizes of equipment. The early demolition phase will be completed with smaller and more conventional excavators equipped with thumbs, shears, and universal processors in the 80,000 lb. – 100,000 lb. range. The late demolition phase will be done with larger and greater numbers of 200,000 lb. to 250,000 lb. excavators equipped with hydraulic hammers, universal processors, and shears and will include 200,000 lb. plus high reach excavators.

Acknowledgement of the Many Permits Required to Execute the Decommissioning of DCPP

Completing the necessary permitting with federal, state, and local jurisdictions is a time-consuming requirement which must be completed prior to any actual site work. Coordination and cooperation between agencies can also be challenging, hence the realization to begin the process early is very important.

Laydown Space Requirements

The DCDP Demolition Plan provides a specific area for the segregation of the waste streams, which include ferrous material and concrete material. The area appears to be large enough area to enable sorting of the waste streams by type of material and by level of contamination, consequently ensuring correct handling, packaging, and routing by the Waste Management Group.

Polar Crane Maintenance and Inspections

The DCDP Demolition Plan addresses polar crane inspection and maintenance activities. Performing scheduled daily, quarterly and annual inspections will serve to minimize schedule delays caused by the crane malfunctioning. During decommissioning, the polar cranes will be used on a much more frequent basis than they routinely are used during plant operations, leading to crane components failing. Performing all of the scheduled inspections on the polar crane will minimize the occurrence of malfunctions and schedule interruptions.

Facility Modifications and Required Design Guidance by a CA Licensed Structural Engineer

The DCDP Demolition Plan addresses facility modifications required prior to commencement of demolition activities on certain structures, including the two containments. The plan correctly identifies the need to gain access to the interior of the containments with demolition equipment and the use of the polar crane to complete the demolition of internal walls and floors. The demolition plan also addresses the requirement to design and construct on both containments accesses which can be kept closed with all internal air being exhausted through HEPA filters during internal demolition. The demolition plan requires a California licensed structural engineer to verify the load carrying capacity of all structural components involved in demolition activities and completed prior to any demolition. It is likely some structural components may need to be modified or additional support members added in order to support the equipment loads associated with demolition or access by heavy machines prohibited due to structural limitations. Structural analysis of all structures by a licensed structural engineer will be required for the demolition teams to gain the necessary Demolition Permits prior to beginning demolition. The Demolition Plan correctly identifies the approaches and discrete activities that will be utilized in the demolition of the Turbine Building, Auxiliary Building, and Containment Buildings.

FINDINGS:

The DCDP Demolition Plan contains the following seven (7) findings:

- Long duration for the light demolition activities
- Compressed duration for the heavy demolition activities
- Potential/realistic realization of the loss of equipment and demolition equipment attachments due to radiological contamination is not considered a direct project cost
- Inefficient method proposed for auxiliary building demolition
- Confusing information on the extent of auxiliary building and turbine building demolition
- Apparent excessive estimated costs for non-manual activities and per diem
- Breakwater removal by marine contractor appears to be prohibitively expensive.

Each of these findings is discussed in more detail below.

Long Schedule Duration for Phases 1 and 2 Non-Heavy Demolitions

In the Decommissioning Summary Schedule PG&E has identified 2 distinct phases of the non-heavy demolition: "Early Non-Heavy Demolitions - Phase 1" with a duration of 21 months and "General Non-Heavy Demolitions - Phase 2" with a duration of 45 months. The two phases will incur extra cost due to the four (4) years separating the phases and the consequent two mobilizations/demobilizations of demolition crews and equipment. Phases 1 and 2 of the non-heavy demolition could be concluded very quickly as the heavy demolition crew and the large associated equipment would also be used in these phases, since they are not radiologically contaminated at this time. The DCDP demolition will likely be completed by a large firm that would ostensibly mobilize two complete crews (contaminated and non-contaminated) with the necessary equipment required for their scopes of work. Mobilization/demobilization of one demolition company one time would save money and the retention of a labor force that has been trained according to PG&E's protocols will result in personnel well-versed in PG&E's safety culture with a resultant efficiency in project performance.

Compressed Schedule Duration for the Heavy Demolition

The current schedule indicates a duration of thirty (30) months, which appears to be an executable schedule. However, allowing additional time for production loss due to work area constraints, weather impacts, and ongoing maintenance issues related to heavy demolition would be a good concept for further consideration. Utilization of the heavy demolition crew in the execution of Phases 1 and 2 of the non-heavy demolition will allow an earlier start to the heavy demolition, consequently the duration could increase, if needed, without extending the completion date. The light demolition crew and most of their equipment would also be utilized in the heavy demolition phases, assuring optimum personnel and equipment utilization during both light demolition and heavy demolition phases.

Potential Loss of Equipment and Equipment Attachments Due to Radiological Contamination

Potential loss of equipment in total, or portions thereof, due to radiological contamination is a reality which must be recognized. Demolition machines that are very large with expensive modifications implemented for the dangerous and destructive nature of demolition work, do constitute a high dollar value to replace. This replacement cost should be recognized and factored into the total project cost, which would also include the containerization, transportation, and disposal of the affected machines at an approved facility.

Inefficient Method for Auxiliary Building Demolition

The PG&E approach to auxiliary building demolition outlined in the Building Demolition Plan appears to be inefficient and expensive. The approach is driven by the assumption that the Auxiliary Building floor at El. 85' is not substantial enough to support demolition equipment and proposes that demolition above El. 85' must be performed with demolition equipment placed on grade around the building. Demolition being done from the perimeter with the equipment located at the existing ground surface will be less efficient due to line loss from friction on hydraulic piping extending 100 plus feet vertically to the hydraulic hammer or concrete processor which will also be smaller in size due to being located at the end of a 100 plus foot boom. Utilizing a hydraulic hammer or processor attached at the second arm of an excavator will allow a much larger attachment to be used, consequently production is increased.

Based on the experience of HBA personnel and a cursory examination of the Auxiliary Building equipment layout drawings, HBA believes that the El. 85' floor should be structurally able to support demolition equipment, resulting in a more efficient demolition process and reduced demolition costs. In the unlikely event of areas with inadequate floor support, installation of shoring towers beneath the floor in those areas could be easily accomplished.

Confusing information on the extent of auxiliary building and turbine building demolition

The Diablo Canyon Waste Disposal Table provides confusing information regarding the concrete demolition below a point three (3) feet below grade in the auxiliary building and turbine building. PG&E explained that the columns below the heading "Bathtub" represent the interior concrete and rebar below a point three (3) feet below grade and do not include the exterior walls and floor slabs of these two buildings. When these "bathtub" quantities are added to the concrete and rebar above that elevation, they represent the total concrete and rebar demolished in these buildings.

HBA recommends that the "Bathtub" label be changed to "Interior concrete more than 3 feet below grade" or similar wording to eliminate any confusion.

Large Per Diem and Non-Manual Support Costs

The detailed demolition estimate contains per diem and non-manual costs in excess of those normally assumed by a demolition contactor. HBA has compared anticipated contractor per diem and non-manual costs with those included in the detailed estimate for the demolition of the turbine buildings, auxiliary / fuel handling buildings, and the containment structures, resulting in about $9 million higher costs to the PG&E estimate. Because an undetermined amount of these estimated costs may be required to be assumed by PG&E or others, HBA has removed the $9 million in the PG&E estimate for comparison to the HBA estimate.

Breakwater removal by marine contractor appears to be prohibitively expensive

HBA's analysis of the demolition of the east and west breakwaters has determined that execution by a marine contractor would necessitate the use of a jack-barge and would most likely be prohibitively expensive. Based on the open-water configuration and the radius required, a floating barge is not feasible. Moreover, the drying, surveying, and trucking off-site of the removed breakwater materials will most-likely be the critical process defining the overall 40-month duration. A marine contractor would have to slow down the pace of the breakwater material removal to less than the industry practice of a 7-day work week.

A more cost-effective, preferable "land-based" approach for consideration would be to use a large crane and specialty material handlers to remove the east and west breakwaters. After removing most of the above-water portions of the breakwaters, a wide surface would be constructed to support the large crane with grapple attachment material handlers and loading debris haulers, on their way back to shore. This land-based demolition approach appears to have several advantages with controllable risk including eliminating waste material barges, the ability to maximize material handling efficiencies, and more cost effectively pace the breakwater demolition work with off-site trucking, yielding a potentially substantial cost savings in the PG&E estimate. Factors that should be considered are equipment utilization in an open environment with impacts from weather and production slowdowns dealing with breakup of injected concrete using strategically placed underwater explosives. In addition, if material handling activities on shore limited the available laydown space for material, the standby time expense of land-based equipment would be much less than that of a marine-based operation.

BUILDING DEMOLITION COST

This Diablo Canyon Decommissioning Project (DCDP) Building Demolition Plan (PMP-031 Plan) presents the recommended approach, sequence and estimated cost to demolish the Diablo Canyon Power Plant (DCPP) Units 1 & 2 in total. The project plan and the detailed demolition costs were evaluated analyzing the costs for labor, equipment, and demolition material costs, including fuel and maintenance costs for reasonableness and accuracy for the overall project, as well as for discreet demolition activities and costs associated with Units 1 and 2 Turbine Building, Auxiliary Building, and Containment Buildings.

HBA EVALUATION

The HBA evaluation of the demolition estimate was based on production times, materials required, equipment required, the fuel and maintenance costs of the equipment for the project duration, and the qualified personnel required to execute the demolition scope of the project in a safe and expeditious manner. Knowledge of production number and durations gained from many demolition projects of similar size and scope were utilized to produce an accurate evaluation of the demolition estimate which include the following for the DCDP:

- Heavy Demolition Duration – 2.5 years (30 months)
- Machine Operating Hours / 10 Hour Day – (7.5 hours) – (Morning Break, Lunch Break, Afternoon Break = 1.5 hours + .25 hour morning safety meeting + .75 hour to pass through site security = 2.5 hours deduction); 7.5 operating hours / day x 5 days / week x 50 work weeks / year = 1,875 machine operating hours / year (50 hour work week)
  NOTE: If the actual machine operating time is shortened due to increased security / site access time, equipment and personnel numbers would have to be increased to complete the demolition in the 30-month duration, resulting in a greater cost.
- Concrete Demolition Production Rate (8,000 – 9,000 PSI) – 15 tons / hour / 1 machine
  * 446,647 tons (Power Block) divided by 15 tons / hour / 1 machine = 29,776 hours / 1 machine
  * 29,776 hours / 1 machine divided by 1,875 machine operating hours / year = 15.9 years with 1 machine
  * 15.9 years for 1 machine divided by 2.5 years duration = 7 demolition excavators (200,000 lb. class) + support equipment (loaders, 30 ton articulated haul trucks, skid steers, sorting / segregating / loading excavators)
  NOTE: All DCPP concrete is very dense and contains heavy rebar mats horizontally and vertically, consequently the demolition machines are dealing with the reduction and separation of two commodities that are designed to remain as a single structure, all while being completed in conditions requiring constant attention to the structural integrity of what the machines are sitting on and where they are located.
- Ferrous / Non-Ferrous Demolition Production Rate – 9.5 tons / hour / 1 machine
  *111,675 tons (Power Block) divided by 9.5 tons / hour / 1 machine = 11,755 hours / 1 machine
  * 11,755 hours / 1 machine divided by 1,875 machine operating hours / year = 6.3 years with 1 machine
  *6.3 years for 1 machine divided by 2.5 years duration = 3 demolition excavators (200,000 lb. class) + support equipment (loaders, 30 ton articulated haul trucks, skid steers, sorting / segregating / loading excavators)

Utilizing the above durations, actual operating machine hours, and production rates, allowed for the determination of numbers of equipment, types of equipment, fuel consumption/each per hour, predictions on other operating / maintenance expenses, and the numbers and qualifications of personnel required to operate, support, and manage the execution of the demolition scope. The following Table IV.5.1 illustrates about 1.5% variance when comparing the

DCDP total estimated demolition costs and the HBA total demolition estimated costs for the buildings reviewed.

ID	SCOPE DESCRIPTION	DCDP DEMOLITION TOTAL COSTS	HBA DEMOLITION TOTAL COSTS
9.03	Unit 1 Turbine Building	$4,900,036	$4,733,390
9.06	Unit 2 Turbine Building	$5,466,991	$4,733,390
10.03	Unit 1 Auxiliary / Fuel Handling Building	$15,834,258	$12,788,217
10.06	Unit 2 Auxiliary / Fuel Handling Building	$12,860,720	$12,788,272
11.03	Unit 1 Containment	$16,767,821	$14,966,863
11.06	Unit 2 Containment	$16,972,840	$14,966,864
	SUB-TOTAL	**$72,806,666**	**$64,976,996**
	PG&E Non-Manual & Per Diem for the Above Structures	($8,821,336)	
	TOTAL	**$63,985,330**	**$64,976,996**

Table IV.5.1: DCDP and HBA Building Estimate Comparison

STRENGTHS:

The DCDP Demolition Plan / Decommissioning Milestone Framework Cost Estimate Summary contains several areas of strength which include, but are not limited to, the following:

- Separating demolition costs for each structure / area
- Breaking down demolition costs for each structure / area by category – labor, equipment, material
- Developing demolition costs using production rates experienced at other decommissioning sites

FINDINGS:

- The DCDP estimated demolition costs for the Power Block structures appear to be accurate when the non-manual and per diem costs are accounted for. HBA recommends that PG&E further evaluate the non-manual and per-diem costs to eliminate any excesses.
- The demolition cost of the east and west breakwaters appears to be excessive based on using a marine jack-barge. A complete land-based approach to removing the east and west breakwaters would appear to significantly reduce costs.

Focus Area 6: System and Area Closure Plan

HBA was asked to evaluate PG&E's system and area closure detailed schedule with specific focus on discrete activities associated with system and area closure of the Unit 1 and Unit 2 Turbine Buildings, Auxiliary Buildings, Containment Buildings and East and West Breakwaters. Additionally, HBA was asked to evaluate the associated labor hours, and costs of equipment, materials, labor and other costs.

The Diablo Canyon Decommissioning Project (DCDP) System and Area Closure (SAC) Plan (Plan 02) sets forth sequence, methodology and estimated cost to prepare the Diablo Canyon Power Plant (DCPP) systems, structures, buildings, and areas for eventual demolition under the Building Demolition Plan 31 scope of work. The project plan and its interaction with other related plans were reviewed for reasonableness and appropriateness.

The Diablo Canyon Power Plant (DCPP) is similar to its sister station, Zion Nuclear Generating Station, in several ways. The reactors and Nuclear Steam Supply Systems are nearly identical. Both stations utilize four (4) loop Westinghouse-designed Pressurized Water Reactors (PWR). Additionally, DCPP uses the same system names as Zion for all of the Emergency Core Cooling Systems. Both stations have similar Polar Crane designs which are supported from the Containment Building refueling floor rather than from the walls of the Containment Buildings. The primary differences in the power block are architectural in nature. DCPP has separate Auxiliary and Fuel Handling Buildings for each unit, whereas Zion had a single Auxiliary Building and a single Fuel Handling Building which served both units.

The DCDP SAC Plan incorporates best practices and lessons learned from past decommissioning projects for the removal of systems, structures and components (SSC), particularly from Zion which is the most recently decommissioned PWR station. Hence, the DCDP SAC Plan is based on advances and improvements that have been proven to reduce both the schedule and the cost of decommissioning a nuclear power plant. The DCDP SAC Plan also addresses current federal, state and local rules, regulations and guidelines that will govern the scope of work.

STRENGTHS:

With its incorporation of best practices and lessons learned from past decommissioning projects, the DCDP SAC Plan contains several inherent areas of strength. Those strengths include, but are not limited to, the following:

- Site-Specific Open-Air Demolition (OAD) criteria is incorporated
- Activities performed by other project plans required to facilitate the DCDP SAC Plan are incorporated

- Activities required to facilitate other project plans are incorporated
- Utilization of the 10CFR50.59 process to evaluate and control removal of SSC is incorporated
- Utilization of mixed craft crews is incorporated
- Rigging and lifting equipment needs are identified
- Requirement to maintain ventilation during removal activities is identified
- Original Work Plan and Work Execution resource estimates revised

Each of these strengths is discussed in more detail below.

Site-Specific Open-Air Demolition (OAD) Criteria Incorporated

One of the most important lessons learned from past decommissioning projects is the cost savings realized by maximizing the amount of material removal performed using large mechanical equipment and minimizing the amount of material removed by surgical removal. The DCDP SAC Plan incorporates the results of the site-specific OAD criteria developed in Plan 18. The OAD criteria developed in Plan 18 provides more liberal limits than previous decommissioning projects for the allowable surface contact dose rate (20 mr for DCPP versus 2 mr for Connecticut Yankee and Zion) of material left in the plant for Open Air Demolition. The more liberal limits for allowable surface contact dose rate will allow more material to be left in place for OAD activities resulting in cost savings for the overall decommissioning project.

Utilizing the above criteria, the DCDP SAC Plan identifies equipment, piping and components that cannot be left for OAD and must be removed under the DCDP SAC Plan. That subject material is primarily associated with the Emergency Core Cooling Systems (ECCS) but also include components of the Liquid Radwaste System, Component Cooling System and Spent Fuel Pool Cooling System. The list of material to be removed under the DCDP SAC Plan is very similar to the list of material removed prior to OAD at Zion Station.

Activities Performed by Other Project Plans Required to Facilitate the DCDP SAC Plan Are Incorporated

The DCDP SAC Plan receives input from the Decontamination Plan (Plan 03), Materials Management Plan (Plan 07), the Source Term Reduction Study (Plan 15), the Open Air Demolition Study (Plan 18), the Reactor Vessel and Internals Segmentation Plan (Plan 27), the Spent Fuel Pool Island Plan (Plan 28), the Large Component Removal Plan (Plan 30) and the Site Infrastructure Plan (Plan 32). The DCDP SAC Plan includes a table (Table 5-1) which provides a brief description of the required interface activities. The table provides a valuable road map to the interactions of the various plans which displays the planning and coordination efforts that were included in the development of the DCDP SAC Plan.

The identification of the material to be removed under Plan 03 prior to the commencement of the DCDP SAC Plan activities and the criteria contained in Plan 18 are very important to the successful and efficient completion of the DCDP SAC Plan activities. This coordination between the various plans as described in the DCDP SAC Plan is a strength.

Activities Required to Facilitate Other Project Plans Are Incorporated

The DCDP SAC Plan provides input to the Decontamination Plan (Plan 03), the Waste Management and Disposal Plan (Plan 04), the Transportation Plan (Plan 05), the Building Demolition Plan (Plan 31) and the Site Infrastructure Plan (Plan 32). Table 5-1 provides a brief description of the required interface activities. The table provides a valuable road map to the interactions of the various plans which displays the planning and coordination efforts that were included in the development of the DCDP SAC Plan.

The identification of the waste streams to be generated by the DCDP SAC Plan is important to the successful execution of Plan 04. Similarly, the identification of material to be left in place for later removal under Plan 31 is important to the successful execution of Plan 31. This coordination between the various plans as described in the DCDP SAC Plan is a strength.

Utilization of the 10CFR50.59 Process to Evaluate and Control Removal of SSC Is Incorporated

Even though a nuclear power plant may be shutdown, there are still SSC that are required to remain functional to satisfy regulatory requirements during the decommissioning process. The Defueled Safety Analysis Report (DSAR) identifies which SSC must remain functional and part of the plant’s licensing basis. Any changes to those SSC must be made using the 10CFR50.59 change process. The DCDP SAC Plan properly identifies the need to utilize that change process to comply with regulatory requirements.

Utilization of Mixed Craft Crews Is Incorporated

Past decommissioning projects have determined that the use of mixed craft crews is the most efficient method of performing surgical removal of plant components. The DCDP SAC Plan included the use of mixed craft crews so that each crew has all of the required work skills that might be encountered in preparing the building for demolition.

Rigging and Lifting Equipment Needs Are Identified

The DCDP SAC Plan correctly identifies the requirement for localized rigging and lifting equipment in order to be able to safely handle the components undergoing surgical removal. Many of the components being surgically removed, as well as some being removed as bulk building preparation activities, will be located in areas that are difficult to access and which are not compatible for use of installed building cranes and trolley beams. The DCDP SAC Plan provides a list of rigging and lifting equipment that will typically be required to support surgical removal of plant components.

Requirement to Maintain Ventilation During Removal Activities Is Identified

Although the buildings included in the DCDP SAC Plan activities will have been identified as not being required for continued operation of the plant, those buildings which are located within the Radiologically Controlled Area (RCA) of the plant must maintain negative pressure relative to the outside atmosphere in order to prevent the unmonitored airborne release of radioactive material. The DCDP SAC Plan correctly identifies the need to maintain a ventilation system which maintains building air pressure negative relative to the outside environment, including the need to protect the ventilation system throughout the demolition process until OAD criteria have been satisfied.

Original Work Plan and Work Execution Resource Estimates Revised

The DCDP SAC Plan estimates for Work Plan and Work Execution resources were too high. The DCDP project team identified this during their review. The DCDP project team performed a more detailed analysis of the Work Plan and Work Execution resource needs. As a result of the more detailed analysis, the DCDP Project Team reduced the resource estimates by three hundred thousand (300,000) man-hours or approximately $27.2 million. The effort to revise the Work Plan and Work Execution resource estimates is a strength. The resulting labor manhours and labor costs for SAC associated with the buildings reviewed by HBA are reasonable.

FINDINGS:

While the DCDP SAC Plan does a fine job of incorporating lessons learned from previous decommissioning projects, few findings have been identified. They are as follow:

- Material estimates for Turbine Building area preparation too high
- Material estimates for Auxiliary Building area preparation too high
- Surgical removal scope of work potential error
- Overall material cost estimate for executing the DCPP SAC Plan is too high

Each of these findings is discussed in more detail below.

Material Estimates for Turbine Building Area Preparation Too High

The DCDP Decontamination Plan (Plan 3) removes all regulated and hazardous material from each of the Turbine Buildings. Additionally, there are very few radiologically contaminated components in the Turbine Buildings. The DCDP SAC Plan estimate includes material costs for several activities which appear to require very little, if any, material. The following is a partial list of line items identified as requiring more than $66,000 in material but which appear to need little, if any, material:

- Transfer reuse materials to staging area per Materials Management Plan
- Remove and dispose of all non-metallic insulation from piping and equipment
- Remove inline fluid filters/resin beds, wipe down to remove contamination
- Remove and wipe down all inline HVAC filters, charcoal beds, etc.

The estimate repetitively applies what appears to be a place holder estimate of $66,000+ for virtually every activity identified under WBS 1.10.01.06.02.01 (for Unit 1). The result is an excessively high estimate for the material required for area preparation of each Turbine Building.

Material Estimates for Auxiliary Building Area Preparation Too High

Like the discussion above for the Turbine Building area preparation estimate, the material estimate for the Auxiliary Building area preparation is too high and includes material costs for activities which appear to require very little, if any, material. The following is a partial list of line items identified as requiring more than $142,000 in material but which appear to need little, if any, material:

- 10226300 – Transfer reuse materials to staging area per Materials Management Plan
- 10226600 – Remove and dispose of all non-metallic insulation from piping and equipment
- 10226700 – As necessary, remove interferences to work locations
- 10226915 – Remove inline fluid filters/resin beds, wipe down to remove contamination
- 10226935 – Remove and wipe down all inline HVAC filters, charcoal beds, etc.
- 10227000 – Air gap and vent all systems and components, including piping low spots
- 10227400 – Notify WOG when waste containers to be exchanged at the staging area

The estimate repetitively applies what appears to be a place holder estimate of $142,000+ for virtually every activity identified under WBS 1.10.01.06.08.01 (for Unit 1). The result is an excessively high estimate for the material required for area preparation for each Turbine Building.

Surgical Removal Scope of Work Potential Error

The surgical removal scope of work identified in Attachment 5 of the DCDP SAC Plan appears to have some errors. Under WBS 1.10.01.06.01.01 – Unit 1 Area Dismantling (Containment Building), the DCDP SAC Plan specifies the removal of the guide tubes from under the reactor vessel to the seal table. The tubes should not be removed under this plan. They are included in the reactor vessel segmentation plan. The tubes must remain in place during reactor internals segmentation due to the reactor being flooded during that effort.

Overall Material Cost Estimate for Executing System and Area Closure Plan Is Too High

The overall material cost estimate for executing the DCDP SAC Plan appears to be too high by approximately five to ten (5-10) percent.

The above discussions for the Turbine Building and Auxiliary Building material estimates identify approximately $1.25 million in savings ($1 Million for the Auxiliary Building and $0.25 million for the Turbine Building) for specific line item activities that should have no material needs.

The above high-level review identifies approximately $1.25 million in material cost savings. The total material cost estimate is $24.1 million. Therefore, the above identified savings is approximately 5% of the total estimate. It is reasonable to assume that another 1% to 5% of savings could be found by performing a more detailed review of the material cost estimate based on the casual observation that placeholder numbers have apparently been used for material estimates rather than providing more exact task-specific material costs. Hence, it is reasonable to conclude the material cost estimate for executing the DCDP SAC Plan is approximately 5% to 10% too high.

Focus Area 7: PG&E Oversight Staffing Structure

HBA was asked to evaluate the PG&E provided organizational structure for reasonableness and appropriateness for decommissioning. Specific focus shall be on the PG&E oversight staffing that will be implemented from 2019 through the completion of DCPP decommissioning.

The Diablo Canyon Decommissioning Project ("DCDP") "Staffing Plan for Diablo Canyon Power Plants Unit 1 & 2 Decommissioning 2017-2071" (Plan 1 or Staffing Plan) sets forth the recommended approach, sequence and estimated cost associated with providing oversight and support staffing for the decommissioning of Diablo Canyon Power Plant ("DCPP") Units 1 & 2 from initial planning stages through site restoration. HBA reviewed the Staffing Plan for reasonableness and appropriateness to support the overall decommissioning of DCPP.

The Staffing Plan identified the knowledge, skills, and abilities needed to oversee and/or support the planned decommissioning activities as well as the timeframes and quantities of personnel needed with those attributes. The information contained in the Staffing Plan is based on material provided by PG&E management personnel with decommissioning experience with Humboldt Bay Power Plant decommissioning and vendor personnel with decommissioning experience.

HBA evaluated the Staffing Plan and the staffing levels provided therein for each department in conjunction with the current project schedule and its associated milestones. Staffing for discrete work is captured in the estimates for that work and not included in oversight and support staffing. However, consideration was given to oversight and support staffing needs during discrete work based on vendor requirements for mobilization support, security, radiation protection, and demobilization. Staffing ramp-up and ramp-down was based on the DCPP Level 1 Decommissioning Milestone Schedule.

HBA's review of oversight staffing included both management/administrative and operational staffing areas. Management and administrative staffing reviewed included the following management areas:

- Core management group
- Project implementation planning, detailed ongoing planning
- Scheduling and cost control
- Safety and environmental analysis, ongoing studies
- Quality assurance and quality surveillance
- General administration and accounting
- Public relations and stakeholders' involvement
- Training support
- Information system and computer support
- Waste management support

- Personnel management and training
- Documentation and records control
- Procurement, warehousing, and materials handling
- Health physics
- Industrial safety

PG&E provided the following information pertaining to corporate reach back support for DCDP decommissioning effort:

Burdened staff, staff that is part of the corporate burden includes:

- IT department/support
- Human Relations group
- Payroll group
- Legal support
- Fleet services
- Some Procurement Support

HBA determined that the staffing levels for twelve (12) of the fifteen (15) management areas listed above were reasonable. HBA had some concerns regarding the staffing for three (3) of the management areas. HBA made the following observations with regard to the oversight and support staffing for those twelve (12) areas. The HBA concerns for those three (3) areas are contained in the Findings section of the review of this Focus Area.

Core management group

The core management group is led by the Sr. Director Nuclear Decommissioning. This position directs a flat operational and support organization. The position has seven (7) project operational direct reports and four (4) administrative reports. Additionally, HR and Legal support are matrixed from the parent organization. This organization structure provides a span of control that is manageable for the Director and provides short lines of communication. The project operational and support staff responsibilities are consistent with other effective decommissioning efforts.

Quality assurance and quality surveillance

One Quality/Value position is a direct report to the Director within the core management organization. When implementing lean strategies, companies build value by reducing turnaround times, lowering costs, and improving quality. However, the need for classic quality oversight expected by NRC, may diminish the need for lean strategies and be more narrowly focused on assessment and quality control.

General administration and accounting

Administrative support is available for most departments within the organization. Project accounting is supported by positions within Project Controls. No local business accounting/site controller positions have been identified within the organization (i.e. controller, AR, AP, and payroll specialists). PG&E indicated that this support will be provided by corporate offices.

Public relations and stakeholder involvement

Two government/public relations positions within regulatory services, will be more than adequate to support decommissioning. This group will also be supported by the core management communications position.

Training support

Training support appears adequate to satisfy the project training needs.

Information system and computer support

The DCDP Oversight Staffing Plan does not identify any Information technology ("IT") and computer support resources being present on-site during decommissioning. Subsequent discussions with PG&E identified IT and computer support resources will be present on-site. IT and computer support resources were not included in the Staffing Plan because these positions are provided by corporate reach back and will be charged to the project through burden markups on direct costs.

Waste management support

The Waste Oversight Manager reports to the Projects Director, who in turn, can provide priorities for site project waste activities. The waste organization is sized correctly to oversee a field generation scheme where the generator is responsible for properly packaged waste. Radwaste and RCRA waste expertise is provided within the group. Transportation expertise is also a part of this staff.

Personnel management and training

Personnel Management/Human Resources ("HR") is matrixed to the organization from corporate support. Employee concerns is a direct report within the core management organization. Training is embedded within Security and Emergency Services. Training demands to provided General Employee Training ("GET") will be high at the on-set of decommissioning to accommodate the initial surge of subcontractors and increase again at the start of the building demolition. Operational training will stop 8 months prior to the fuel transfer and all duties go to the GET trainer and discontinued after fuel transfer to the on-site ISFSI. After the surge of contractor personnel at the start of the Building Demolition phase, the training organization should be reduced to only one trainer.

Documentation and records control

Document control and records management is adequately staffed with a lead and 4 support positions. The group reports to the Support Director and provides the emphasis needed within the other staff groups to ensure proper control and preservation of documents.

Procurement, warehousing, and materials handling

The DCDP Oversight Staffing Plan does not identify the presence of any local purchasing support on-site during decommissioning. Subsequent discussions with PG&E identified that dedicated purchasing support will be present on-site during decommissioning. It was not identified in the Oversight Staffing Plan because these positions are provided by corporate reach back and will be charged to the project through burden markups on direct costs.

Health physics

There are thirty-eight (38) personnel within the HP organization, this level of staffing meets all needs of routine support. Subcontractor provided technicians will accomplish non-routine rad monitoring. There may be an opportunity to reduce routine staff as decommissioning transitions from unit shutdown and decontamination into the project phases of the effort.

Industrial safety

Two safety professionals and one industrial hygienist report to the Safety Manager. The Fire Captains and Fire Brigade will be reduced following removal of the zirconium fire hazard but a Fire Protection team will remain on site to support demolition efforts due to remote location of site.

STRENGTHS:

The DCDP Staffing Plan contains several areas of strength. Those strengths include, but are not limited to, the following:

- Detailed analysis of department-by-department staffing requirements
- Detailed analysis of flexible staffing requirements as project proceeds through various phases
- Detailed organization charts for the overall project and each support organization
- Sufficient staffing is provided for timely development and submittal of licensing and permitting documents
- Sufficient staffing is provided for timely development and issuance of bid specifications for discreet projects
- Overall Staffing Plan is reasonable

Each of these strengths is discussed in more detail below.

Detailed Analysis of Department-by-Department Staffing Requirements

The DCDP Staffing Plan contains a detailed analysis of the positions required to be filled in each department in order to provide proper oversight and support of decommissioning activities. The analysis identifies unique numbers of employees required for each position within each department.

Detailed Analysis of Flexible Staffing Requirements as Project Proceeds Through Various Phases

The DCDP Staffing Plan repeats the department-by-department staffing analysis discussed above on an almost continuous basis as the project proceeds through various phases. Staffing adjustments are made as various milestones are achieved, as well as within time periods between milestones. The DCDP Staffing Plan addresses ramping up and ramping down the staff which serves to minimize the inefficiencies associated with step changes in staffing levels.

Detailed Organization Charts for the Overall Project and Each Support Organization

The DCDP Staffing Plan provides detailed organization charts for the overall project and for each of the seven (7) organizations reporting to the Senior Director of Nuclear Decommissioning. The organization charts include the detailed department-by-department maximum staffing levels. Due to the flexible nature of the staffing requirements as the decommissioning of the station continues, it would be burdensome and too voluminous to include in the Staffing Plan document to show the precise staffing totals for each department for each individual phase of the project. The organization charts with the maximum staffing levels adequately depict the project organization allowing for all employees to understand reporting responsibilities and chain-of-command.

Sufficient Staffing is Provided for Timely Development and Submittal of Licensing and Permitting Documents

The DCDP Staffing Plan provides direction for establishing a planning organization several years prior to plant shutdown. The early staffing of the decommissioning organization provides adequate time and resources for development and submittal of all licensing and permitting documents required on the national, state and local levels.

Sufficient Staffing is Provided for Timely Development and Issuance of Bid Specifications for Discreet Projects

The DCDP Staffing Plan recognizes the need for personnel staffing to develop and issue bid specifications for discreet projects, such as reactor segmentation, spent fuel dry cask storage and large component removal. The associated bid specifications are quite complex and not easily developed. The DCDP Staffing Plan addresses this issue by providing adequate staffing prior to plant shutdown.

Overall Staffing Plan Is Reasonable

The strengths identified in the above paragraphs have led to development of an overall Staffing Plan with reasonable levels of staff throughout the various phases of the project. The determination of the staffing requirements on a department-by-department basis identified in the DCDP Staffing Plan minimizes uncertainty, which leads to a reasonable level of staffing. The peak level of staffing appears excessive at first viewing but is found to be reasonable once required Security staffing levels are understood. Reductions in staffing after the conclusion of the Zirc Fire period and again at the conclusion of the spent fuel transfer campaign are reasonable. The HBA IRT review identified very few minor staffing level findings, as discussed below.

FINDINGS:

The DCDP Staffing Plan relies on estimates provided by cognizant managers regarding the number of personnel required and the length of time each position would be required with due consideration of the project milestone schedule. The resulting staffing levels were reviewed by comparing them to the staffing levels used at DCPP sister station Zion during its decommissioning project which is ninety-nine (99) percent complete at this time. Findings identified during this review include:

- Operations support staffing levels
- Maintenance department staffing levels
- Engineering department staffing levels
- ISFSI staffing level
- Project Controls staffing
- Project implementation planning, detailed ongoing planning
- Scheduling and cost control
- Safety and Environmental analysis

Each of these findings are discussed in more detail below.

<u>Operations Staffing Levels</u>

The DCDP Staffing Plan identifies the requirement for eight (8) Certified Fuel Handlers (CFH) and sixteen (16) Non-Certified Operators (NCO) to be on the staff after both units are shut down and the spent fuel remains in the pool. Assuming the Operations Department is working twelve (12) hour shifts, only five (5) CFH are required to maintain around the clock staffing. It is prudent to have a one (1) backup CFH and two (2) backup NCO to cover vacations, illness and other absences. Therefore, the HBA IRT believes only six (6) CFH and twelve (12) NCO are required after both units are shut down.

<u>Maintenance Department Staffing Levels</u>

The DCDP Staffing Plan identifies thirty-seven (37) maintenance personnel during the period between shut down of Unit 2 and completion of the spent fuel transfer to the on-site ISFSI. This level of maintenance personnel is higher than the level which successfully maintained Zion Station during the similar period in the project. Once the Spent Fuel Island installation is complete, the number of required plant systems and components which need to be maintained is significantly reduced. Additionally, the number of systems, structures and components requiring action by the Fix-It-Now (FIN) team is significantly reduced. At Zion, the FIN team was eliminated after the Spent Fuel Island was installed. The responsibilities were handled by the maintenance technicians responsible for maintaining the Spent Fuel Island and the other systems and components which were required to remain operable.

Assuming the contactors on-site will be required to maintain their own equipment and with the Spent Fuel Island installed, the HBA IRT believes the number of Mechanical Maintenance (MM) and Electrical Maintenance (EM) technicians can be reduced to four (4) of each. Instrumentation and Control (I/C) supporting site security will remain unchanged. The Facility Maintenance staff can be reduced from five (5) to three (3) personnel. Those reductions would result in a Maintenance Department staff of twenty-eight (28) personnel being required.

Engineering Department Staffing Levels

The DCDP Staffing Plan identifies the requirement for ten (10) Engineering Department personnel at the time of Unit 1 shut down. The ten (10) personnel consist of a manager, one (1) engineer from each of seven (7) disciplines and two (2) Fire Protection engineers. For the time period from Unit 1 shutdown until all of the spent fuel is transferred to the on-site ISFSI, this staffing level is too low. Review of contractor-prepared modifications to the Fuel Building to support the spent fuel transfer campaign, review of maintenance work packages, review of contractor demolition plans, support of contractor engineering requests and review of Defueled Safety Analysis Report (DSAR) changes are just some of the activities for which the Engineering Department will be responsible. The Engineering Department staff should have a minimum of two (2) Civil, Electrical, Mechanical and I&C/Security engineers on the staff. Those additions would increase the Engineering Department staff to fourteen (14) personnel.

ISFSI Staffing Level

The ISFSI staffing level appears high. Regulatory support and contract management can be provided by PG&E corporate office. Maintenance can be subcontracted. Staffing level can be reduced to approximately thirty (30) from the currently planned staffing level of thirty-seven (37). With the ISFSI currently scheduled to operate for thirty-five (35) years, the cost savings accumulated over the operating life of the ISFSI would be in the tens of millions of dollars.

Project Controls Staffing

The overall Project Controls staffing level is correct. However, the distribution of the personnel should be further evaluated. The DCDP Oversight Staffing Plan specifies four (4) Invoice Coordinators. Two (2) invoice coordinators should be sufficient to support the project. Conversely, the number of Project Controls Specialists currently planned is insufficient during peak decommissioning work activity. The number of Project Controls Specialists should be increased to four (4) from the currently planned level of two (2).

Project implementation planning, detailed ongoing planning

Work Control within Project management is possibly understaffed, especially during the plant cleanout phase following unit shutdown. Project managers are adequately staffed, but the only planners within the organization are within maintenance and not projects.

Scheduling and cost control

Project Controls has over eighteen (18) personnel assigned, with contract managers and project accounting as a significant part of this staff. With only two project/risk control specialists and two schedulers in the group, there could be insufficient support for the core responsibility of the group during peak site work activities.

Safety and environmental analysis, ongoing studies

Safety analysis will be accomplished within the Safety Manager's organization. Four (4) environmental professionals support Regulatory Services Manager. This amount of environmental support is excessive, unless significant remediation activities are initiated. This support if required, could be subcontracted in accordance with a subcontracting strategy to be developed

Focus Area 8: Contingency Strategy

HBA was asked to evaluate PG&E's current strategy for DCPP Decommissioning Cost Estimate contingency for reasonableness and appropriateness.

PG&E'S CONTINGENCY STRATEGY

PG&E's initial contingency strategy for the Diablo Canyon Decommissioning Cost Estimate was to apply a fixed contingency factor of 25% to the estimated base costs for the known scope of work. PG&E asserts this fixed percentage contingency factor accounts for:

a. The differences between the base cost and unforeseen, but anticipated, costs,

b. Unforeseen costs within the defined activity scope (i.e., events that will occur in the field during the implementation of the overall decommissioning work period and which are not accounted for in the base cost estimate),

c. Events characterized as the "known unknowns" that will occur over the duration of the decommissioning project,

d. Specific risks of increased costs resulting from conditions at the project site after the commencement of the decommissioning work, and

e. Assurance that sufficient funding is available to accomplish the intended project scope and are expected to be fully expended during decommissioning.

PG&E 's Contingency factor does not include scope changes, or "unknown unknowns" such as a change in regulatory criteria, significant natural disasters, and security or terrorist activity.

PG&E initially applied to the estimated base costs a fixed contingency factor value of 25%. This contingency factor was based on research started in 2008 of government published reports and guidance, industry practices, and recommended cost engineering practices including those promulgated by the Association for the Advancement of Cost Engineering ("AACE"), the American Institute of Consulting Engineers ("AICE"), and the Construction Industry Institute ("CII"). PG&E published its initial research in ***Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion on the Decommissioning Revenue Requirements***, **Study Number: DECON-POS-H002**, **Revision B**, Status Final, April 2009 which was made part of the 2009 NDCTP filing.

Subsequently, PG&E has augmented its research on contingency factors to reflect additional information collected since the 2009 Technical Paper and to reflect new published reports or guidance on decommissioning cost estimates and how contingency factors are applied. The results of PG&E's updated research on contingency factors is presented in the recently issued ***Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion on the Decommissioning Revenue Requirements***, **Study Number: DECON-POS-H002**, **Revision C**, Status Final, November 2018. As noted in the Technical Paper, PG&E and SCE have consistently applied the 25% contingency factor to their decommissioning cost estimates for DCPP and other decommissioning projects since the 2009 NDCTP filings. PG&E maintained the contingency factor of 25% in the 2015 NDTCP Filing submitted to the California Public Utilities Commission ("CPUC") in March 2016.[2]

PG&E also has a formal Risk Management Program to identify and analyze the effects of "uncertainties" of the occurrence of an event during the DCPP decommissioning project and the negative effect on the project baseline objectives (scope, schedule, cost, quality). This program is described in DCPP-PMP-006, Risk Management Program, Rev. 0 dated September 2018.

The events addressed in the Risk Management Program may or may not occur, and therefore are generally considered to be outside or not intended to be covered by the 25% contingency factor.

CPUC POSITION ON CONTINGENCY

The CPUC stated in its decision regarding the 2012 NDCTP Filing[3]:

> "The Commission finds the reasonableness of a contingency amount is significantly related to the stage of decommissioning and the activities projected, including particular site-specific challenges. Consequently, the reasonable contingency factor may vary between nuclear plants and at different stages of decommissioning."

The CPUC further clarified its position on contingency regarding the 2015 NDCTP Filing[4]:

> "[The CPUC] do[es] not accept PG&E's premise that a 25% contingency is Commission policy."
>
> "PG&E should not rely on SONGS contingency factor as a premise for maintaining a 25% contingency factor going forward."
>
> "As [the CPUC] move[s] into the next stage of NDCTPs and the site-specific study is completed, PG&E is expected to provide more specific details regarding costs that

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[2] Decision 17-05-020, May 25, 2017, Section 4.1, Assumptions, page 29

[3] Decision 17-05-020, May 25, 2017, Section 4.3.2, Page 47 and D.14-12-082 at 38.

[4] Decision 17-05-020, May 25, 2017, Section 4.3.2 Contingency, Page 46 & 47

> will allow the CPUC to better assess the reasonableness of the assumed contingency rate."
>
> "[The CPUC] will carefully consider ORA's recommendation of adopting a reduction of overall project contingency estimates from the current level to account for less uncertainty over time and greater industry experience in future NDCTPs."

PG&E FURTHER CONTINGENCY ANALYSIS

Since the start of the HBA independent review, PG&E has amended its contingency strategy to embrace a more detailed contingency analysis of the Decommissioning Cost Estimate. Accordingly, PG&E provided HBA with its Decommissioning Cost Estimate with contingency analysis details. This detailed contingency analysis was conducted on a line item basis for each of the one-hundred-seven (107) cost details (referred to by PG&E as the "white lines") for the twenty (20) Unassigned and Discrete Cost Summary categories (referred to by PG&E as the "blue lines") in the Decommissioning Milestone Framework Cost Estimate. PG&E applied a contingency percentage value to each of the one-hundred-seven (107) white lines. The contingency percentage value was based on the individual conditions, characteristics, and perceived uncertainty for the given white line item. A contingency dollar value was then calculated for each white line item by multiplying the applied contingency percentage times the sum of the white line item details for labor, material, equipment, and other costs. PG&E subtotaled the contingency for each of the twenty (20) Unassigned and Discrete Cost Summary categories and the grand total for the Decommissioning Cost Estimate.

STRENGTHS:

PG&E has conducted research on contingency and presented its findings in the updated Technical Paper, DECON-POS-H002. The information collected provides some good benchmarking data on how to evaluate the results of more rigorous line-by-line item basis analysis.

PG&E's use of contingency in its decommissioning cost estimates is consistent with industry practices to serve as a specific provision for unforeseeable elements of cost within the defined project scope and address less than ideal conditions on which the cost estimate is based.

PG&E's recent deterministic contingency analysis carried out on an estimate line item basis is a step forward to understanding and factoring in the individual conditions, characteristics, and perceived uncertainty at the PG&E "white-line" item detail (one level of detail lower than the PG&E "blue-line" detail shown in the Decommissioning Milestone Framework Cost Estimate).

This “white-line” item level contingency analysis is an improvement to the previous methodology utilizing a single contingency factor to the entire DCE.

FINDINGS:

The recently performed detailed contingency analysis of the Decommissioning Cost Estimate recently completed by PG&E at the “white-line” item level of detail does not meet current industry “best practices” in the development of project contingency values and specifically does not:

- Use a range of contingency values at the “white-line” level of detail based on the type of cost estimate and expected accuracy range (low to high);
- Consider the impact to the schedule and associated time sensitive costs as a result of unforeseen events within the project scope; and
- Utilize a Monte-Carlo/probabilistic modeling tool to analyze the cumulative impact of the individual line item contingency value ranges and consequently the establishment of an overall project contingency profile showing the level of confidence in attainment of success, i.e., 50%, 80%, 90%, etc. An overall project contingency profile is important and useful management decision making information.

V. Recommendation Summary and Next Steps

Listed below are the suggested recommendations of the HBA IRT to address the findings identified for each of the eight (8) Focus Areas in Section IV.

Focus Area 1: Decommissioning Summary Schedule

As detailed in Section IV, there are identified findings in the Decommissioning Summary Schedule (DSS). HBA recommends each of these findings be corrected by making the following revisions to the DSS.

A. Evaluate potential for shortening the timeframe for spent fuel cooling and transfer to dry storage at the on-site ISFSI for each unit by taking advantage of developing improvements in dry cask technology. This effort would include conducting discussions with cask vendors and would consider site specific seismic requirements for DCPP. Additionally, consider including activities for fuel cooling and transfer to the on-site ISFSI for each unit individually in the schedule. [Refer to Table IV.1.1 Proposed Summary Schedule Changes]

B. Evaluate the optimum start and completion dates for RVI and RPV segmentation. This effort would include comparing the potential savings resulting from removing RPV segmentation from the critical path with additional segmentation and waste packaging costs associated with an earlier start of segmentation activities. [Refer to Table IV.1.1 Proposed Summary Schedule Changes]

C. Evaluate the project schedule critical path to determine whether the stated schedule activities are truly part of the longest schedule critical path, as well as whether or not the schedule activities should be on the schedule critical path. In order to minimize costs, it is recommended that efforts should be made to shorten the critical path by rescheduling activities that can be performed off the schedule critical path and including only those activities that must be completed in series. For example, evaluate advancing the east and west breakwater demolition in the schedule and removing the work from the overall project critical path. [Refer to Table IV.1.1 Proposed Summary Schedule Changes]

D. Evaluate increasing the total duration for the heavy demolition portion of the project from its current scheduled duration of thirty (30) months to thirty-six (36) months, with the six additional months being gained from the non-heavy demolition completion date moving left on the schedule. Lessons learned from heavy demolition work performed on other large projects include the realization that equipment and related attachments do experience mechanical problems which can take time to correct. It is recommended that the additional time in the heavy demolition schedule be distributed among the various buildings/structures comprising the total heavy demolition work.

E. Evaluate clarity of schedule activity descriptions to determine if revising those descriptions can be made more easily understood by a less informed audience. Two (2) examples include: 1) Final Status Survey for Zones 10-13 are addressed in two (2) different activities; and 2) Main Warehouse Building Demolition.

F. Evaluate revising the project milestones to address the findings presented in Section IV, including adding a Reactor Vessel Segmentation Complete milestone.

Focus Area 2: Decommissioning Security Plan

As detailed in Section IV, there are identified findings in the Decommissioning Security Staffing Plans. HBA recommends each of these findings be corrected by making the following changes.

A. PG&E should evaluate means available to reduce the duration for Period 2 per the recommendations provided in Focus Area 1. Any reduction in the duration of the wet-fuel window would result in a estimated security staff cost savings of approximately $3 million per month.

Focus Area 3: Waste Disposal Costs

HBA did not identify any weaknesses with the Waste Disposal Costs. HBA does recommend for PG&E to provide proper consideration and evaluation for any risk events outside the project scope that may result in an unplanned increase in overall waste disposal costs such as interruptions by interested intervenors delaying transportation and unexpected landfill access restrictions/closures.

Focus Area 4: Reactor Pressure Vessel and Internals Segmentation Schedule

As detailed in Section IV, there are two (2) findings in the Reactor Pressure Vessel and Internals Schedule that have been identified. Based on experience gained on the Zion project as detailed in the above discussion, HBA recommends each of these findings be addressed by evaluating the following revisions to planned schedule durations for the Unit 1 and Unit 2 Reactor Pressure Vessel and Internal Segmentation:

A. Evaluate increasing the total duration for segmentation of the reactor internals for Unit 1 from its current scheduled duration of one (1) year and ten (10) days to a total of eighteen (18) months based on experience gained during the reactor internals segmentation work completed at Zion. It is recommended that the additional time be distributed among the various activities which comprise the critical path for the internals segmentation work.

B. Evaluate increasing the total duration for segmentation of the reactor internals for Unit 2 from its current scheduled duration of ten (10) months and twelve (12) days to eighteen (18) months. It is recommended that the additional time in the Unit 2 schedule be distributed among the various activities which comprise the critical path for the internals segmentation work.

C. Evaluate increasing the planned duration for rail travel from Pismo Beach to the WCS facility in Andrews, Texas, from four (4) days to eight (8) days or investigate the utilization of dedicated trains for the waste transport. Also evaluate that there are a sufficient number of rail cars available to avoid any schedule interruption/delay.

Focus Area 5: Building Demolition Plan

HBA has identified several findings in the Demolition Plan Schedule, Cost, and process. Based on experience gained on other large demolition projects, it is recommended that each of these findings be evaluated and the estimate revised if appropriate:

A. HBA suggests that an evaluation be completed by PG&E to determine if much of the Phase 1 demolition could be delayed to start at a later date that would immediately precede Phase 2, allowing one mobilization of the majority of equipment and personnel. Decreasing the total duration for Phases 1 and 2 non-heavy demolitions by eliminating the time interval of 26 months between the phases. The non-heavy demolition schedule could also be compressed as the demolition contractor would mobilize the majority of the equipment spread and related crews planned for both non-heavy demolition and heavy demolition one time. The larger equipment planned to be used on the heavy demolition portion would arrive in a non-contaminated condition, consequently would also be used in the non-heavy demolition with increased production times and a shorter schedule being the result.

B. Evaluate increasing the total duration for the heavy demolition portion of the project from its current scheduled duration of thirty (30) months to thirty-six (36) months, with the six additional months being gained from the non-heavy demolition completion date moving earlier in the schedule and the same completion date attained. Lessons learned from heavy demolition work performed on other large projects include the realization that equipment and related attachments do experience mechanical problems which can take time to correct. It is recommended that the additional time in the heavy demolition schedule be distributed among the various buildings/structures comprising the total heavy demolition work.

C. Evaluate including the potential loss of equipment in total, or portions thereof, and associated attachments due to radiological contamination. Such losses are a reality which should be recognized by PG&E. Analytical data at the conclusion of the project will indicate if radiological contamination is present and levels, with PG&E being responsible for that replacement cost, as reflected by the current market value and an independent valuation by a qualified equipment appraiser. The replacement cost for equipment and related attachments should be factored into the total project cost, including the containerization, transportation, and disposal at an approved facility.

D. Revisit the plan for demolition of the Auxiliary Building. HBA suggests that PG&E have the El 85’ floor analyzed by a structural engineer to confirm its ability to support or augmented to support the necessary demolition equipment. Completing the demolition from this elevation allows the use of shorter booms and heavier attachments and will increase the production rates.

E. Resolve the apparent confusion in the Waste Disposal Table regarding the quantities of the auxiliary and turbine building structures to be left in place below three feet in the ground, by renaming the “Bathtub” columns with a more descriptive title.

F. Evaluate utilizing a land-based approach to remove the east and west breakwaters in lieu of a marine-based operation requiring the use of a cost prohibitive jack-barge. In addition, given the overall duration of forty (40) months, consideration should be given to the cost benefit of hiring an experienced demolition company to provide skilled labor and purchasing the large equipment, which could be sold at the conclusion of the work.

G. Evaluate reducing apparent excessive estimated costs for non-manual activities and per diem.

Focus Area 6: System and Area Closure Plan

As detailed in Section IV, HBA has identified several findings with PG&E's System and Area Closure Plan. HBA recommends each of these findings be addressed by making the following revisions to the decommissioning schedule:

A. Evaluate revising material estimates for area preparation of the Turbine Buildings to remove inappropriate material expenses. In addition to removing or reducing those inappropriate material expenses identified above, the entire Turbine Building area preparation estimate should be revised by replacing placeholder values with actual "best estimate" values.
B. Evaluate revising material estimates for area preparation of the Auxiliary Buildings to remove inappropriate material expenses. In addition to removing or reducing those inappropriate material expenses identified above, the entire Auxiliary Building area preparation estimate should be revised by replacing placeholder values with actual "best estimate" values.
C. Evaluate to ensure removal of Incore Detection System guide tubes removal scope of work, identified in Attachment 5 of the DCDP SAC Plan, is paired with the appropriate plan (Plan 02 or Plan 27) and its cost only included in one plan to eliminate duplicating the associated cost.
D. Evaluate revising the material cost estimate by approximately five to ten (5-10) %.

Focus Area 7: PG&E Oversight Staffing Structure

As detailed in Section IV, there are several findings that have been identified with PG&E's Oversight Staffing Structure. Based on experience gained during the decommissioning of DCPP sister station, Zion, it is recommended that the following changes be implemented to the oversight Staffing Plans:

A. Evaluate the feasibility of reducing the Operations Department staffing level after both units are shut down and the spent fuel remains in the pool to six (6) CFH and twelve (12) NCO
B. Evaluate the feasibility of reducing the Maintenance Department staffing level during the period between shut down of Unit 2 and completion of the spent fuel transfer to the on-site ISFSI from thirty-seven (37) to twenty-eight (28).
C. Evaluate the feasibility increasing the Engineering Department staffing level at the time of Unit 1 shut down from ten (10) personnel to fourteen (14).

D. Evaluate the feasibility of reducing the ISFSI staffing level from thirty-seven (37) to thirty (30)
E. Evaluate the feasibility of reducing the number of Invoice Coordinators from four (4) to two (2)
F. Evaluate the feasibility of increasing the number of Project Controls Specialists from two (2) to four (4)
G. Additional recommendations affecting the Staffing Plan that are a function of schedule durations are discussed in the Decommissioning Summary Schedule review in Focus Area 1 of this Report.
H. Recommended changes for security staffing are discussed in Focus Area 2 of this Report.
I. Evaluate the feasibility of adding work planners to the project organization.
J. Evaluate the feasibility of reducing the number of environmental support personnel.

Focus Area 8: Contingency Strategy

As detailed in Section IV, there are several findings that have been identified with PG&E's Contingency Strategy. HBA suggests for future decommissioning cost estimates PG&E consider implementing the following actions to bring its contingency strategy more in line with best practices.

A. Analyze the impact of unforeseen events within the project scope on the cost estimate at the next lower level of detail in the WBS.

B. Apply a range of contingency factors based on the type of cost estimate and level of accuracy following guidelines established by the NEA/IAEA published International Structure for Decommissioning Costing (ISDC), 2013.

  - Order of Magnitude Estimate: -30% to +50%
  - Budgetary Estimate: -15% to +30%
  - Definitive Estimate: -5% to +15%

C. Analyze the impact of unforeseen events within the project scope on the schedule and associated time sensitive costs. Apply a range of contingency factors to the schedule activity durations similar to the range of contingency factors applied to the cost estimate.

D. Harness the analytical power gained by applying an integrated cost/schedule Monte-Carlo/probabilistic modeling tool such as Oracle Primavera Risk Analysis ("OPRA"). This modeling tool will allow an evaluation of the identified range of contingency factors at the line item level of detail and is essential to account for the interdependency of cost and schedule. Moreover, a probabilistic risk analysis tool would produce an overall project contingency profile showing the level of confidence in attainment of success, i.e., 50%, 80%, 90%, etc., relative to the contingency factor percentage.

E. Care should be taken when developing the integrated cost/schedule Monte-Carlo/probabilistic simulation model to ensure PG&E individually and independently capture the contingency profile for each of the nineteen (19) Unassigned and Discrete Cost Summary categories (referred to by PG&E as the "Blue Lines") in the Milestone Framework cost estimate and totaled to establish the overall estimate contingency.

VI. Attachments

Attachment A: HBA Experience Overview and Independent Review Team Resumes

History of Independent Estimates, Analysis and Assessments

High Bridge is a Project Management, Project Controls, Estimating and Engineering consulting and services company. Its Principals have extensive experience supporting capital projects, decommissioning/closure projects, and operating/maintenance programs in various markets. This includes the power/energy, petro/chemical, infrastructure, government, industrial, commercial, telecommunication, and environmental/waste management business sectors. We have delivered managed task services and served as owner's representative for managing the execution of engineering, construction, and operations for projects/programs of various size and complexity. ***High Bridge has provided consulting and technical subject matter expert services to customers spanning Cost Estimating, Cost/Schedule Reviews, Risk Assessments, Due Diligence Evaluations, Feasibility Studies, Readiness Assessments, Contract Change Management/Claims, and Technical/Management Assessments. Some representative assignments are summarized below.***

TVA- Browns Ferry Nuclear Plant--2018
LP Turbine Replacement

TVA- Watts Bar Nuclear Plant--2018
Bentley Nevada Vibration Monitoring
Digital Controls Main Feed Pumps
Replacement ICCM
EDG Power Pack Replacement
Main Bank Transformers

TVA- Sequoyah Nuclear Plant-2018
Steam Generator Replacement Estimate

Southern Company- Vogtle 3 and 4 AP 1000-2018
Membrane Roofing Install-Fair Price Estimate
Cathodic Protection- Fair Price Estimate
Remaining Insulation- Fair Price Estimate
Penetration Seals- Fair Price Estimate
Demin and Effluent lines - Fair Price Estimate
Perm Plant Communication - Fair Price Estimate
Underground Electrical- Fair Price Estimate
Lightning Protection- Fair Price Estimate
Heat Trace- Fair Price Estimate
Shield Bldg Stairlift- Fair Price Estimate
SWS Bldg Coatings- Fair Price Estimate
Class 1E Raceways- Fair Price Estimate

Duke Cogema Stone and Webster (DCS) – 2002 to Present
Assessed project scope, risks, schedule, and capital cost elements, and assisted with developing the project risk mitigation plan, management staffing resources, baseline re-estimate, and preparing the schedule for a $1.5B Mixed Oxide Nuclear Fuel Fabrication Facility for the US Department of Energy at the Savannah River Site.

Entergy-ANO-2018
EDG Voltage Regulator

Entergy-Riverbend Nuclear-2018
Instrument Air Compressors

Black & Veatch-PGE Diablo Canyon-2018
Diablo Canyon Super Bundle Decommissioning Estimate

Team Holtec-2018
Independent review of decommissioning cost estimates for Pilgrim and Palisades Nuclear Stations

D&Z-Roxboro Plant-2018
FGD WWT Project

Dominion-North Anna Nuclear Plant-2018
Feedwater Heater Replacement Project

SCE SONGS Decomissioning-2018
Change Order Delay Options
Nuclear Island Maintenance
FTO Waste Transportation and Disposal
ISFSI Vehicle Barrier System
On-Site Scheduling and Estimating Support and Development
Erosion Control for Lot 4 Slope
Beach Discharge Drainage Feature
Deferment Beyond 12 Months

Entergy Nuclear - Jackson, MS - 2017
Project Controls Program Development

Entergy Nuclear - Arkansas Nuclear One – 2017
Nalco Inject Pipe Replacement
A&B EDG Voltage Regulator Exciter Replacement
ICW Heat Exchanger "C" Replacement

Entergy Nuclear - Grand Gulf Nuclear Station - 2017
Domestic Water Plant Brine Tank Replacement
Main Security Sallyport Swing Gate
Seal Steam Generator Replacement
Circ Water Expansion Joint Replacement
Fire Detection System (P65)

Entergy Nuclear - Waterford 3 - 2017
Vibration Monitoring Equipment
Replacement of Seismic Monitoring Equipment
Provide Manual Transfer Switching Capability on TEDG
Turbine Trip System, Mechanical Overspeed and Protective Trip Devices Replacement
Travelling Screens Auto Controls Implementation
Replace ENI Safety Channel Processing Drawers due to Obsolescence
Broad Range Gas Monitors
PWR Incores RF22
Steam Generator Feedring Modification
Intake Cannel Weir Wall Replacement
Address Obsolete Rosemount Xmters
Turbine Valve Refurb RF22

HP Turbine Diagonal Stage Replacement
MCC 315B Repair & Corrosion Mitigation
RF22 Feed Pump B Rotor Replacement
Fire Protection Valves Replacement
Replace All MXL Fire Protection Panels

Entergy Nuclear - River Bend Nuclear Generating Station - 2017
Fire Detection System
Acid Feed System Skid Replacement
Replace Liquid Radwaste (LWS) Discharge Line
Radwaste Streaming

TVA - Sequoyah Nuclear Plant - 2017
316b Travelling Water Screen Replacement

TVA - Watts Bar Nuclear Generating Station - 2017
316b Travelling Water Screen Replacement
Replace Category 1- A&B SDBR and A&B MCR Chillers
Replace U1 EGTS Modulating Dampers
ERCW Motor Power Cable Replacement
CO2 Compressor Replacement for 6-Ton & 24-Ton Cardox Units
Replace TDAFW Traps with Orifices
MDAFW LCV Replacement
Demin Water Booster Pump Installation for 2 Unit Operation
Obsolete Target Rock Valves in the SGBD System
Replace Radiation Monitoring System-Phase 2 (6 skids) 400's
WBN Replace U1 Incore Instrument Room Chilled Water Check Valves (4)
Waste Gas Compressor Replacement

TVA - Browns Ferry Nuclear Plant - 2017
3A1 & 3C1 HP Feedwater Heater Replacement
U2 and U3 Amertap System Upgrade
CRD RPIS and Temperature Indication Improvement
Replace 4kV Shutdown Board Battery Chargers
Generator Relaying
Ventilation System Air Wash Material Upgrade
Maintenance Building – Cost Savings Study
Travelling Water Screens 4kV Infrastructure & Controls
CCW Cable Replacement

AECON - Darlington Nuclear Plant - 2017
Heavy Water Management Building West Annex

DUKE ENERGY - Oconee Nuclear Station - 2017
Main Power Relay

Exelon - Calvert Cliffs Nuclear Power Plant - 2017
Metal Clad Building

Day & Zimmerman - 2017
ACI System Mechanical Install

Day & Zimmerman - Plant Bowen - 2017
Front Reheater Replacement

Day & Zimmerman - Plant Neal - 2017
Submerged Chain Conveyor

Day & Zimmerman - Plant Roxboro - 2017
SFC Piping Project

Southern Nuclear - Plant Farley - 2017
R60s & R70x Rad Monitor Replacement

Southern Nuclear – Vogtle Unit 3 & 4 - 2017
EDCR No. SV3-CC01-GEF-000091_Personnel Hatch Coatings

Southern Nuclear - Vogtle Unit 4 - 2017
CWS Pump Intake Structure Concrete Embeds

NIPSCO - Bailly Generating Station - 2017
Mega Voltage Amerage Reaction (MVAR)

NIPSCO - Mitchell Generating Station - 2017
Mega Voltage Amerage Reaction (MVAR)

WACHS - P&G Beauty Care Building - 2017
Off-Rack Piping Estimate

Southern California Edison - SONGS - 2017
Fuel Transfer Ops
Repair of the Rip Rap Scope per M2 Amendment 8
Class B/C Waste Filters Disposal- Co.11

San Onofre Nuclear Generating Station - 2017
HOLTEC – ISFSI Pad Expansion
Phase 3 Demolition Below 3 FT
Site Dewatering

WACHS Technical Services—Protor&Gamble-2017
Estimate for new production line piping

Entergy—Grand Gulf -2017
Estimate for Domestic Water Brine Tank Replacement

Entergy—ANO-2017
Estimate for Nalco Injection Pipe Replacement

Southern Company—Gorgas Generating Plant--2016
Screening Estimate New Start-Up Boiler

NextEra Energy--Point Beach Nuclear Plant--2016
Bottoms Up Spent Fuel Pool Heat Exchanger Modification

Exelon- Calvert Cliffs Nuclear Plant—2016
Perform Estimate LITE for installation of 3rd Feed Pump

Exelon--Peach Bottom—2016
ISFSI Pad Expansion Project Independent Bottoms Up Cost Estimate

Exelon--Calvert Cliffs Nuclear Power Plant--2016
ESFAS/AFAS Independent Cost Estimate

Exelon-- Nine Mile Point--2016
Unit 2 Generator Step-up Transformer Replacement Conceptual Estimate

Duke Energy-Oconee Station-2016
Bottoms Up estimate for Installation of New Power Circuit Breakers

Dominion Nuclear—Millstone U2—2016
Bottoms up Estimate for TDAFW Pump Full Flow Test Line

NiSource/Nipsco – Gas Pipeline – 2015
Perform independent bottoms up estimate to install a 4.5 mile long gas pipe line to the St. Joseph Energy Center.

TVA– Sequoyah – 2015
Perform independent bottoms up estimate for Open Phase Relay Project.

Southern California Edison-SONGS-2015
Perform independent bottoms up estimate for Decommissioning Modifications

PPL – Susquehanna – 2015
Perform independent bottoms up estimate for Hardened Containment Vent System

NextEra – Turkey Point – 2015
Perform independent bottoms up estimates for Flooding Modifications Project and Incipient Fire Detection Project

NextEra – Fleet – 2015
Perform independent bottoms up estimates for Open Phase Protection Projects at Point Beach, Duane Arnold, St Lucie, and Turkey Point

Exelon – Peach Bottom – 2015
Perform independent bottoms up estimate for Hardened Containment Vent System Project

Southern Company – Vogtle Unit 1 – 2015
Perform independent bottoms up estimate for Digital Turbine Controls Project

Enercon – License Extension Projects – 2015
Perform independent bottoms up estimates for Independent Spent Fuel Storage Installation, Cooling Tower Installation, and Steam Generator Replacement Projects for undisclosed utility

NiSource/Nipsco – Gas Pipeline – 2015
Perform independent bottoms up estimate to install a 4.5 mile long gas pipe line to the St. Joseph Energy Center

TVA– Sequoyah – 2015
Perform independent bottoms up estimate for Open Phase Relay Project

PPL – Susquehanna – 2015
Perform three (3) independent bottoms up estimates for Fire Pump Replacement, Service Water Pipe Replacement, and Open Phase Protection projects

NextEra/FPL – Turkey Point – 2015
Perform three (3) independent bottoms up estimates for cooling upgrade projects for CCW, ICW, and TPCW systems

CBI – Crystal River – 2015
Perform bottoms up estimate for Independent Spent Fuel Storage Installation Project at Crystal River

Duke – Sutton CT Project – 2015
Perform independent 3rd party estimate review for the Sutton LM6000 CT Project

Southern – Vogtle Unit 1 – 2015
Perform independent bottoms up estimate for GE Turbine Digital Controls Upgrades Project

TVA– Watts Bar and Browns Ferry – 2015
Perform independent bottoms up estimate for Open Phase Relay Projects

Exelon– Calvert Cliffs – 2015
Perform independent bottoms up estimate for Open Phase Relay Projects

TVA– Sequoyah – 2014
Perform independent review of estimate for Fukushima Flood Mode Mitigation Project

Duke Energy – Fossil – Ash Management – 2014 - Current
Provide assistance and augmented staffing to develop estimates for Ash Basin Strategic Action Team across Duke fleet of 22 sites

TVA– Browns Ferry – 2014
Perform independent bottoms up estimate for new site maintenance building

Entergy – Waterford 3 – 2014
Perform independent assessment of project scope and field logistics for Condenser replacement and additional diesel fuel oil storage tank projects

Exelon – Ginna – 2014
Develop detailed bottom up estimate for Alternate Charging Pump replacement

Southern California Edison – S.O.N.G.S. – 2014
Develop detailed bottom up estimates for multiple Cold and Dark modifications in preparation for decommissioning.

Entergy – JA Fitzpatrick – 2014
Develop a detailed bottom up estimate based on design mods resulting from NRC order EA-13-109 for Reliable Containment Hardened Vents in response to Fukushima disaster

Wolf Creek Nuclear Operating Corp – 2014
Developed three detailed bottoms up estimates for design, procure and installation: 1) new 1E Equipment Room Chillers, 2) Containment Cooler replacements and 3) ESW Water Hammer Mitigation mods.

Constellation/Exelon – 2014
Developed detailed estimates and scope documents for various plant modification projects at Calvert Cliffs Nuclear Power Plant including: GSI-191, NFPA-805, PAMS Node Box replacements, and new 500kV transformer

Tennessee Valley Authority – 2014
Developed high level conceptual estimates and scope documents for future plant modifications including:
Sequoyah – New Auxiliary Air Compressors and RCS Temperature Element Replacement
Browns Ferry – 161kV Switchyard Replacement and Traveling Water Screen Replacement
Sequoyah – Exo-sensor Temperature Monitors and Part 21 Valve Pin Replacement projects

Entergy – 2014
Developed detailed estimates and scope documents for fleet wide plant modifications including: ANO – 3 options to replace or repair Essential Service Water supply piping

NIPSCO – 2014
Developed detailed bottom up estimates for three new construction transmission and distribution projects including a new substation, new 69kV transmission lines, and new fiber optic circuits

TetraTech (NPPD-Cooper) – 2014
Develop a detailed bottoms up estimate and Level 2 Scheduled based on design mods resulting from NRC order EA-13-109 in response to the Fukushima disaster associated with Reliable Containment Hardened Vents.

Entergy – 2014
Developed detailed estimates and scope documents for fleet wide Fukushima modifications based on issued final design packages for mechanical and electrical modifications (Flex and Spent Fuel Pool Instrumentation).

NIPSCO – 2014
Developed detailed bottom up estimates for various modification projects throughout their fossil/hydro fleet including a dam spillway expansion and a 3 unit stack and precipitator demolition

Wolf Creek Nuclear Operating Corp – 2014
Developed a total project bottom up independent estimate for the Independent Spent Fuel Storage Installation (ISFSI) project

American Electric Power – 2013
Developed a bottom up independent scope and estimate for DC Cook's Unit 2 Heater Drain Pump Replacement Project

Wolf Creek Nuclear Operating Corp – 2013
Perform analysis and comparison of estimates for two scope options on 1E Equipment Room Chiller mods. Develop ROM estimates as needed to improve accuracy of WCNOC estimates for valuable option comparison.

NPPD – 2013
Developed a comprehensive and detailed bottoms up scope and estimate for implementation of Cooper's EPU required modifications

Dominion Power – 2013
Developed detailed bottom up scope and estimate for the Unit 3 CCW Heat Exchanger Replacement Project at Millstone

NIPSCO – 2014
Developed detailed bottom up estimates for various modification projects throughout their fossil/hydro fleet including Stack Inlet duct repairs, conveyor heating mods, dam buttress repairs, and bypass stack isolation mods

FPL/NextEra – 2013
Perform parametric estimate evaluation of client prepared Fukushima modification estimates addressing FLEX Mods, FLEX equipment, FLEX storage, Spent Fuel Pool level indication, and Containment Hardened Vents for entire FPL/NextEra fleet including St. Lucie, Turkey Point, Seabrook, Point Beach, and Duane Arnold.

Entergy – 2013
Developed detailed scope and estimate documents for Fukushima modifications addressing FLEX Mods, FLEX equipment, FLEX Storage, Spent Fuel Pool level indication, Containment Hardened Vents, and EP- Communication initiatives for entire Entergy fleet including ANO, Indian Point, Grand Gulf, Waterford, River Bend, Fitzpatrick, Pilgrim, Vermont Yankee, and Palisades.

Dominion Power – 2012 - 2013
Developed 2 detailed bottom up major project scope and estimate documents – 1) Reserve Station Service Transformer Replacement project at North Anna and 2) Feedwater Heater Replacement Project at Millstone

Dominion Power – 2012
Developed estimates for various design options for Fukushima required FLEX equipment storage facilities at North Anna, Surry, and Millstone sites

Omaha Public Power District – 2012
Developed initial conceptual estimate for Ft. Calhoun's Containment Internal Structure Repair Project

AREVA - Tennessee Valley Authority – 2012
Performed review and gap analysis of estimating process and estimate to complete for AREVA portion of Bellefonte Nuclear Project

American Electric Power – 2012
Developed 3 bottom up independent estimates for DC Cook projects – 1) Glycol Chiller Replacement, 2) Ice Equipment Replacement, and 3) Feedwater Heater Replacement

Duke Energy -Zapata Engineering –- 2012
Performed detailed cost evaluation of containment repair project at Progress Energy's Crystal River Nuclear Plant

Wolf Creek Nuclear Operating Corp – 2012 - 2013
Developed total project cost, bottoms up independent estimates for 9 separate major modification projects at the Wolf Creek operating site 1) Station Blackout Diesel addition, 2) Replacement of all Essential Service Water System above ground piping, 3) Replacement of all 480v non-safety breakers, 4) Replace Westinghouse 7300 System, 5) Replace LP Feedwater Heaters, 6) Emergency Diesel Gen Load Shed Sequencer Control system digital upgrade, 7) Emergency Diesel Gen Start Circuit Control system digital upgrade, 8) Emergency Diesel Gen Instrumentation system digital upgrade, and 9) Site Supervisory System Digital Upgrade

Florida Power & Light / NextEra – 2012
Developed bottom up independent conceptual estimates for Turkey Point and St. Lucie to remove all fibrous piping and equipment insulation from containment in accordance with GSI-191.

Progress Energy – 2012
Performed independent bottom up estimates for Brunswick Nuclear Plant diesel generator upgrade project – safety related and non-safety related scope

Florida Power & Light / NextEra – 2012
Performed independent review and analysis and bottoms up estimate on MCR annunciator replacement and Fire Protection upgrade projects

Tennessee Valley Authority – 2012
Performed independent review and analysis of the Watts Bar Unit 2 estimate to complete. Developed estimate baseline database in WinEstimator® for implementation of change management and earned value management (EVM) processes.

Bechtel / Florida Power & Light – 2012
Performed independent estimates on multiple scope additions to the Turkey Point Nuclear Plant Extended Power Uprate project

Dominion – 2012
Performed independent bottom up estimate for Millstone Nuclear Plant's Electro Hydraulic Controls replacement project

NextEra Energy – 2011
Performed independent analysis and assessment of implementation contractor estimate deviations on the Point Beach Nuclear Plant Extended Power Up Rate Project

Tennessee Valley Authority – 2011
Performed independent review of project estimate for Steam Generator Replacement Project at the Sequoyah Nuclear Plant

Entergy – 2011
Performed independent bottom up scope and estimate development on 5 individual projects for direct implementation craft labor and materials for Extended Power Uprate at Grand Gulf Nuclear Station. Performed evaluation and validation of the existing EPU estimates for field non-manual, craft indirects, distributables, and facilities costs.

Bechtel Power Corporation - 2011
As an independent third party, participated in a joint assessment and evaluation of the m-Power small modular reactor project estimate.

Xcel Energy– 2011
Performed independent assessment and evaluation of the overall cost at completion for the Extended Power Uprate Project at the Monticello Nuclear Station.

Exelon – 2011
Performed independent project scope development and estimate validation on 30 individual projects for direct implementation craft labor and materials for Extended Power Uprate at Peach Bottom Atomic Power Station.

Bechtel / Florida Power & Light – 2011
Performed independent bottom up estimates on 36 individual projects for direct implementation craft labor and materials for Units 3 & 4 Extended Power Uprate at Turkey Point Nuclear Station.

Tennessee Valley Authority – 2011
Performed independent bottom up estimate for Tritiated Water Storage Tank Project at Watts Bar Nuclear Plant

American Electric Power – 2011
Performed independent bottom up estimate for Low Pressure Rotor Replacement Project at DC Cook Unit 1

NextEra Energy – 2010 - 2011
Performed independent bottom up estimates on 16 individual projects for implementation labor on the Unit 2 EPU and AST projects at the Point Beach Nuclear Station.

Luminant Energy – 2010
As Owner's Representative worked with Luminant management to perform review and analysis of MNES/URS/B&V estimate data during annual update of Comanche Peak Units 3 & 4 project.

NuScale Power – 2010
Performed independent review and analysis of the design and implementation estimates for the NuScale Small Modular Reactor project.

Tennessee Valley Authority - NGDC – 2010
Developed working desktop procedure for project estimate development for the NGDC PMO organization. Developed and conducted two-day training course for implementation with PMO personnel.

UniStar Nuclear – 2010
Performed independent review and analysis of EPC Contractor's field non-manual and Owner's non-manual oversight organizations proposed for the Calvert Cliffs 3 nuclear project.

Arizona Public Service (APS) Palo Verde – 2010
Performed evaluation of onsite PMO organization's estimating programs, procedures, and personnel. Developed detailed analysis report and recommendations.

Louisiana Energy Services – National Enrichment Facility– 2010
Performed independent bottom up estimate for construction of SBM-1003 facility

American Electric Power – 2010
Perform detailed independent estimate for DC Cook's Condensate Polisher System Project.

Florida Power & Light – 2009-2010
Performed independent bottom up estimates on 44 individual projects including design and implementation labor and materials, field non-manual, owner's oversight and LAR costs for the Unit 3 Extended Power Uprate at Turkey Point Nuclear Station.

Dominion – 2009 - 2010
Performed assessment of five consortium proposals for the North Anna Unit 3 New Nuclear Project.

Luminant Energy – 2009
As Owner's Representatives worked with Luminant management to perform review and analysis of MNES/URS/B&V estimate data during annual update of Comanche Peak Units 3 & 4 project.

STP Nuclear Operating Company – 2009
Worked with NRG, STP-NOC and Bechtel to perform review and analysis of STP Units 3 & 4 estimate information from Toshiba and Fluor.

NextEra Energy – 2009
Performed independent review and analysis of the Point Beach Station Unit 1 EPU project estimate.

American Electric Power – 2009 - 2010
Perform detailed independent estimates for ISFSI (Dry Cask Storage) and Security Computer Replacement projects. Also perform independent estimate validations on 6 capital modification projects including MSR replacement.

Duke Energy - 2009
Performed independent review and analysis of McGuire Station Main Generator Stator Project

Louisiana Energy Services – National Enrichment Facility – 2009
Developed a detailed conceptual estimate for design, procure and construction of the first expansion phase at the National Enrichment Facility in Eunice, NM.

Constellation Nuclear – 2007 – 2009
Performed multiple independent cost estimates for capital modifications at all three Constellation nuclear facilities (Calvert Cliffs, Nine Mile Point, and Ginna).

Duke Energy – 2008 – 2009
Performed assessment of Westinghouse/Shaw proposal for the Lee Units 1&2 New Nuclear Project

UniStar Nuclear - 2008
Performed an independent analysis of construction craft performance unit rates used in the owner's estimate to build the Areva designed next generation EPR nuclear power generating facilities in the US.

American Electric Power – 2008
Performed a review and analysis of AEP corporate estimating process, procedure, and personnel skill sets.
Performed an estimate assessment of a 12-month schedule delay at the JW Turk Super critical Coal Project. New construction – total estimate > $1 Billion.

Duke Energy - 2008
Prepared independent estimates for design and construction of six Wind Turbine Energy Farms

Matrix Service Inc - 2008
Prepared independent estimate for the Sandy Creek Project – Tank Farm and Coal Chute Construction

Delta-T Corporation - 2008
Performed contractor claims evaluations on post construction claims at new construction Ethanol plants

American Electric Power – 2007 - 2008
Performed assessment of MNES/Sargent & Lundy proposal for DC Cook Unit 3 New Nuclear Project

NMC – Prairie Island Nuclear Generating Plant - 2007
Performed detailed estimate review of the Electro Hydraulic Controls Upgrade Project

Shaw / Westinghouse – 2007
Managed and performed the development of the conceptual estimate for the new AP1000 nuclear power generation facility. This estimate was the basis for business case modeling for utilities considering this design.

Constellation Generating Group - 2007
Prepared independent estimates on various modifications at 4 coal units to implement imposed Healthy Air Act restrictions. Total estimated value $185 million.

Constellation Nuclear - 2006 - 2007
Developed the Project Management Organization estimating process/procedure to be utilized in developing project scope and estimate packages. The process integrates the cost estimating process with the capital project development and authorization process within Constellation for all power generation projects.

Louisiana Energy Services (Urenco USA) – National Enrichment Facility – 2006 - 2007
Developed a detailed definitive estimate for design, procure and construction of the National Enrichment Facility in Eunice, NM. Total estimate value >$2 billion.

Burns & Roe – Entergy - 2006
High Bridge and Burns & Row were awarded a contract to provide Owners Engineer Services in support of the development of new nuclear power generation facilities for Entergy. In this role, High Bridge developed the project management infrastructure to manage this immense and complicated project. High Bridge is also performing independent estimates to support funding projections and comparison to bid proposals.

Duke Energy – 2006
Performed independent cost estimates for major capital projects under development and approval for the Duke Oconee Nuclear Station. Estimates are utilized as check estimates for contractor bids and for validating budget requests to Executive Management.

DOE Hanford – 2005
Provided independent cost estimating assessments for the Waste Treatment Project at the Hanford site. Reviews included construction unit rates, material pricing, non-manual staffing plans, construction methodologies, implementation schedules, construction indirects, and contingency. Provided detailed reports to DOE for assigned areas of responsibility.

Burns and Roe – 2004 to 2005
Assisted Burns and Roe with providing estimating, planning, and project management support to the US Department of Energy for the Yucca Mountain Nuclear Waste Repository Project. Performed a parametric evaluation of the Yucca Mountain project cost estimate, and providing estimating support for the development of the government's detailed project cost estimate for the Critical Decision 2 (CD-2) project milestone.

British Nuclear Fuels – 2003 - 2004
Performed assessment of the detailed estimate for the INEL Advanced Mixed Waste Treatment Project

British Nuclear Fuels – 2002 - 2003
Performed assessment of the detailed estimate for the ORNL K25 Three Building Decommissioning Project

Connecticut Yankee Atomic Power Company - 2002
Performed a comprehensive evaluation of contract management and contract administration practices associated with its prime contract for services to decommission its nuclear power plant facility. Focus areas included the contract; company organization; company policies, procedures and guidelines; work management; contractor performance management; change management, claims and dispute resolution; and document management.

U. S. Department of Energy - 2001
Performed a comprehensive assessment of the conceptual estimate and contingency for the ORNL Spallation Neutron Source Accelerator project

Tennessee Valley Authority (TVA) - 1999
Performed a comprehensive review and update of TVA's owner estimate and schedule for the restart of the Browns Ferry Nuclear Station, Unit 1, with a total estimated capital cost in excess of $1 billion.

New Hampshire Nuclear Decommissioning Financing Committee - 1997 & 1998
Reviewed the financial and economic methodologies used in establishing escalation and contingency factors for the decommissioning, dismantling, and decontamination of the Seabrook Nuclear Plant. This review included the assessment of the total project estimate and scope basis for the $1 billion decommissioning Seabrook.

Duke Hanford Company - 1997
Prepared an Independent Cost Estimate (ICE) for the $20 million Integrated Water Treatment System, as part of the K-Fuel Storage Basin D&D Program for the DOE at the Richland Hanford Site.

HIGH BRIDGE
ASSOCIATES

J. MICHAEL FOLEY, PE, PMP, CCP
EXECUTIVE CONSULTANT

Experience Summary

Mr. Foley is a proven leader, effective listener, and problem solver. He has four (4) decades of broad based experience managing the technical and business challenges associated with complex projects and programs in the government, commercial, industrial, energy, power, utility, oil and gas, information, environmental, and insurance industries. For the last thirty (30) years he has had executive management and principal consultant responsibility with several professional services consulting companies. He is a respected and proven source of practical expertise using industry "best practices" in strategic business and program planning; project management; project control; cost engineering and cost estimating; project risk management; earned value management systems; contract management; change order/claims management; dispute resolution; and regulatory defense.

His experience spans the life cycle phases of complex projects and capital programs from conceptual planning and engineering through construction, operations, maintenance, and facility decommissioning. He has established effective methods to integrate engineering, economic, financial, and risk management principals to analyze and manage schedule and financial risk on complex projects. He has led cross-functional teams to evaluate EPC project plans, estimates, schedules, and execution strategies. He has played a leading role in management audits and project performance assessments. His expert technical capabilities have been utilized to successfully resolve contract differences, rate proceedings before public utility commissions, and matters before the Federal Energy Regulatory Commission. He has been designated as an expert in several disputes and has been accepted in United States Federal Court and proffered testimony as an expert witness.

Mr. Foley is also well appreciated for being an advocate for STEM education and applied learning opportunities for students through robotics. He actively serves on the board of Directors of the Georgia Robotics Alliance and STEM Compass; mentors the FERNBANK LINKS, a Competition Robotics Team in Decatur, GA; and frequently provides robotics team teachers and students with training in the principals of engineering, fabrication, testing, project management, business management, and programming. **Mr. Foley** also serves as judge/judge advisor/robot inspector for BEST, FLL and FRC robotics competitions locally and nationally.

Employment History 1986-2018

CEO and Executive Consultant, GATE 6 Solutions, Inc., (GATE 6) Atlanta, GA, 1986-Present
Mr. Foley founded GATE 6 and developed it into a thirty two (32) year old company that is well known for providing executive consulting services and strategic and tactical technical expertise in business management, project management, cost management, cost engineering, cost estimating, project controls, risk management, and contract management/administration. Mr. Foley is well respected for his abilities to establish, lead and mentor teams of seasoned executive and senior staff to help clients

successfully plan and execute complex projects. As an executive consultant, Mr. Foley is a subject matter expert and trusted advisor to commercial and government clients in integrated project baseline development (scope, schedule and cost), facility decommissioning planning, project reviews/assessments, earned value management, contract change management, and project risk management to help solve their toughest and most urgent project challenges. He is a frontrunner in creatively identifying and implementing tailored management solutions centered on harnessing the power of people, processes, and technology to quickly create client value.

Affiliate Director, The Duggan and Rhodes Group, Pittsburgh, PA 2005-2009 Executive technical expert services in project management and project controls on a broad range of contract claims and dispute resolution matters for commercial and government clients.

Regional Manager and Executive Consultant, TEAM Associates, Inc., Norcross, GA 2003-2005 Executive consultant leading/supporting independent project assessments, project control, project risk management, and contract management/claims/dispute resolution services.

Principal Consultant, LEGIS Consultancy Inc., Atlanta, GA 2003 Principal consultant leading/supporting contract management/claims/dispute resolution services.

Vice President & Executive Director of Technical Consulting Services Division, Project Control Services (*PCS*) Augusta, GA, 1997-2001 Executive consultant for a full service cost management and professional services consulting firm with executive management responsibility for national marketing and business development programs, proposal preparation, operations and technical oversight, contract administration, resource management, management information systems recruiting, and training activities. Directed management-consulting contracts involving project and operations management evaluations, financial and service performance improvement studies, project risk assessments, and expert witness services. In the first year, established a national business development program that lead to tripling the number of clients, doubling the number of active projects, and increasing annual revenues 28%. Additionally, established a formal employee-training program leading to certification in cost engineering/management.

Vice President & Executive Director of Strategic Business Planning and Development, Project Time and Cost (*PT&C*), Atlanta, GA, 1995-1996 Executive consultant for a full service cost management, cost estimating, and professional services firm with executive responsibility for formulating and implementing strategic market and business development strategy-a significant part of the overall company strategic plan; assessing and developing future long range business markets and applied technologies; and overseeing strategic consulting engagements. The nature of the work demanded flexibility in combining marketing, business and proposal development skills; traditional cost management skills; and other management skills with new analytical approaches to serve new clients and their needs. Forerunner in developing/implementing environmental cleanup project risk modeling and evaluation tools to establish thresholds for stop loss coverages offered by global insurance company. Developed project review strategies/methods/tools to monitor risk during the project lifecycle. Contributed to increasing company annual revenues from $5 million to more than $10 million, a 28% annual growth rate.

Senior Consultant, The Liberty Consulting Group (*Liberty*), Atlanta, GA, 1987-1995 Senior Consultant in a variety of management areas associated with commercial, industrial, energy, environmental and utility issues. Responsible for managing southeastern operations while leading/providing professional consulting services to clients dealing with the management/technical challenges associated with complex project and business matters.

Employment History 1976-1986

Principal Consultant/Founder of GATE 6 Solutions, Inc. (*GATE 6*) Atlanta, GA, 1986-1987
Principal Consultant/Owner, Foley and Ray, Inc. (*F&R*), Atlanta, GA, 1984-1986
Lead Consultant, Summit Project Management (*Summit*), Atlanta, GA, 1983-1984
Project Cost and Schedule Supervisor, EBASCO, Atlanta, GA, 1981-1983
Project Manager/Estimating Manager, M. W. Buttrill (*MWB*) Construction, Atlanta, GA, 1980-1981
Engineer, Chicago Bridge and Iron Company (*CBI*), Birmingham, AL, 1976-1980

Business Affiliations

Board of Directors Member of the Georgia Robotics Alliance, Inc., a Georgia headquartered, Not-for-Profit Corporation formed for the purpose of promoting and supporting the development and expansion of science, technology, engineering, and mathematics fields (STEM) in pre-college students through educational science and robotics programs in the school systems of the state of Georgia and the Southeast. Serves as a judge for BEST and FIRST robotic tournaments at the district, state, and international levels.

Board of Directors Member of STEM Compass, Inc.., a Georgia headquartered, Not-for-Profit Corporation formed for the purpose of attracting and retaining "at-risk" youth who pursue STEM careers by exposing them to transformative educational experiences which inspire and empower them to be innovators and leaders in technology.

Lead Mentor and Technical Trainer for the Fernbank LINKS Robotics Team, a DeKalb County high school competition robotics team in Decatur, Georgia, composed of students from a number of public, private, and home school groups. The primary focus is to promote Science, Technology, Engineering, and Mathematics (STEM) in the community and on a larger scale.

Past Chief Financial Officer, Member of Board of Directors, and Past Chairman of the Board of Directors of the Atlanta Institute of Musicianship and Singing/Atlanta Youth Choir, Inc. (formerly The Metropolitan Atlanta Young Singers, Inc.) an internationally recognized, Not-for-Profit Corporation, dedicated to children's choral music and performance training

Past Board of Directors Member for the New London Theatre, a Not-for-Profit community theatre company.

Past Chairman of the Board of Directors of Whispering Pines Airpark, Inc, a private community airpark whose purpose is to own and safely operate and maintain an airport facility for its residential member use.

Education

- Bachelor of Civil Engineering from Georgia Institute of Technology, Cooperative Program 1970-1975

- Courses toward a Master's in Business Administration, Georgia State University, 1981-1983

Relevant Papers & Presentations

- Foley, J.M. and Graham, J.A., "FERC Is Holding Utility Transmission Projects To A Higher Standard For Cost And Incentive Recovery", July 2013
- Foley, J.M. and Bowland, B. P., "Protecting Proprietary Data without Compromising Regulatory Compliance", published in NCMA Contract Management Journal, January 2010
- Foley, J.M. and Bowland, B. P., " Small Business Administration Joint Venture Rules", published in NCMA Contract Management Journal, February 2010
- Foley, J.M. and Bowland, B.P., "Unpopulated Joint Venture/Limited Liability Companies: Contract Administration, Performance Reporting, and Compliance", published in NCMA Contract Management Journal, tbd
- Foley, J.M. and Bowland, B.P., "Unpopulated Joint Venture/Limited Liability Companies: Formation and Exit Strategies", published in NCMA Contract Management Journal, March 2010
- Foley, J. M. and Luciano, G. L., "Why Planning Fails?" Paper and Presentation at the 1990 American Association of Cost Engineers' Mid-Winter Symposium and 1991 American Power Conference, Chicago, IL
- Foley, J. M. and Dittmar, L. A., "Rising Nuclear Production Costs: A Challenge for the Nuclear Alternative" Paper and Presentation at the 1991 American Nuclear Society 15th Biennial Reactor Operations Division Topical Meeting on Reactor Operating Experience.
- Foley, J. M., "A Structured Approach to Evaluating Environmental Cleanup Projects", June 1995
- Foley, J. M. and Cavan, B. P., "Environmental Decision Making with Certainty: Uniting Environmental Issues and Economic Performance", Presentation at the Sixteenth Annual Southeast Advisory Committee Inland Marine Underwriters Association Continuing Education Seminar, Atlanta, GA
- Foley, J. M. and Cavan, B. P., "Is There Green in Brownfields or are They Just Another Blackhole?" Presentation at the Environmental Risk Management Services Winter 1996 Seminar, Nashville, TN

Relevant Training

- Postgraduate work toward a Master's of Business Administration, Georgia State University, Atlanta, GA.
- Numerous documented continuous education courses in engineering, project management, business management, project controls, cost engineering and estimating, budgeting, scheduling, performance measurement using earned value, risk management, change management, construction contract law, dispute resolution, and decision making.

Professional Registration and Certifications

Registered Professional Engineer in Georgia (#12647)
Registered Professional Engineer in Illinois (#062-059002) (in-active)
Project Management Professional (PMP) (#1740575)
Certified Cost Professional (CCP) by the Association for Advancement of Cost Engineering (#1506)
Certified Valuation Analyst (in process)
American Arbitration Association Panel of Neutrals (in active)
Licensed as a Single Engine Land Airplane Pilot

Software Proficiency

Primavera P6, MS Project Professional, Oracle Primavera Risk Manager, MS Office, Crystal Ball, @ Risk, Visio, Prezi, MindJet, Success Estimator, Success Enterprise, Cobra, Prism, and SharePoint

Representative FACILITY DECONTAMINATION/DECOMMISSIONING Experience

- **Executive Consultant** to High Bridge Associates, Inc., with responsibility for leading a seasoned team of subject matter experts in the independent review of PG&E's decommissioning cost estimate and schedule for Diablo Canyon Power Plant.
- **Executive Consultant** to Consolidated Decommissioning International, LLC (CDI), a Joint Venture partnership formed by Atkins Global and Holtec with responsibility for leading, supervising, and participating as a member of the Cost Management Group in the preparation of the integrated technical/cost/schedule Baseline Plans for the fuel removal and facility decommissioning of several national and international nuclear power plants (Pilgrim, Palisades, Oyster Creek, Crystal River 3, Ringhals, and Barakah). Subject Matter Expert on project controls and risk management to establish cost and schedule reserves for estimate uncertainty and risk events.
- **Executive Director and Consultant to TerranearPMC-Energy*Solutions* Environmental Services 2008 LLC (TES)** responsible for providing technical subject matter expertise in contract management and recovery of about $2 million in costs associated with changed conditions and schedule delays on a $1.6 million firm fixed price contract with the USACE Buffalo District to provide several field investigative methods to delineate the vertical and horizontal extent of the beryllium and other contaminates of concern in the surface and subsurface soils at the LUCKEY FUSRAP site.
- **Executive Director and Consultant to TerranearPMC-Energy*Solutions* Environmental Services 2008, LLC (TES)** responsible for successfully providing technical subject matter expertise in contract management and recovery of more than $1.8 million in costs associated with changed conditions on a firm fixed price IDIQ contract with the Army Contracting Company-Rock Island for the packaging, transportation and disposal of radioactive and other hazardous materials from the former Hunters Point Shipyard in San Francisco, CA.
- **Executive Director and Consultant to TerranearPMC-Energy*Solutions* Environmental Services 2008, LLC (TES)** responsible for providing technical subject matter expertise in contract management and recovery of certain costs associated with changed conditions on a firm fixed price IDIQ contract with the Army Contracting Company-Rock Island for remediation services for the free release/decommissioning and license termination of USDA operated Beltsville Agricultural Research Center burial site in Beltsville, MD.
- **Consultant to confidential commercial nuclear utility client and its legal counsel** in matters related to the on-going decommissioning of its nuclear power facility. Performed a comprehensive technical evaluation of contract management and contract administration practices associated with its prime contract for decommissioning operations services. Focus areas included the contract; company organization; company policies, procedures and guidelines; work management; contractor performance management; change management, claims and dispute resolution; and document management. Evaluation was prepared in anticipation of proceedings before the Federal Energy Regulatory Commission and other legal forums.
- **Consultant and Technical Expert to Alston and Bird and its client** involved in a civil dispute over an extensive environmental cleanup of environmental contamination caused by a leaking

underground fuel storage tank. Provided retrospective cost engineering, scheduling, damage assessment, and deposed as a technical expert to support civil legal actions over an extensive cleanup of environmental contamination caused by a leaking underground petroleum storage tank. Assessed the reasonableness of the actual cleanup duration and costs, determined the range of probable costs associated with an "as-should have been" cleanup work scope, prepared damage theories and quantified the magnitude of actual cost damages.

- **Consultant to a confidential environmental engineering company and their insurance company**. Provided retrospective cost engineering, scheduling, damage assessment, and structured settlement services to quantify damages and the range of financial liabilities resulting from alleged engineering errors and omissions that occurred during disposition of hazardous waste from the site before construction on the Alamo Dome and Various Landfills in San Antonio, TX.
- **Consultant to Nuclear Energy Services** on its subcontract work during the decommissioning of the Shippingport Nuclear Facility located in Shippingport, PA. Provided retrospective cost engineering, scheduling, damage assessment, and claim preparation services to prepare and present damage theories and actual schedule and financial damages resulting from schedule delay, interference, inefficiency, constructive acceleration, extended periods of performance, and time extensions.
- **Executive Consultant and Technical Expert to BNFL, Inc.** on various change order and request for adjustment matters related to its several hundred-million-dollar prime contract with the DOE for decontamination, decommissioning, and recycling services for three Gaseous Diffusion Plant buildings (K-29, K-31, and K-33) in the East Tennessee Technology Park (formerly the K-25 Site). Provides strategic guidance, thought leadership, and technical support services to assist and otherwise support efforts to plan, research, analyze, prepare, and present the appropriate documentation and related information in order to successfully recover costs associated with the impacts arising as a result of the many unforeseeable direct impact changes during the contract lifecycle that were attributable to others. Provides technical guidance and analytical support in the areas of 1.) Research/review/preparation of "as-planned" project schedules and other initial project performance baselines; 2.) Forensic (retrospective) reconstruction and support of the "as-built" project schedule and other actual performance indicators; 3.) Schedule and other performance variance analysis from "as-planned" in order to i.) identify and segregate the changes attributable to the government and/or any other causal factors, ii.) measure the schedule and performance impact of the identified and segregated changes and quantify the resultant costs, and iii.) support the measurement and pricing of delay, disruption, interference, acceleration, and impacts arising from various forms of contractual entitlements.

Mark A. Gunderson

Senior Project Manager/Senior Estimator

PROFESSIONAL SUMMARY

Mr. Gunderson has over 35 years of professional experience in the mining, heavy industrial, oil & gas, and utility industries. He has a background in various types of large project management; cost estimation; construction management; design oversight and modification implementation; cost and time management; personnel and sub-contractor management involving from 50 to 1200+ people; and client/regulatory agency relations for mining, oil & gas, and industrial industries. Mr. Gunderson's areas of specialization include large project management, cost estimation, ferrous and non-ferrous salvage valuation, remedial/rehabilitation action projects associated with contamination, and new construction projects. Demolition/environmental projects included demolition of obsolete mining equipment at Climax Molybdenum Mine (CO) such as ore conveyors, above ground and underground piping, PDCs and electrical systems, gear reduction drives, and crusher components – all completed to facilitate the installation of new equipment. The demolition of former Stapleton International Airport in Denver, CO was also a large project, which included the demolition of the main terminal, five concourses, large airplane hangars, many airport support buildings, large fuel storage tanks, underground fuel piping, storm/sanitary sewers, concrete duct banks, concrete taxiways, all concrete runways, and all support vehicle roadways.

RECENT SAFETY TRAINING

- 40-Hour OSHA Training, Hazardous Waste Site Operations (29CFR1910.120); 8-Hour OSHA Refresher Course (29CFR1910.120)
- MSHA 8-Hour Refresher Course
- Online Safety Training
- Supervisory training: Multiple courses in project management, staff supervision, technical, constructability, cost, and budget reviews

PROFESSIONAL EXPERIENCE

Northwest Demolition & Dismantling – Portland, Oregon

3/2017 – Present

SENIOR PROJECT MANAGER/SENIOR COST ESTIMATOR

- Senior Project Manager on the complete demolition and dismantling of a $700M molybdenum autoclave processing plant at the Rio Tinto/Kennecott Copper Mine in Utah.
- Project includes the management of several subcontractors and NWD&D personnel in the execution of the project, along with schedule and cost management weekly. Also for the Rio Tinto/Kennecott Copper Mine, generated a Final Closure
- Report for the mine, complete with compilation of salvage weights and related

monetary values, coupled with the demolition costs for the all areas of the mine.

- Provided Decommissioning & Demolition Estimates for Fossil Fuel Electrical Generating Stations (ferrous/non-ferrous metal salvage values, surface and subsurface demolition of all facilities, and Nuclear Fueled Electrical Generating Stations (ferrous/non-ferrous salvage values of non-radiation contaminated components, weights/volumes of radiation contaminated components, demolition methods/costs/durations of both contaminated and non-contaminated components/structures), including the following facilities:
    - Vermillion Coal Fired Generating Station, Oakwood, IL
    - Elrama Coal Fired Power Plant, Units 1-4, Elrama, PA
    - Monticello Coal Fired Power Plant, Units 1-3, Mt. Pleasant, TX
    - Big Brown Coal Fired Power Plant, Units 1-2, Fairfield, TX
    - Sandow Coal Fired Power Plant, Units 4-5, Rockdale, TX
    - Pilgrim Nuclear Generating Station Unit 1, (Entergy), Plymouth, MA. This decommissioning and demolition proposal included – demolition methods, demolition costs/durations, radiated and non-radiated material quantities were assessed with final numbers and methods developed.
    - Palisades Nuclear Generating Station Unit 1, (Entergy), Covert, MI. This decommissioning and demolition proposal included – demolition methods, demolition costs/durations, radiated and non-radiated material quantities were assessed with final numbers and methods developed.

CB&I – Greenwood Village, Colorado
8/2014 – 9/2016
SENIOR COST ESTIMATOR/SENIOR PROJECT MANAGER

- Provided Decommissioning & Demolition Estimates for Fossil Fuel Electrical Generating Stations (ferrous/non-ferrous metal salvage values, surface and subsurface demolition of all facilities, including FGD, Bottom Ash, and Fly Ash Pond Closures) and Nuclear Fueled Electrical Generating Stations (ferrous/non-ferrous salvage values of non-radiation contaminated components, weights/volumes of radiation contaminated components, demolition methods/costs/durations of both contaminated and non-contaminated components/structures), including the following facilities:
    - Westar Energy, Lawrence Energy Center and Jeffrey Energy Center, Lawrence, KS and St. Marys, KS
    - PacifiCorp Jim Bridger Generating Station, FGD Pond 1 Closure, Rock Springs, WY
    - PacifiCorp Naughton Generating Station, FGD Ponds 1 & 2 Closures, Kemmerer, WY
    - San Onofre Nuclear Generating Station Units 2 - 3, Southern California Edison, San Clemente, CA. This decommissioning and demolition proposal included – demolition methods, demolition costs/durations, radiated and non-radiated material quantities were assessed with final numbers and methods developed.
    - Huntington Beach Generating Station Unit 5, AES, Huntington Beach, CA

- Alamitos Generating Station Unit 7, AES, Long Beach, CA
- Reid Gardner Units 1- 4, NVEnergy/Berkshire Hathaway Energy, Moapa, NV
- Conners Creek Power Plant, Units 15-16, DTE Energy, Detroit, MI
- Kammer Generating Station Units 1- 3, Global One/AEP, Moundsville, WV
- Zion Nuclear Generating Station Units 1- 2, Excelon Power, Zion, IL
- Grainger Electric Generating Station Units 1- 2, Santee Cooper, Conway, SC
- Jeffries Electric Generating Station Units 1- 4, Santee Cooper, Moncks Corner, SC
- Empire Generating Station Units 1- 3, Empire Generating Company, LLC, Rensselaer, NY
- Eddystone Electric Generating Station Units 1- 2, Excelon Power, Essington, PA
- Mystic Generating Station Units 1- 6, Excelon Power, Charlestown, MA
- Benning Generating Station Units 15- 16, PEPCO Energy Services, Washington, DC
- Buzzard Point Generating Station Units 1- 16, PEPCO Energy Services, Washington, DC
- KAW Generating Station Plant Units 1- 3, Kansas City Board of Public Utilities, Kansas City, KS
- Mountain Creek Generating Station Units 1- 3, Exelon Power, Grand Prairie, TX
- Georgia Pacific Camas Generating Station Unit 1, PacifiCorp/Berkshire Hathaway Energy, Camas, WA
- Four Corners Units 1- 5, Arizona Public Service (APS), Fruitland, NM

Northern Plains Region – Willbros Construction U.S. – Englewood, Colorado
8/2013 – 8/2014
BUSINESS DEVELOPMENT MANAGER

- Managed the business development effort for a company, focused on the installation of gathering and cross-country pipelines, compressor stations, tank farms, and pump stations for the transfer of crude oil and natural gas.
- Areas of coverage included the Rocky Mountains and the northern plains, including CO, WY, UT, ID, MT, MN, and ND.
- In one year, was able to increase the value of projects won from $70M to $120M+.

Shaw Environmental & Infrastructure, Inc. – Centennial, Colorado
11/2011 – 11/2013
SENIOR COST ESTIMATOR/SENIOR PROJECT MANAGER

- Provided Decommissioning & Demolition Estimates for Fossil Fuel Electrical Generating Stations – ferrous/non-ferrous metal salvage values, and surface and subsurface demolition of all facilities.
- Provided project management on other projects in the oil & gas arena located in Niobrara Play in Colorado and the Bakken Shale Play in North Dakota.

Jacobs Field Services, Inc. – Climax/Freeport Molybdenum Project – Leadville, Colorado
10/2008 – 11/2011
BALANCE OF PLANT (BOP) PROJECT MANAGER/CONSTRUCTION MANAGER

- Provided field supervision and coordination of multiple subcontractors, which included 1200+ people of all trades and supervisory positions, on a mineral processing plant and continued maintaining daily interaction with Climax/Freeport personnel during all construction phases as the voice and representative of the total project which exceeded $900M.

BP Wamsutter Stabilization Plant – Wamsutter, Wyoming
PROJECT MANAGER/CONSTRUCTION MANAGER

- Lead the writing and arrangement of the Request for Proposal for the civil/structural, piping, instrumentation, and mechanical upgrades that were being done to improve product quality, increase the plant throughput, and reduce plant downtime. Also lead the pre-bid conference and the interviewing of the pre-screened general contractors during the final selection process.

Manlove Gas Storage Field – Near Champaign, Illinois
PROJECT MANAGER/CONSTRUCTION MANAGER

- Project Manager/Construction Manager for the in-line inspection phase that served as the major input to the Engineering Study of the natural gas gathering system at the Manlove Gas Storage Field near Champaign, IL.
- Six segments of the gathering system were identified as representative of the total field and were either pressure inspected or tether inspected with both a geometry inspection tool and a metal loss inspection tool (Magnetic Flux Leakage).
- The data gained from these tools provided the basis of one replacement option under consideration by the client.
- Assisted with the development of the Final Report and was part of the team that presented the findings and conclusions to the client at Champaign, IL.

Jacobs Field Services, Inc. – MillerCoors Brewing Facility – Golden, Colorado
CONSTRUCTION MANAGER

- Provided coordination to many subcontractors who were doing extensive isolation and rework to allow the Coors facility to brew and containerize Miller products.
- $100M project was extremely fast tracked and with construction leading engineering in all areas, posing many dilemmas which had to be resolved quickly to allow construction to continue.

Jacobs Field Services, Inc. – Climax/Freeport Molybdenum Project – Leadville, Colorado
CONCENTRATOR AREA PROJECT MANAGER/CONSTRUCTION MANAGER

- Provided field supervision of multiple subcontractors on a $980M mineral processing plant.
- Demolition of obsolete components, large rotating equipment, heavy piping, electrical

systems, multiple utilities, large industrial buildings, steel erection and foundation placement, cold weather and extreme working conditions were all part of the project.

Parsons Corporation – Denver, Colorado
12/2005 – 10/2008
COST ESTIMATOR/SENIOR CONSTRUCTION MANAGER

- Provided cost estimating and home office construction management support for multiple projects and commercial clients. Projects included:
    - City and County of Denver – Oversaw $70M in major infrastructure, storm drainage, parks, and sanitary sewer work. Many miles of pipelines were installed, including large diameter jack& bores (up to 10 feet diameter) under railroads and highways, sanitary sewers, storm sewers, water lines, including high pressure steel mains up to 6 feet diameter, pipe bursting efforts using HDPE fusion welded pipe horizontally bored under downtown city streets, along with associated curb, gutter, sidewalk, and pavement demolition and replacement. Actively managed a city-wide construction and related safety program for multiple contractors and multiple sites, all on a fast-tracked schedule to minimize time of interference with the public. Numbers of personnel subcontractor personnel involved would exceed 200 throughout each year.
    - Major Oil Company – Lead conceptual cost estimator for oil shale development in western Colorado involving excavation, site development, and reclamation efforts for huge areas involving thousands of acres and costs of $1.5B+.
    - San Diego City College System – Lead construction schedule developer for several large building renovations and the construction of new buildings/infrastructure.
    - Las Vegas, Nevada Veterans Administration Hospital and Medical Complex – Lead constructability and estimate reviewer on this new medical complex, including all related infrastructure.

Soil Excavation and Demolition Projects, ESA – Denver, Colorado
4/2004 – 12/2005
PROJECT MANAGER/ESTIMATOR

- Project Manager for demolition projects and soil remediation projects impacted by buried ACM materials such as transite.
- Projects included many months spent in Florida managing crews doing the blue roof installations on homes with roof damage after the hurricane season.

Montgomery Watson Harza – Soil Excavation and Environmental Project – Broomfield, Colorado
1/2000 – 4/2004
PROJECT MANAGER

- Project Manager for demolition projects and soil remediation projects impacted by jet fuel, gasoline, glycol, solvents, and other contaminants.

- Demolition projects involved asbestos abatement, PCB ballast removal, and containerization with correct manifesting and chain of custody of all contaminants, prior to shipping to an approved disposal facility.
- Demolition projects included many large commercial airplane hangars, main terminal and concourses, with strong emphasis on recycling of all possible constituents, consequently minimizing the waste stream and the related costs.
- Soil remediation also involved abatement of transite pipes and ACM wrapped fuel lines with correct manifesting and disposal of the asbestos material.
- Responsibilities included daily monitoring of contractors, contract administration, change order management, quality control/assurance, regulatory compliance, review of safety programs, review of pre-characterization data, review/approval of confirmatory analytical data, review/editing of Corrective Action Plans, and review/editing of Corrective Action Plan Implementation Reports once remediation had been completed.
- The 4700 acre Stapleton site is the largest Brownfield Development site to date in the United States, consisting of the removal of several million cubic yards of overburden, extraction of a million plus cubic yards of contaminated soil, recycling millions of tons of concrete and asphalt runway, demolition of all concourses, terminal, support buildings, and hangars, and the removal of all infrastructure, allowing future development of residential, commercial and retail sites. Total remediation cost will be in excess of $900M.

ERI Inc. – Construction Projects – Denver, Colorado
4/1998 – 1/2000
PROJECT MANAGER

- Managed construction of a permanent water treatment facility and related offices; tasks included equipment leasing, personnel management, health and safety monitoring, purchasing and quality control.

Asphalt Road Construction Project
PROJECT MANAGER

- Managed construction of a two-mile, two-lane, asphalt road.
- Project included road base preparation of several cuts and fills, elevation controls, compaction requirements/results, poured in place low water crossings and cattle guards, sub-base preparation and asphalt paving.
- Work included equipment leasing, subcontractor procurement / negotiation / coordination, personnel management, health and safety awareness and daily monitoring, design implementation/modification, cost tracking/control, client interface, and the fostering of excellent community relations.

Phillips Reclamation Inc. – Reclamation Projects – Lafayette, Colorado
1/1988 – 8/1992 & 8/1995 – 4/1998
PROJECT MANAGER

- Responsible for the re-vegetation of disturbed areas and right-of-way associated with construction of a thirty mile, four-lane highway system.

- Activities included personnel management, health and safety control, daily report preparation and client relations on a project that exceeded 1500 acres.

Wetlands Project
PROJECT MANAGER

- Planned and re-vegetated newly constructed wetlands with selection of appropriate plant life based on water levels, sedimentation concerns, and aesthetic appeal.

Westinghouse Remediation Services – Minneapolis, Minnesota
8/1992 – 8/1995
PROJECT MANAGER

- Managed the installation of a low permeability clay cap at a former disposal site.
- Project included the placement of a geotextile fabric and a geomembrane liner on a riverbank for stabilization and to ensure success of the soil vapor extraction system.
- Work included equipment leasing, sub-contractor coordination, personnel management, health and safety issues, design modification, cost accounting, purchasing and daily report preparation, and client interface.

Contaminated Soil Removal Project
PROJECT MANAGER

- Managed removal of several thousand tons of PCB and TCE contaminated soil from within the affected facility.
- Soil vapor extraction pumps were used to lower the TCE limits, thereby allowing for a more cost effective final disposition of the contaminated soil.
- Responsible for equipment procurement, personnel management, health and safety issues, correct routing and shipment of material, daily cost accounting accompanied by daily reports, quality control and client interface.

Prison Excavation Project
PROJECT MANAGER

- Managed excavation of several thousand tons of material from a former state prison and shipment of the material to approved facilities.
- Directed the surgical excavation of the landfill to determine lateral limits and depth limits of contamination.
- Extensive field sampling was incorporated to route segregated wastes to approved facilities for final disposition.
- Work included equipment leasing, subcontractor coordination, personnel management, health and safety, sampling and monitoring, cost accounting, daily report preparation, and final report.

Removal and Shipment Project
PROJECT MANAGER

- Directed stabilization removal and shipment of benzene and PAH contaminated sludge and soil from a former coal gasification plant to a coal fired generating plant where the material was used as an industrial fuel.

- Activities included personnel management, health and safety management, equipment procurement, coordination of subcontractors, daily cost accounting and daily reports, sampling and final report.
- Directed the restoration of the site following the removal of 3000 tons plus of contaminated material.

Contaminated Site Clean Up
PROJECT MANAGER

- Managed cleanup of a site contaminated with more than 200 drums containing unknown products in the gaseous, liquid, and solid phases.
- Extensive sampling and analytical work were used to allow correct waste profiles and subsequent waste management.
- Wastes included various solvents, lead based paints, inks, petroleum products, chrome plating wastes and others.
- Directed equipment leasing, personnel management, daily cost accounting and scheduling, health and safety plans and final report preparation.

BG Homes LTD – Home and Commercial Construction – Fargo, North Dakota
6/1970 – 8/1987
PROJECT MANAGER

- Managed construction of several hundred single-family homes and several thousand units of apartments and condominiums.
- Tasks included personnel management, health and safety, subcontractor scheduling and management, equipment and material procurement, quality control, and cost control/management.

Office Building Constructioin
PROJECT MANAGER

- Managed construction of many office buildings and large commercial warehouse/retail buildings.
- Work included personnel management, health and safety management, subcontractor scheduling and management, equipment and material scheduling/procurement, quality control and cost control management.

EDUCATION

University of Colorado
M.S., Environmental Science/Engineering

Concordia College – Minnesota
B.A., Biology

JAMES E. LOOMIS

SUMMARY

Mr. Loomis is a senior construction management professional with over 40 years of EPC experience in managing, assessing, planning, scheduling, and estimating of engineering, design, and construction for large projects. This includes nuclear power plants, government remediation facilities, and advanced technology projects. He has extensive experience supporting facility owners in managing the interfaces for engineering, procurement, and construction contractors; and a solid background with planning/preparing for site infrastructure and facilities, construction crane and equipment utilization, field non manual staffing needs, and overall mobilization of large nuclear projects.. Some relevant experience includes development of construction indirect and distributable estimates for Shaw Nuclear for six AP1000 units; managing construction completion of the BNFL AMWTP Idaho facility for processing mixed radioactive waste; and managing engineering and construction for the LMES Pit 9 Idaho waste management project. He also supported the preparation of a detailed cost estimate for construction of the LES National Enrichment Project (NEP).

Mr. Loomis has experience that includes 13 years with High Bridge Associates/Team Associates, 5 years as an Independent Consultant, and 26 years with Stone and Webster. He has held assignments supporting planning, contracting strategy development, mobilization, and execution of a major nuclear power plant construction program for Dominion North Anna 3; coordination of the development of an engineering, procurement, and construction schedule for the Richland River Protection Project multi-billion dollar nuclear remediation facility; resolution of construction claims; and overview of engineering/construction schedules. He is a results-oriented manager with excellent people, organization, and communication skills. As a Licensed Professional Engineer with a BS in Mechanical Engineering, he has extensive consulting experience in the management, assessment and closeout of firm price construction projects; claims analysis and resolution; implementation of project management systems; and construction contracting. Experience highlights include:

High Bridge Associates, 2004 to Present

- Refined indirect and distributable estimates for reducing the construction schedule for the V.C. Summer Nuclear Station Units 2 and 3
- Developed a non-manual staffing estimate for construction of nuclear units at the Calvert Cliffs Unit 3 Project and reviewed the contractors estimate for same
- Performed an independent price and schedule analysis of vendor proposals for a large nuclear unit for the Dominion Energy North Anna 3 Project
- Performed an assessment of the construction estimate for a 1500MW Economic Simplified Boiling Water Reactor (ESBWR) for Dominion Energy for the North Anna 3 Project
- Developed distributable construction estimates for construction of two Westinghouse AP1000 Pressurized Water Reactor Power Stations on three different utility sites
- Review and validation of construction schedules for the > $10 billion US DOE Waste Treatment Project
- Development of detailed construction cost estimate for a multi-billion dollar uranium enrichment facility
- Independent assessment of the construction cost estimate for the US DOE Mixed Oxide Fuel Facility

Team Associates Inc., 1997 to 2004

- Managed construction completion of the Advanced Mixed Waste Treatment Facility for BNFL, Inc.
- Resolved construction subcontract claims for BNFL Inc. on the Advanced Mixed Waste Treatment project at INEEL. Provided construction scheduling and estimating assistance
- Managed pre-construction activities for the radioactive waste treatment plant at Hanford and the development of an integrated project schedule
- Managed high-level reviews of BNFL's fixed price estimates for vitrification of radioactive wastes at Hanford, and processing of mixed waste at INEEL
- Provided project management support and cost/schedule assessments for BNFL's fixed price disassembly and decontamination of uranium enrichment facilities at Oak Ridge, TN

Independent Consultant, 1993 to 1996

- Evaluated technical and management issues in support of nuclear utility litigation
- Engineering and Construction Manager for a privatized radioactive waste remediation facility at INEEL
- Provided management and technical support for completing a firm price contract for erection of two 150MW coal fired boilers, including resolution of a major subcontractor claim
- Assessed contractor activities and organizations at the U.S. DOE Hanford site
- Performed cost and schedule assessments of firm price construction projects

Stone & Webster Engineering Corporation, 1966 to 1992

- Managed multi-disciplined fifty person staff providing technical support to the U.S. Department of Energy at Richland, WA, 1987 to 1992
- Construction Manager/Superintendent: Clinton Nuclear Station, 1982 to 1986; River Bend Nuclear Station, 1979 to 1981; and Nine Mile Point Nuclear Station, 1974 to 1979
- Extensive experience in planning and organizing construction projects, including constructability, maintainability, and operability reviews, contracting plans, site layout, engineering/construction interface, and project management systems
- Provided plant arrangement input for the Advanced Light Water Reactor program at the Electric Power Research Institute
- Conducted cost, schedule, and technical assessments of commercial and DOE nuclear projects and facilities

EXPERIENCE DETAILS

August 2005 to Present
High Bridge Associates, Inc.

January 2011 to February 2011
High Bridge Associates
Assisted Shaw Nuclear with refining estimates for reducing the construction schedule for the V.C. Summer nuclear station Units 2 and 3

November 2010 to December 2010
High Bridge Associates
Estimated the indirect estimate for extended power up-rates at the Point Beach Nuclear Station

June 2010 to July 2010
High Bridge Associates
Reviewed the indirect estimate for construction of a NuScale small reactor plant

June 2010 to July 2010
High Bridge Associates
Developed a non-manual staffing estimate for construction of nuclear units at the Calvert Cliffs site and reviewed the contractors estimate for same

May 2010
High Bridge Associates
Reviewed a proposed plan for reducing construction duration for AP1000 nuclear plants at two different sites being constructed by Shaw Nuclear

April 2010 to June 2010
High Bridge Associates
Provided expert review of data relating to a contractors claim submitted to a client for construction of a military installation in Iraq

November 2009 to December 2009
High Bridge Associates
Reviewed the Indirect Estimate for construction of 2 Nuclear Plants at the South Texas site

May 2009 to October 2009
High Bridge Associates
Participated in a price and schedule analysis of vendor proposals for a large nuclear unit for the Dominion Virginia Power North Anna Site

November 2008 to December 2008
High Bridge Associates
Reviewed a construction estimate for a 1500MW Economic Simplified Boiling Water Reactor (ESBWR)

May 2007 to June 2008
High Bridge Associates
Prepared distributable construction estimates for construction of two Westinghouse AP1000 Pressurized Water Reactor Power Stations on three different utility sites. Work was performed for Shaw Nuclear in Charlotte, NC.

March 2007
High Bridge Associates – Performed for Project Time & Cost
Reviewed Bechtel National, Inc. Requests for Equitable Adjustment for engineering and construction of DOE's Waste Treatment Facility in Richland, WA.

December 2006 to February 2007
High Bridge Associates
Coordinated preparation of a detailed cost estimate for construction of the Louisiana Energy Services (the URENCO US subsidiary) Nuclear Enrichment Facility in Eunice, NM

November 2006
High Bridge Associates
Prepared a detailed cost estimate for a major upgrade project at Duke Energy's Oconee Nuclear Station.

December 2005 to September 2006
High Bridge Associates – performed for Project Time & Cost for the U.S. Army Corps of Engineers
Review and verification of the Estimate at Completion for the> $10 billion Waste Treatment Plant being designed and constructed by Bechtel National, Inc. for the Department of Energy at Richland, WA. Specific areas of involvement included construction unit installation rate reviews, and construction schedule reviews to assess validity of logic, interfaces, durations, and resource integration.

November 2005
High Bridge Associates
MOX Fuel Fabrication Facility for Duke COGEMA Stone & Webster, LLC
Performed a review of the construction cost estimate for this multi-billion dollar facility.

August 2005
High Bridge Associates
Shaw Environmental & Infrastructure, Houston, TX
Provided support for proposal preparation for several flood control projects as part of a larger effort to improve Shaw's estimating process.

September 2004 to November 2004
Independent Consultant - Burns & Roe
Yucca Mountain Project, Las Vegas, NV
Developed baseline construction estimating unit rates for use in an independent estimate of this Department of Energy project

August, 2004
Independent Consultant - Longenecker & Associates
Developed program for processing low level radioactive waste in support of a proposal for clean-up management at the Idaho National Environmental & Engineering Laboratory

May 1997 to May 2004
Team Associates Inc.

April 2004 to May 2004
BNFL, Inc.; Idaho Falls, ID

Advanced Mixed Waste Treatment Facility
Assisted with finalizing the Operating Estimate for AMWTP

August 2003 to March 2004
BNFL, Inc.; Richland, WA
Acting Corporate Project Controls Manager for BNFL, Inc.

July,2002 to July 2003
BNFL, Inc.; Idaho Falls, ID
Advanced Mixed Waste Treatment Project

February, 2003 to July 2003
Construction Completion Manager for the Advanced Mixed Waste Treatment Facility at the INEEL. Responsibilities include the completion of construction acceptance testing and turnover of the facility to commissioning.

July, 2002 to February, 2003
Provided assistance in resolution of increases requested by the construction subcontractor on a $100 million subcontract. Supported the Project Controls organization in the analysis and development of construction schedules. Provided schedule analysis and estimating support for contract adjustments and potential projects.

March, 2001 to May, 2002
Bechtel National, Inc.; Richland, WA
River Protection Project-Waste Treatment Plant
Provided consulting support to the Project Controls and Construction Organization. Assisted in developing the baseline schedule and the more detailed Construction schedule for the $1 Billion Pretreatment Facility. Facilitated the resolution of multidiscipline issues impacting the facility schedule. Provide constructability support during conceptual engineering and design.

October, 2000 to February, 2001
CH2M Hill Hanford Group, Inc.
River Protection Project-Waste Treatment Plant
Richland, WA
As Deputy Construction Manager for the River Protection Project - Waste Treatment Plant managed construction department activities for constructability reviews, design interface, site development, installation of temporary construction facilities, and planning of construction transition from CHG to the WTP contractor selected by DOE-ORP. Managed an effort to integrate the WTP construction schedule with the design schedules for the several facilities that comprise the WTP.

July, 2000 to September, 2000
BNFL, Inc.; Boise, ID
Managed a top-down review of BNFL's firm fixed price estimate for engineering, construction, start-up, and operation of the Advanced Mixed Waste Treatment Project located at the Idaho National Environmental and Engineering Laboratory.

March, 2000 to April, 2000
BNFL, Inc.; Richland, WA
Managed a top-down review of BNFL's firm fixed price estimate for engineering, construction, start-up, operation, and deactivation of the River Protection Project - Waste Treatment Plant for vitrifying radioactive wastes currently stored in underground tanks on the Hanford site.

April, 1999 to November, 1999
BNFL. Inc.; Oak Ridge, TN
Developed a revised estimate and schedule for the dismantlement and decontamination portions of BNFL's contract for D&D of three gaseous diffusion facilities at the K-25 area. Managed an effort to walk-down/take-off the quantities of material to be removed from the facilities by BNFL for the purpose of determining an equitable adjustment to BNFL's contract, which is based on the weight of material to be removed. Determined the impact of the increased quantities found as a result of the completed K-33 building walk down. Assisted the BNFL procurement/contracting organization with contract interpretation and development of cost recovery strategies.

Sept, 1998 to Jan, 1999
Manufacturing Services Corporation
Oak Ridge, TN
Prepared contract/scope of work documents for construction projects. Implemented a design control process.

May, 1997 to July, 1998
Duke Engineering & Services, Inc.
Managed two projects for spent nuclear fuel retrieval at K Basins on the U.S. DOE Hanford site.

1993 to April, 1997
Independent Consultant

Sept, 1996 to April, 1997
The Nielsen-Wurster Group, Inc.
Princeton, NJ
Provided expert evaluation of technical issues in support of nuclear utility litigation. Provided technical support to a D&D Contractor for cost recovery resulting from changed conditions to a fixed price contract at a DOE Site.

June, 1995 to August, 1996
Lockheed Martin Advanced Environmental Systems
Engineering and Construction manager for the privatized Pit 9 environmental remediation facility at the Idaho National Engineering Laboratory.

November, 1993 to April, 1995
Zack Power & Industrial Co.
Provided management and technical support for completion and close out of a firm price contract for erecting two (2) 150 MW coal fired boilers, including resolution of a major subcontractor claim. Provided management support for implementation of a Total Quality Management program.

1993 and 1994
Vectra Government Services
Provided technical support for implementation of a project management system for construction and testing of an arc melter for disposal of low-level radioactive waste.
Assessed contractor activities and organizations at the US Department of Energy's Hanford site. The Nielsen-Wurster Group, Inc.
Seattle, WA
Performed cost and schedule assessments of firm price construction projects.

1966 to 1992
Stone & Webster Engineering Corporation

1987 to 1982
General Support Services Contract, US Department of Energy
Richland, WA
Managed multi-disciplined fifty person professional staff providing technical support to Richland Field Office. Performed and coordinated design and constructability reviews. Conducted assessments of ongoing Hanford projects, site facilities and operations.

1986 to 1987
Electric Power Research Institute
Palo Alto, CA
Provided constructability, modularization, and planning input for plant arrangement of Advanced Light Water Reactor Program.

1982 to 1986
Clinton Nuclear Power Station
Illinois Power Company
Managed construction activities for a 950 MW boiling water reactor.

1981 to 1982
South Texas Nuclear Project
Houston Light and Power Company
Determined basic causes of construction cost variances for pressurized water reactor under construction.

1981
Vogtle Nuclear Power Plant, Unit 1
Georgia Power Company
Assessed construction schedule developed by utility for completing a pressurized water reactor.

1979 to 1981
River Bend Nuclear Power Station
Gulf States Utilities
Directed all field force activities for a 984 MW boiling water reactor. Responsibilities included field supervision, planning, scheduling, material acquisition, engineering liaison, safety and labor relations for 2000 craft and 300 non-manual personnel. Implemented first use of the National Nuclear Stabilization Agreement which eliminated jurisdictional disputes and work stoppages. Executed innovative alternating shift schedule that significantly improved overall performance.

1974 to 1979
Nine Mile point Nuclear Station, Unit 2
Niagara Mohawk Power Corporation
Managed pre-construction and field activities for 1100 MW boiling water reactor constructed by multiple contractors. Directed layout, procurement and construction of all temporary site facilities and infrastructure. Developed and implemented contracting plans and construction management systems. Improved constructability through review of drawings and specifications.

1966 to 1974
Various Field and Office Assignments
Provided constructability, planning, and scheduling input for engineering, procurement, and construction of nuclear and fossil power plants.

EDUCATION

BS, Mechanical Engineering, Worcester Polytechnic Institute, 1966

PROFESSIONAL

Professional Engineer - New York
Member - American Society of Mechanical Engineers

HIGH BRIDGE
ASSOCIATES

STEVE R. MAEHR

SUMMARY

Mr. Maehr has more than thirty years of experience in Engineering, Project Management, and Executive leadership positions in the electric utility and management services industries. His principal areas of expertise include Strategic Planning, Business Development and Sales, Planning and Scheduling, Budgeting, Financial Planning and Accounting, Maintenance, Outage Management, Management Information Systems, Licensing, Engineering and System Testing. With degrees in Mathematics, Nuclear Engineering (BS) and Industrial Management (MS), he has held positions of increasing responsibility with electric utilities, management service contractors, and consulting/project management companies.

Mr. Maehr has a demonstrated record of accomplishment in developing opportunities and assisting customers with managing their projects, programs, and corporate operations. He is an entrepreneurial and strategic thinker, an excellent communicator, and a versatile leader. With his network of resources developed over the years by working with hundreds of owners, specialty contractors, and staff resources, he has an exceptional proficiency in assembling project teams to deliver "Just in Time" skills to customers, when and where they are needed.

PROFESSIONAL SUMMARY

(July 2003 to Present) High Bridge Associates, Inc. and Work Management, Inc.

In the role of PRESIDENT responsible for all aspects of business operations for a management services company providing consulting and project management services to Oil & Gas, Electric Utility, Information Technology and Government industries. Operational control spans all phases of business and new product development, strategic planning, recruiting, management of consulting and service projects, and profit and loss. Provides management consulting for process reengineering and management control system development.

(July 2001 to June 2003) Team Associates, LLC.

As PRESIDENT responsible for all aspects of business operations of a GE affiliate company operating under Granite Services, Inc. and providing consulting and project management services to the utility, architect-engineering, construction and government industries. Operational control spans all phases of business and new product development, strategic planning, recruiting, management of consulting and service projects, and profit and loss.

(December 1994 to June 2001) Team Associates Inc., Norcross, GA

As SENIOR VICE PRESIDENT responsible for project and business management of consulting and management control services company. Grew the company from origination to $19 MM annual revenue over a six-year period. Operational control spans all phases of business and new product development, strategic planning, recruiting, management of consulting services and service projects, and profit and loss for assigned business lines. Provides management consulting for process reengineering and management control system development. Recent experience includes: Development of integrated restart schedules, outage management processes, and work control processes for shutdown nuclear power plants (Browns Ferry, Cooper, Dresden, LaSalle, DC Cook); development of a comprehensive baseline estimate and schedule for the demolition and decontamination of DOE's Uranium Enrichment Facility at Oak Ridge, TN; assessments of engineering processes, environmental restoration Life Cycle Cost Estimates, operations & maintenance activities, and project control processes for DOE's Hanford, Savannah River, & Oak Ridge Sites; and numerous management assessments for large electric utilities.

(October 1989 to December 1994) The Spear Group Inc., Norcross, GA
In the position of VICE PRESIDENT responsible to the President to ensure the successful acquisition, control, and execution of all assigned projects. Specific duties included all aspects of day-to-day operations, including client relations and fiscal accountability. Responsible for long-range planning and development of company goals and objectives. Performed consulting services in the power generation, construction, and government defense and energy industries. Specific experience includes project management and technical oversight for the development of an activity based budgeting and accounting process for a major western utility, development of integrated cost and schedule processes for the maintenance and operating contractor for a DOE facility, and development of project cost estimates, schedules, and management control processes for the restart effort of a shutdown nuclear power plant.

(August 1978 to September 1989) TVA, Browns Ferry Nuclear Plant, Decatur, AL
As WORK CONTROL/ OUTAGE SUPERINTENDENT responsible for managing all activities associated with unit outages including defining scope, planning, scheduling and implementation. Orchestrated all plant activities associated with the restart program for the first unit to be brought back into service. Also responsible for defining and implementing the process controlling day-to-day work activities to ensure compliance with plant licensing requirements and the achievement of schedule milestones.

(September 1985 to December 1988) TVA, Browns Ferry Nuclear Plant, Decatur, AL
As MANAGER, SITE PROJECT CONTROLS & FINANCIAL SERVICES was responsible for project management, planning, scheduling, budgeting, materials management and accounting functions for all site organizations. Organized and staffed a department which performed all project control functions for a site of over 6,000 employees and annual budgets to $500M. Developed and implemented the first procurement engineering group utilized within TVA to ensure material procured for maintenance and modification activities complied with safety and quality requirements of the design basis.

(April 1984 to September 1985) TVA, Browns Ferry Nuclear Plant, Decatur, AL
As PLANNING AND SCHEDULING SUPERVISOR responsible for unit outage, maintenance and periodic test planning and scheduling for a three unit nuclear power plant. Developed and implemented an organization with responsibility for building new scheduling, tracking and management information data bases for all maintenance, engineering, and modification activities on site.

(April 1983 to April 1984) Sequoyah Nuclear Power Plant, Soddy Daisy, TN
As ASSISTANT OUTAGE DIRECTOR Responsible for the planning, scheduling and implementation of modifications and major maintenance activities for a two-unit nuclear power plant. Developed and implemented new planning programs that resulted in significant improvements in unit outage durations previously experienced. Chattanooga Corporate Office

(May 1981 to April 1983) TVA, Sequoyah Nuclear Power Plant, Soddy Daisy, TN
As REGULATORY GROUP SUPERVISOR responsible for power plant licensing interface with other TVA organizations and with the Nuclear Regulatory Commission. Developed and implemented a program involving technical review of nuclear events and experiences from other utilities. Developed an extensive knowledge of the overall design basis, operating practices, and regulatory framework involved with licensing and operating a nuclear power plant.

(December 1979 to May 1981) TVA, Sequoyah Nuclear Power Plant, Soddy Daisy, TN
In the position of NUCLEAR ENGINEER worked in the plant startup test program, operational and design change safety evaluations and the development and review of the TVA Action program in response to the Three Mile Island accident. Responsible for development of a special test program involving natural circulation tests never before performed at a commercial nuclear plant.

(August 1978 to December 1979) TVA, Sequoyah Nuclear Power Plant, Soddy Daisy, TN
In the position of PRE-OPERATIONAL TEST ENGINEER worked in the pre-op test program including researching, inspecting, coordinating, and testing of nuclear plant systems. Developed an in-depth knowledge of all phases of system testing including mechanical and electrical design verification. Assigned shift coordinator and test director for the plant hot functional test series

EDUCATION

- M.S. - Industrial Administration - Purdue University - Krannert Graduate School of Management - ***1978***
- B.S. - Nuclear Engineering - Purdue University, Lafayette, IN - ***1977***
- B.A. - Mathematics - Augustana College, Rock Island, IL - ***1977***

ANTHONY QUALANTONE

Precision Remotes LLC. (Director, Business Development) 08/2011 to Present
PRL
1101 Nimitz Ave, suite 212
Vallejo, CA 94592
John Warner, 510-215-6474, 60-80 / Hours per week

Creates strategic alliances with senior executive teams from all branches of the U.S. Military, other U.S. government agencies, international militaries, and American industry, directly supporting the protection of personnel, nuclear assets, and critical infrastructure. Conducts studies to develops plans and defense strategies with remote weapon technology. Identifies increase security plan effectiveness, opportunities to reduce O&M security cost, and maximize return on investments with the integration and deployment of remote weapons.

Entergy. (Senior Manager, Security Operations) 03/2009 to 08/2011
Entergy
1340 Echelon Parkway, Jackson, MS
Fred Marcussen, 601-572-6711, 60-70 / Hours per week

Analyse Entergy's physical security programs to develop and implement defensive strategies with offensive capabilities using advanced technologies and force deployments. Strategy redesigns provide capital saving with reduced operating expense, achieve compliance with Nuclear Regulatory Commission (NRC) "New-Rule" requirements as outline in 10CFR 73.55, and triturate any Design Basis Threat (DBT) and adversary characteristic.

SIGNIFICANT CONTRIBUTIONS:

- Developed and implemented "Phase-One" defensive strategy with offensive capability at the Waterford Nuclear Generating Plant, reducing $500,000 a month operating expense created by required compensatory measures.

Department of Energy. (Safeguards and Security Inspector Office of Safeguards and Security Evaluations) 10/2002 to 03/2009
Eagle Research Group, Inc
505 Kings Ave, Columbus, OH
Steve Henwood 614-424-7940 / Hours per week: (80 when contracted)

Primary responsibilities are to inspect safeguards and security programs at Department of Energy's (DOE) Special Nuclear Material (SNM) facilities. Coordinate with DOE senior level management on vulnerability assessments and protective strategy implementations to improve this Nation's Defense of nuclear assets.

SIGNIFICANT CONTRIBUTIONS:

- Conducted multiple security inspections to determine vulnerabilities and provided detailed threat assessments to all DOE facilities nationwide.
- Developed Composite Adversary Team (CAT) lesson plans in terrorist tactics. Instruct and developed all CAT members in the necessary skills needed provide a realistic test to improve the protection capabilities.
- Maintain Q level security clearance (Department of Defense top-secret equivalent).

Nuclear Energy Institute. (Senior Project Manager, Security) 04/2006 to 03/2009

1776 Eye Street, NW, Suite 400
Washington, DC 20006-3708
Jack Roe, 202-739-8000 / Hours per week: 40-60

Provided project management through planning, directing, and coordinating activities to address key policy and technical regulatory issues related to nuclear power plant security. Additional duties include; collect, analyse, and disseminate intelligence data on terrorist tactics/techniques, conduct vulnerability assessment and provide expert recommendations in the design of engineered physical security systems, Defense strategies, intrusion detection/video surveillance at commercial nuclear power plants with in the United States.

SIGNIFICANT CONTRIBUTIONS:

Directed multiple security/vulnerability inspections to all (64) commercial nuclear facilities nationwide.

- Directed/moderated discussions with the Nuclear Regulatory Commission (NRC), NEI, and key industry personnel to revise NEI 03-12 (Industry Physical Security Plan Template) to address changes in 10CFR 73.55.

Xcel Energy (PINGP Security Manager) 03/2003 to 04/2006

Prairie Island Nuclear Generating Plant
1717 Wakonade Drive East, Welch, MN 55089
Brian Linde, 715-377-3310 / Hours per week: 40-72

Primary responsibility was to provide the leadership necessary to exceed business case and Defense capability expectations while providing authoritative consultation and recommendations to Senior Vice Presidents and XCEL asset owners.

Developed complex policies and maintain responsibility for technical oversight on advanced technologies, coordinated interactions and conducted formal presentations on Defense philosophies and the use of advanced security technologies to senior government officials within the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), and the Department of Defense (DOD).

Coordinated and led the PINGP security force in the establishment of performance goals, objectives, and key performance indicators. Managed a seven-million-dollar annual O&M budget and assigned as management sponsor for multiple security projects involving capital monies totalling over 10 million dollars. Developed and monitor leadership performance and organizational capabilities within the PINGP security force, adjusting department structures to ensure personnel are congruent with the roles and responsibilities to the assigned mission.

SIGNIFICANT CONTRIBUTIONS:

- Designed an inimitable Defense strategy utilizing advanced technologies, establishing the paradigm in which this Nation will protect infrastructure and nuclear assets.
- Defense strategy continually benchmarked by other government agencies and military organizations as a cynosure in Defense capabilities.
- Successful completion of NRC triennial Force on Force inspection using advanced technologies.

- Established an advanced leadership development program at PINGP with demonstrable results in organizational improvements.
- Maintained O&M budget target range for 2004 at 1% over while achieving expectation to remain flat to 2003's O&M budget with no reduction in headcount.
- Sponsored a successful 6.4 million dollar security order capital project at $300,000 under budget with no increase to O&M dollars while providing possible future O&M reductions/savings.

Security Coordinator, Nuclear Management Company, 04/2002 to 02/2003
Nuclear Management Company (NMC)
700 1st Street, Hudson, WI 54016
Mark Finley, 803-345-4186 / Hours per week: 40-60

Developed and coordinated the process to roll out NMC fleet security procedures during post 9/11 NRC requirements. Developed the synergy needed for senior management involvement during the inchoate, change management, and adoption phases to security programs to ensure site accountability for successful implementation. Identified and coordinated vulnerability resolution to ensure solid base protective strategies for the NMC Fleet. Verified NMC security programs met regulatory requirements and were integrated in each site's security plan.

SIGNIFICANT CONTRIBUTIONS:

- Developed detailed threat assessment at each NMC facility.
- Supported sites as the special operations advisor on tactics, explosive protection, small unit tactic, and close quarter combat capabilities.
- Developed NMC take back strategy policy and procedures involving close quarter combat operations.

Project Manager, Nuclear Physical Security Specialist (US Army), 10/1996 to 06/2003
USASF
HQ, USASFC, G-3 Special Projects, Ft. Bragg, NC 28303

Edward Hall, 910-432-3839 / Hours per week: 60

Provided expert knowledge in counter terrorism and assisted the NRC, DOE and Defense Threat Reduction Agency (DTRA) in baseline and Force on Force (FOF) security inspections. Provided up-to-date information through critical intelligence gathering on; physical security philosophies, site-specific protective strategies, security procedures, response plans, and defensive techniques related to commercial nuclear power reactors, fuel processing facilities and weapon storage depots. Subject matter expert in terrorist/counter-terrorist methodology, small unit tactics, weapons handling and explosive characteristics, charged to identify potential weaknesses within protective strategies. Assess licensee's ability to protect the public's health and safety against the theft of radiological material or the threat of radiological release from a terrorist attack. Provided critical feedback on strategy implementation, target set assignment, table top exercises, FOF exercises, and after-action reviews.

Additional responsibilities included having the ability to communicate with individuals having varying degrees in high-level positions within the government and a wide range of senior executives of the civilian populace. Position required writing succinctly and organizing ideas clearly with the capability to communicate both orally and in writing.

Established and maintained work schedules to ensure timely performance, evaluated the effectiveness of operations, made changes in work assignments and balanced workloads to increase the effectiveness of operations. Planned yearly budget and maintained all records and operational reports.

The position demanded the ability to operate with minimal program and policy guidance and required a Q clearance with all agencies involved, to include Critical Nuclear Weapon Design Information (CNWDI).

SIGNIFICANT CONTRIBUTIONS:

- Supported the NRC in conducting over 35 Operational Safeguards Response Evaluations (OSRE), 25 Regional Assist (RA), and 16 Attachment III Inspections.
- Authored and illustrated The Protected/Vital Area Barrier Penetration document that is currently being utilized by the industry/NRC when establishing or evaluating protective strategies.
- Selected to advise the Nuclear Material Safety and Safeguards division (NMSS) of vulnerabilities that exist with Spent Fuel Pools, Dry Cask Storage and Gaseous Diffusion Plants (GDP). Conducted numerous inspections/evaluations on CAT I fuel facilities, and sites storing Special Nuclear Material (SNM).
- Primary Contributor in establishing security strategies for the Office of Safeguards and Security (OSS) and the Transportation Safeguard Division (TSD) of the DOE by validating scenarios through Joint Tactical Simulations at Sandia National Laboratories and conducting actual force on force exercises.
- Formulated Security guidance and policy for DTRA pertaining to costly and highly sensitive DOD assets essential for the National Security of the United States.

- Appointed team leader to validate the various agencies' DBT by physically testing key industry equipment using specialized explosives, small arms munitions, rocket propelled grenades and commercially available equipment.

U.S. Army Special Forces Communication Sergeant, SFC, 10/1989 To 09/1996
B Co, 1st, BN, 3rd SFG(A)
Fort, Bragg, NC 28310
Robert Hash, 910-432-2030 / Hours per week: 55

Special Operations Communications Sergeant on an African-oriented, Special Forces SCUBA detachment, conducted real world missions on an international level. Duties as a military advisor to other nations on Foreign Internal Defense, Direct Action, Special Reconnaissance, Unconventional Warfare and Counter Terrorism Operations. Instructed advanced tactics and techniques in disciplines of warfare in host nation language. Designed course outlines in target language with up to 100 indigenous personnel as students. Maintained long-range communications, (four thousand miles) while analysing enemy radio direction finding capabilities. Developed in-depth communication plans in support of up to theater operations and was personally responsible for the maintenance and accountability of communication equipment, and all classified/highly sensitive cryptographic materials.

Operations Sergeant, Tank Commander, SGT, 10/1985 To 10/1989

Military Police Desk Sergeant / Patrolman, Specialist, 06/1982 To 09/1985

GENERAL INFORMATION/EDUCATION

- U.S. Citizen
- Safe Guards Qualified (former DOE Q Clearance)
- Completing Bachelor of Science in Business Administration (BSBA) Degree at Liberty University.
- Military Service: 21 years (Medically retired/Disabled Veteran)

SPECAILIZED TRAINING

Department of Defense, Basic Law Enforcement School	1982
Department of Defense, Small Group Leadership School	1983
Criminal Justice Correspondence Course	1984
Department of Defense, Special Forces Communications School	1990
Department of Defense, Mid-Level Management and Leadership Program	1991
Department of Defense, Arabic-Egyptian Language School	1991
Department of Defense, Combat Diver and Dive Supervisor Course	1993
Department of Defense, French Language Course	1993
U.S. Space Command, Master Radcal Satellite Operations Course	1994
Department of Defense, Advance Senior Leadership Training	1995
Department of Defense, Advance Communications and Electronics Program	1995
Department of Defense, Operations and Intelligence Course	1995
Department of Defense, Special Forces Demolitions Course	1996

Department of Defense, Applied Explosives Techniques	1997
Department of Defense, Military Free Fall Parachutist Course	1997
Department of Energy, Force on Force Controller Training Course	1997
Nuclear Regulatory Commission, Westinghouse Technology Course (R-104P)	1997
Management of Intrusion Detection Systems Seminar	1998
Department of Energy, Special Reaction Team, Breachers Course	1998
Sandia National Laboratories, Joint Tactical Simulation Operator’s Course	1999
Maintenance and Operation of Intrusion Detection Systems Seminar	1999
Nuclear Regulatory Commission, GE BWR/4 Technology Course (R-104B)	2000
Advanced Mountaineering and Vertical Accent Course	2001
Department of Defense, Military Free Fall Jumpmaster’s Course	2001
Department of Defense, Special Forces Advanced Urban Combat Course	2001
Technical Surveillance Sciences, Inc., Vehicle Acquisition Course	2001
Carlson School of Management, University of Minnesota	2005

HIGH BRIDGE
ASSOCIATES

Donald F. Roth

PROFESSIONAL SUMMARY

Mr. Roth currently holds the position of Subject Matter Expert for High Bridge Associates. He provides third party review and oversight functions for the nuclear power plant decommissioning industry. His expertise includes:

- Nuclear Decommissioning
- Project Management
- Structural engineering
- Nuclear and fossil plants
- Power Plant Design and Modifications

PROFESSIONAL EXPERIENCE

Mr. Roth has extensive experience in the design, construction, operations and decommissioning support of fossil and nuclear power plants. From October 2016 to June 2017, he held the position of Vice President of D&D and Construction for *EnergySolutions* for the Zion Restoration Project. He had the responsibility for managing all physical demolition activities, waste handling operations and engineering work, including managing the associated schedules and budgets.

In that role, he managed the transition to the Open Air Demolition phase of the project. He also managed the demolition of the Fuel Handling Building, all of the above grade portion of the Auxiliary Building and all of the above grade demolition of the both Containment Buildings' internals. In April, 2017, he presented a paper on the history of the Zion Restoration Project to an audience from the International Atomic Energy Agency at Argonne National Laboratory.

From September 2010 to October 2016, he held the position of Director of Engineering for Zion*Solutions* for the Zion Restoration Project. He had the responsibility of managing the Zion*Solutions* Engineering team for the decommissioning of Zion Station. His responsibilities included planning and coordinating all engineering work associated with dismantlement and decontamination of Zion Station. Included among those responsibilities was managing work performed by consulting engineering firms. His work scope included directing the generation of all Design Changes, Technical Specifications, plant modifications and field engineering support for physical dismantlement activities, including support of construction activities associated with dismantlement. He also was responsible for maintaining configuration control of systems, structures and components via the system reclassification program, in association with the Operations and Work Control organizations. He also provided support for development and maintenance of the project schedule and project budget.

In that role, he directed the generation of over one hundred design modifications. Included in that number are major modifications including, a) creating large construction openings in each of the two Containment Buildings, b) repowering the entire power block with a new source of 34kV construction power, c) replacing two Service Water pumps with smaller, more efficient pumps to supply all of the station's cooling requirements d) installing a new Security Access Control Facility, e) a new Radiologically Controlled Area (RCA) entrance facility f) a new liquid radwaste processing system and g) modifications for implementing a phased-in approach to achieving Cold and Dark status in the plant. In July of 2014, he authored and presented a paper on the history and status of the Zion Restoration Project at the 2014 ASME Pressure Vessel and Piping conference in Anaheim, California. In November of 2014, he participated in Southern California Edison's Focused Area Self-Assessment for the station's 10CFR50.59 process at the San Onofre Nuclear Generating Station.

In preparation for the transfer of the operating license Zion Station to Zion*Solutions*, Mr. Roth completed seventeen tasks associated with preparing the ZS engineering team to support the transfer of the Zion Station operating license from Exelon to Zion*Solutions*. He also hired the engineering staff and developed their training plan. He also wrote the technical specification for de-tensioning and removal of the Containment Building pre-stressing tendons. He also authored the OSHA-required Demolition Engineering Survey for the Dry Active Waste Building, the first structure dismantled for the Zion Restoration Project. In 2009, he led the Zion*Solutions* engineering team's effort to develop the reactor vessel and internals segmentation bid specification and Request For Proposal (RFP). He also served as the lead engineer for the technical evaluation of the vendor proposals received in response to the RFP. He also led the engineering team's effort to revise the project Work Breakdown Structure (WBS) element scoping documents, as well as leading the team's effort to revise the WBS element budget estimates. He also completed a study of multiple EPRI decommissioning experience documents, which resulted in generation of a Lessons Learned data base. He presented a summary of the study to the site project team. He also generated a project schedule for the first two years of the project. That schedule became the basis for current project schedule.

Prior to working on the Zion Decommissioning project for Energy Solutions, Mr. Roth worked for Sargent & Lundy on the conceptual design and cost estimates for large air pollution control projects for Ameren's Joppa, Edwards and Newton Generating Stations in Illinois. Prior to this, he completed conceptual design and cost estimate work for air pollution control projects for Allegheny Energy's Armstrong Generating Station. He supervised structural engineers involved in the analysis and design of foundations and structural steel framing for a large air pollution control project at Mirant's Morgantown Generating Station in Maryland. He also provides support for construction activities for the project. Prior to this, he performed similar supervisory services for air pollution control projects at Cinergy's Gibson generating station in Indiana and at Reliant Energy's W. A. Parish Station in Texas.

Mr. Roth has also served as a Project Manager for the Commonwealth Edison Company. He served as Project Manager for the Spent Fuel Nuclear Island Project at the utility's

Zion Nuclear Station. That project designed and implemented the long-term solution to storage of spent nuclear fuel at the station after it was permanently shut down. He also authored that company's "Master Facility Plan" which created the 5-year site plan for the support facilities for six nuclear power plants. He also served as Project Manager for some of those facilities projects.

Mr. Roth served as Lead Structural Engineer at the Zion Nuclear Generating Station for 8 years. In that role, he supervised the structural engineering support of plant operations and maintenance activities. He also provided support for construction of plant modifications.

He assisted in the Commonwealth Edison Company Facilities Improvement Program helping to evaluate various site plans for the LaSalle and Zion stations. He also supervised a group of structural engineers involved in the as-built qualification of mechanical component supports for Niagara Mohawk Power Company's Nine Mile Point nuclear station. He also prepared a pipe support design guideline manual for use on the Nine Mile Point station during this assignment. Before that, he was supervising a group of structural engineers at Commonwealth Edison Company's Braidwood nuclear station involved in the analysis and design of mechanical component supports and the resolution of field problems associated with the installation of mechanical component supports.

This group was also involved in the qualification of installed supports subject to increased loadings due to reconciliation and reanalysis of piping systems subject to both rigorous and alternate analysis. These qualifications required review of concrete expansion anchor bolt assemblies for conformance with margins of safety specified in NRC IE Bulletin 79-02. During the latter stages of the assignment, the group was responsible for designing plant modifications to Unit 1 (an operating unit) and resolving associated construction problems. The size of this group varied over the four years from a minimum of 30 engineers to a peak of 81 engineers. This number varied based on client production requirements which it was Mr. Roth's responsibility to monitor so that both manpower schedules and man-hour budgets were sufficient to properly support the client's requirements. Mr. Roth met with client, contractors and personnel in other Sargent & Lundy divisions to plan production schedules and to resolve field construction problems. In this assignment, Mr. Roth was also involved in the development of design criteria and revisions to existing design criteria.

Mr. Roth has also supervised and trained structural engineers involved in the analysis and design of mechanical component supports for PSI Energy's Marble Hill nuclear power station. His work involved the design of new supports for rigorously analyzed piping systems as well as the development of typical supports for alternate analysis piping systems. He also was involved in the incorporation of as-built information into the design process. The size of the group Mr. Roth supervised and trained varied from a minimum of 10 engineers to a maximum of 25 engineers.

Before that, Mr. Roth supervised structural engineers involved in the analysis and design of mechanical component supports for Commonwealth Edison Company's Byron nuclear station. His work involved the design of new supports for rigorously analyzed piping systems. The size of the group that Mr. Roth supervised varied from a minimum of eight engineers to a maximum of 15 engineers. Earlier Mr. Roth supervised the analysis of nuclear safety-related piping systems for Commonwealth Edison Company's LaSalle County nuclear power station involving the incorporation of as-built information into the analysis process.

Mr. Roth has also supervised design and analysis of structures for several fossil-fired stations. This work has encompassed steel and concrete structures for material handling systems and the gas ductwork and associated steel supports. Prior to his supervisory experience, Mr. Roth worked on the layout, analysis, and design of structural steel floor framing and bracing systems for two other fossil stations. He joined Sargent & Lundy in 1972.

NUCLEAR SERVICES EXPERIENCE

Energy Solutions – Zion Station
June 2008 – Present
DIRECTOR OF ENGINEERING (*September 2010 – Present*)
LEAD STRUCTURAL ENGINEER, LEAD MAJOR COMPONENT ENGINEER (*June 2008 – August 2010*)

Commonwealth Edison Company / Exelon
May 1988 – November 2000
FACILITIES PROJECT MANAGER (*October 1999 – November 2000*)
- Corporate Nuclear Headquarters

PROJECT MANAGER (*January 1998 – October 1999*)
- Zion 1 and 2, Nuclear, 1085 MW each.

OPERATIONS AND MAINTENANCE SUPPORT (*December 1989 – January 1998*)
- Zion 1 and 2, Nuclear, 1085 MW each.

FACILITIES IMPROVEMENT (*May 1988 – September 1988, January 1989 – December 1989*)
- LaSalle 1 and 2, nuclear, 1122 MW each.

FACILITIES IMPROVEMENT (*May 1988 – September 1988*)
- Zion 1 and 2, nuclear, 1085 MW each.

DESIGN EXPERIENCE

Ameren
PROJECT ENGINEER
- Joppa 1-6 Coal
- Edwards 1-2 Coal
- Newton 1-2 Coal

Allegheny Energy
PROJECT ENGINEER
- Armstrong 1-2, Coal

Mirant
PROJECT ENGINEER

- Morgantown 1-2, Coal

Cinergy
PROJECT ENGINEER
Gibson 1-5, Coal

Reliant Energy
PROJECT ENGINEER

- Parish 4, Oil

Niagara Mohawk Power Company
1998
SENIOR STRUCTURAL ENGINEER

- Mechanical component supports
- Nine Mile Point 1, nuclear

Commonwealth Edison Company
January 1984 – May 1988
SENIOR STRUCTURAL ENGINEER

- Mechanical component supports
- Braidwood 1 and 2, nuclear, 1175 MW each

PSI Energy
September 1981 – January 1984
SENIOR STRUCTURAL ENGINEER (*September 1983 – January 1984*)

- Marble Hill 1 and 2, nuclear, 1175 MW each.
- Cable tray, conduit, mechanical component, and HVAC duct supports

SENIOR STRUCTURAL ENGINEER (*September 1981 – March 1983*)

- Mechanical component supports.

Central Power & Light Company
March 1983 – September 1983
SENIOR STRUCTURAL ENGINEER

- Coleto Creek 2, coal, 707 MW
- Structural steel

Commonwealth Edison Company
September 1981 – March 1983
SENIOR STRUCTURAL ENGINEER

- Byron 1 and 2, nuclear, 1175 MW each;
- Braidwood 1 and 2, nuclear, 1175 MW each.
- Mechanical component supports.

Northern Indiana Public Service Company
March 1981 – September 1981

- Schahfer 17 and 18, coal, 393 MW each
- Structural steel and concrete

Southwestern Electric Power Company
September 1980 – March 1981
SENIOR STRUCTURAL ENGINEER

- Pirkey 1, lignite, 707 MW.
- Structural steel and concrete.

Commonwealth Edison Company
February 1980 – September 1980
SENIOR STRUCTURAL ENGINEER

- LaSalle 1, nuclear, 1122 MW.
- Piping analysis.

Illinois Power
October 1979 – February 1980
SENIOR STRUCTURAL ENGINEER

- Clinton 1, nuclear, 985 MW.
- Structural steel.

Middle South Services, Inc.
May 1979 – October 1979
SENIOR STRUCTURAL ENGINEER

- Standard Unit 2, coal, 750 MW.
- Senior Structural Engineer

Wisconsin Public Service Corporation
October 1977 – May 1979
SENIOR STRUCTURAL ENGINEER (*July 1978 – May 1979*)

- Weston 3, coal, 321 MW.

- Structural steel and flue gas ductwork.

STRUCTURAL ENGINEER (*October 1977 – July 1978*)

- Structural steel and flue gas ductwork.

Central Power & Light Company
October 1974 – October 1977
STRUCTURAL ENGINEER

- Coleto Creek 1, coal, 707 MW.
- Structural steel and flue gas ductwork.

PSI Energy
May 1972 – September 1974
STRUCTURAL ENGINEER

- Gibson 1 and 2, coal, 618 MW each.
- Structural steel.

EDUCATION

Northwestern University - M.B.A. - 1979
Valparaiso University, Indiana - B. S. Civil Engineering - 1972

HIGH BRIDGE
ASSOCIATES

Michelle Taylor, MBA

PROFESSIONAL SUMMARY

- 18 years of Project Controls experience within the engineering and construction remediation fields, both schedule and cost controls.
- Proficient with project planning and analysis, proposal development (both technical and cost volumes) utilizing multiple formats and types of software; budget tracking/cost analysis/forecasting/scheduling processes and tools; Earned Value Management Systems methods (EVMS)
- Experienced with Multiple federal agencies including the Department of Defense (DoD), Department of Energy (DOE), U.S. Army Corps of Engineers and power companies such as NiSource, Georgia Power, and Duke Energy.
- Experienced in multiple estimate and cost reviews on large capital projects.
- Skilled in utilizing Oracle and Cobra cost systems, PRISM, Microsoft Project, Primavera P6, Maximo, PowerPlant, WInsight, Risk based software and various systems for Procurement, and advanced Microsoft Excel and Access for data analysis and reporting.

PROFESSIONAL EXPERIENCE

CRC Technologies
August 2017 – July 2018
SENIOR CONSULTANT
Mid-America Conversion Services

- Provide project controls support and other planning, integration, and support, and/or other tasks as requested by the client during development of Requests for Equitable Adjustment to be processed and submitted to DOE.
- Analyze the impacts by reviewing the actual cost conditions as compared to the bid conditions found in Basis of Estimate and Estimate.
- Price impacts and prepare estimate spreadsheets, P6 and Cobra before and after spreadsheets and load files.
- Prepare justification and entitlement position in writing linking back to detailed cost estimate and impact analysis.
- Prepare and submit certified cost and price backup.

Fluor Federal Group

- Participate in Estimate Reviews and provide requested support for various projects.

Charter Global for Georgia Power Company
October 2015 – March 2017
COST ENGINEER AND SCHEDULE ANALYST

- Lead the effort to allocate and schedule transmission events in support of GPC Capital Projects for Metro Atlanta, East, and South Regions.

- Responsible for leading meetings and discussions related to budgeting, scheduling and resource allocation.
- Review scope and build schedules accordingly.
- Coordinate transmission capital project activities (i.e. Engineering, Procurement, Environmental, System Outages, Construction, etc.) schedules for design engineering and construction activities, resolves conflicts, and update schedule progress.
- Produce reports for key Transmission Stakeholders.
- Analyze project cost exceptions, projections, and assist with variance explanations.
- Support the Baseline Change Process.

Work Management, Inc. for NiSource
February 2014 – April 2015
LEAD PROJECT CONTROLS ENGINEER

- Responsible for the establishment of cost processes for the new TDSIC (Transmission Distribution and Storage System Improvements Charges) project.
- Work with leadership team to determine needs of stakeholders.
- Lead team in establishment of accrual, forecasting, variance analysis, reporting, budgeting, and change control processes.
- Create project controls and project management templates for all cost related activities.
- Lead implementation of project controls by training and mentoring Project Managers, Project Controls Engineers, Analyst and schedulers.
- Review estimates, create funding requests, and open work orders.
- Provide review of FERC assets, capital expense classification, and property units for projects.
- Implement all processes.
- Resource load, status, and analyze schedules in P6 providing weekly reports of progress and Earned Value.

RCS Corporation for Duke Energy – Oconee Nuclear Power Station
October 2009 – February 2014
SR. PROJECT CONTROLS ENGINEER-LEAD

- Perform work with Major Projects at Oconee Nuclear Power Station on nuclear modifications and construction projects totaling $1 billion.
- Responsibilities include cost reporting, variance analysis, accruals, cash flows, budget tracking, and change management.
- Perform budget development, forecasting, root cause analysis and EVMS reporting.
- Create weekly labor reports, project status reports, and forecasts for EAC’s.
- Analyze risk and contingency reporting.
- Perform estimates during the initial development and throughout the project lifecycle.

Washington Closure Hanford
February 2009 – October 2009
SR. PROJECT CONTROLS ENGINEER

- Responsibilities include monthly variance reporting, ETC forecasting, monthly accruals, cost and schedule variance analysis per EVMS; suggest corrective action plans.

- Prepare detailed staffing plans, cost studies, trends, baseline change management tracking, labor reports, and research cost for coding and corrections; update schedules in P3, review of scope criteria and development of estimates.
- Assist in preparing cost/schedule data for proposals or contract negotiations.
- Prepared reports in support of American Recovery and Reinvestment Act.

High Bridge Associates, Inc.
September 2008 – February 2009
COST ENGINEER
Washington Division URS-Idaho National Lab – Integrated Waste Treatment Unit

- Responsibilities include developing and implementing the construction Performance Measurement Baseline (PMB) in PRISM.
- Responsibilities include establishing and maintaining construction (EVMS) earned value management system as well as prepare and maintain the budget baseline from estimates.
- Perform percent complete calculations, quantity tracking, cost and quantity comparisons, forecasting costs, monthly accruals, cost and schedule variance analysis.
- Identify and track all cost related to construction trends; baseline change management tracking, development, and support.
- Create all weekly and monthly variance reports; review of craft time sheets for proper coding; updates to project schedule to track progress; maintain code of accounts; research costs for coding and corrections.

Project Services Group
November 2005 – November 2007
PROJECT CONTROLS ENGINEER
Bechtel

- Assigned as a project controls engineer at the Hanford site Waste Treatment Plant (WTP).
- Responsibilities include preparing and reviewing the presentation of cost analysis/ control activities per EVMS (Earned Value Management Systems) guidelines.
- Prepare detailed staffing plans; review scope criteria and develop additional estimating bases as necessary.
- Prepare cost studies utilizing historical data, statistical analysis, and cost comparisons
- Identify and analyze cost variance and suggest corrective action.
- Prepare forecasts and specialized reports, monthly accruals, labor reports, research cost for coding and corrections.
- Development of Baseline Change Proposals (BCPs) and Trends and monthly Estimates at Completion (EACs).
- Create COBRA load files for implementation.
- Maintain project code of accounts.
- Support CAM and eight WPM.
- Create variance reports to comply with EVMS structure guidelines, instituting root cause analysis activities and preparing variance analysis reports.
- Project received EVMS certification during this time.

Bechtel

- Assigned to the FEMA Bechtel trailer operations project in Jackson, Mississippi for emergency response to Hurricane Katrina with responsibility for daily updating of the forecasting model.
- Prepared daily task order tracking toll providing burn rates and remaining budget funding analysis and remaining days.
- Maintain the cost and commitment tracking.
- Create staffing curves, research cost for coding and corrections, and assist estimators.
- Supported project management, contracts and estimating.

Cornerstone Management and Technical Services
May 2004 – November 2005
PROJECT COST ANALYST

- Performed project control evaluations for a number of service clients including Mixed-Oxide Fuel (MOX) project, USACE, TVA, and DoD Information Technology Group.
- Evaluations included the creation and analysis of various reports and spreadsheets from system data using Excel and other software.
- Completed data analysis for data dumps that included merging, reformats, and splicing of data using excel Access and Oracle.
- Costing of complete project resources.
- Evaluations also included client interviews, training, and participation in other key areas/functions of the business or respective processes.
- Created and modified spreadsheets and pricing models as required.
- Prepared complex and/or large cost/price proposals in compliance with the RFP.
- Wrote, edited, and prepared cost and contractual volumes of proposals.

TEAM Associates
August 2000 – May 2004
PROJECT ASSISTANT

- Supported the President and Vice President of the company.
- Extensive work in project planning, work breakdown structure and development of detailed schedule and cost reports.
- Wrote and edited large proposals for DoD, DOE, TVA, and Nebraska Public Power contracts.
- Interpreted client RFP requirements to identify applicability of proposal.
- Designed format and coordination of production.
- Organized and maintained database of proposal development through several revision cycles.
- Created databases and earned value reports for projects utilizing Excel and Microsoft Project.

ASSOCIATIONS

- AACE International- Member
- North American Young Generation in Nuclear
- PMI- Member

EDUCATION

New York Institute of Technology
Master of Business Administration, Project Management

Georgia State University
Bachelor of Business Administration

COMPUTER SKILLS

Access, Excel, Word, PowerPoint, Project, Outlook, Crystal, QuickBooks, Oracle, Cobra, CRS, PRISM, WInsight, SharePoint, Source, Primavera P3, Primavera P6, Business Objects, Nuclear Asset Suite, Maximo, Crystal Ball, PowerPlant, Lotus Notes, and multiple Procurement Systems.
Advanced P6 Certification

HIGH BRIDGE
ASSOCIATES

Gregory von Beck

Senior Project Controls Specialist, Nuclear Decommissioning Planning

PROFESSIONAL SUMMARY

He is an expert Project Controls Specialist who has managed +$300 million-dollar planning efforts to successful conclusions. Although he is an expert in PMP methodologies it is his leadership experience that makes the difference. In directing the development of programs, he uses the skills of the team to constantly improve the estimates and communicate within and outside the team. As a result of his skills, he has achieved the award of over $10 Billion in new work for my organization.

His expertise in estimating large programs with limited information allows for the most accurate cost, schedule, and risk analysis creating the most complete program estimates ensuring the true upfront cost of the program is known. As a Senior Project Controls Specialist on extremely large programs in multiple countries, he has developed effective communication skills to help the team know what is critical to the program and keep the Leadership aware of the direction and risks so that decisions are made early.

SKILLS

- Leadership
- Project Management
- Business Management
- Leading Proposal Development
- Cost Estimating
- Scheduling
- Cost Analysis
- Cost and Financial Modeling
- Risk Management
- Data Management
- Quality Analysis
- Software Development (e.g. Java, C#, C, Visual Basic, Python, Perl)
- Databases
- Communication

PROFESSIONAL EXPERIENCE

Atkins – Columbia, SC

April 2016 – Present

SENIOR PROJECT CONTROLS SPECIALIST

- Leader of planning teams developing cost and schedule for nuclear power plant decommissioning programs around the world.

- Also involved in further design and refinement of the estimating system that was originally developed at EnergySolutions.
- Led the development of bid packages that resulted in +$2B in new work and gaining a foothold in US nuclear power plant decommissioning for my company.
- Developed plans for projects from $400M to $1.5B that managed hundreds of people for up to 10 years.
- Developed plans for international customers in collaboration with European colleagues.
- Mentored and trained new employees and existing subject matter experts in cost, schedule, and proposal development.
- Served as an expert consultant in decommissioning planning for outside clients.
- Developed the group's Quality Assurance Plan.
- Duties include significant travel within the US and internationally.

EnergySolutions – Aiken, SC
July 2009 – April 2016
PROJECT CONTROL SPECIALIST AND PROGRAMMER/ANALYST

- Lead the team that designed and implemented a solution for creating cost estimates with a high degree of confidence. The solution uses Microsoft SharePoint, SQL Server, Primavera P6 and Excel to significantly decrease re-estimating during iterations and decrease errors due to human interactions while remaining customizable to new business practices and adding features not available in industry standard software such as Timberline and Success Estimator. Using this tool, led or assisted in the development of major proposals in the US, UK and Canada.
- Led the development of bid packages that resulted in over $350M in new work for the company.
- Developed plans for projects from $300M to $7B that managed hundreds of people for up to 14 years that resulted in $7.5B in new work for the company and its partners.
- Lead the development of a solution that increased the time available to produce estimates for proposals by as much as two weeks by implementing an estimating system that reduced re-estimating, human errors, and calculation times.
- Developed witness testimony and other court documents that lead to a £120M settlement against the UK government.
- Provided 3rd party expert review and analysis of plans to validate plausibility and risk for an international regulator.
- Duties included significant travel within the US and internationally including short-term assignments in the United Kingdom.
- Ownership of the business division transferred to Atkins in 2016.

River Oak Homes, Aiken, SC
June 2005 – June 2009
CONSTRUCTION MANAGER

- Manager of home construction projects including scheduling, purchasing, personnel management, customer relations, and meeting inspection requirements.

TRW Automotive – Mesa, AZ
May 2000 – May 2005
PROGRAMMER/ANALYST

- Developed business management and project controls applications that supported TRW's worldwide organization and its reporting needs.

EDUCATION

Arizona State University – Tempe, AZ (*1997 – 2002)*
Bachelor's Degree, Computer Engineering Technology

SOFTWARE

- Excel
- Primavera P6
- Primavera Risk Analysis
- Microsoft Project
- Microsoft SharePoint

Dwight Daniel Watson

Program and Operations Manager

PROFESSIONAL SUMMARY

- Entrepreneurial industrial sector manager with more than 32 years of experience managing operations, processes, personnel and corporate administration for start-ups, small businesses, Lockheed-Martin and the US Navy.
- National award-winning management style and customer satisfaction record of providing safe and productive industrial operations.
- On the floor workplace experience that provides a strong foundation for executive strategic decision making.
- Extensive Department of Energy (DOE) program experience in UF6 Operations, waste management, environmental, and administration.

MANAGEMENT QUALIFICATIONS

- Nuclear Power Decommissioning Estimation
- DOE/Commercial Site Review and Oversight
- Radioactive and Non-Rad Waste Management
- DOE Readiness Reviews
- Project Baseline Development
- OSHA / Enviro / QA / HR Regulatory Compliance
- Procedure/Training Development
- Exempt / Non-exempt / Union Management
- Change and Productivity Implementation
- Continuous Improvement Cycle

PROFESSIONAL EXPERIENCE

Akylex Inc – Almo, KY

2009 to Present

PROJECT PLANNER/ ESTIMATOR / SUBJECT MATTER EXPERT

- Subject Matter Expert (SME) / Organization and Waste Management Estimator for twelve (12) proposals for the Department of Energy and two (2) tenders for the NDA, United Kingdom.
- SME areas of expertise included D&D of Nuclear Reactors and Nuclear Facilities, Radioactive Waste Management, Risk Management, and Radioactive Waste disposal, and transportation.
- These efforts included Technical Scope written response, WBS Scope development and definitions (WBS Dictionary), Estimation of D&D WBS at the Structure/Equipment/System level (WBS levels-5, 6, 7--), Radioactive Waste Mass

Balance disposition schemes, and Project Organization and Staffing development and estimation.

- Accomplishments include:
    - Completed DOE RFP writing assignments, site walkthroughs, estimating, and strategic input for operations of two Depleted Uranium Hexafluoride Conversion plants, for 3 different RFPs (Design/Build, Operations, and Operations Follow on Scope)
    - Completed RFP writing assignments, estimating, and strategic input for operations for West Valley Demonstration Project Remediation and D&D, NSC M&O, NNSS M&O, Sandia M&O. Paducah D&R, and LANL LLCC.
    - Completed writing assignments, estimating, radioactive waste balance, and strategic input for the D&D of the Portsmouth Uranium Gaseous Diffusion Plant, ETTP/K25 D&D, Douneay Scotland Scientific Reactors (2) D&D, Zion Nuclear Reactor Plant D&D, and the Magnox 12 nuclear plant D&D across the UK.
    - Personally responsible for the D&D/DECON estimates of 6 Magnox Nuclear sites and site reactors, Pilgrim/Pallisades NPS, and Oyster Creek NPS.

Ecotone Services Inc – Dover, TN
2003 to 2009
OWNER / BOARD CHAIRMAN / PRESIDENT / BUSINESS DEVELOPMENT

- Principal executive of a government contracting company that provided operations and maintenance services to the USDA Forest Service and US Army Corps of Engineers.
- Company operations included personnel management of 65 employees, facility maintenance, janitorial, grounds keeping, highway and road maintenance, drinking water distribution, wastewater treatment, environmental compliance oversight, waste management, wetland restoration, and forest conservation.
- Completed personal ownership exit strategy and sale of company contracts to a competing government contractor in 2009.
- Served in the capacities of Chairman - Board of Directors 2003 -2009, President 2003 - 2006, Director of Business Development 2003 – 2009, and supported L&M Technologies Inc 2008 - 2009.
- Nominated for SBA prime contractor of the year in 2005, 2006, and 2007 by the Forest Service.
- Received the following awards:
    - 2007 "SBA National Prime Contractor of the Year" – Awarded in Washington, DC, April 2007
    - 2007 "SBA Region IV Prime Contractor of the Year" – Awarded in Washington, DC, April 2007

L&M Technologies Inc – Houston, TX
2008 to 2009
PROGRAM MANAGER

- Replaced L&M Project Manager to provide temporary oversight and contract closure support (14 months) for a commercial facility maintenance contract between L&M and the United Space Alliance (USA).

- Completed oversight of facility maintenance, janitorial and landscaping for USA-NASA space shuttle support facilities in Houston, Huntsville, and Cape Canaveral with a declining workforce.
- Support included:
    - Established and monitored over 60 subcontracts.
    - Provided emergency support for Hurricane IKE recovery
    - Successfully completed safe and productive contract closeout

WESKEM LLC – Oak Ridge, TN
1999 to 2003
GENERAL SITE MANAGER / BUSINESS DEVELOPMENT

- General Site Manager at Paducah, Kentucky and Director of Business Development for a newly formed LLC.
- Completed initial start-up and marketing, establishing marketing and sales functions.
- Seamlessly transitioned operations at the Paducah Uranium Gaseous Diffusion Plant as a subcontractor to Bechtel Jacobs Company, under contract to the US Department of Energy.
- Site manager responsibilities included management of all legacy and newly generated radioactive, RCRA hazardous, TSCA, and sanitary wastes.
- Managed all aspects of the waste program conduct of operations including safety, waste characterization, packaging, storage, processing, transportation, treatment, and disposal.
- Accomplishments included:
    - Completed hiring and transition of 160 workers and supervisors.
    - Managed the shipment of over 7 million kilograms of waste to offsite treatment and disposal across the USA.
    - Maintained the Integrated Safety Management process.
    - Had "zero" recordable and lost time safety injuries during a 3 year tenure as Plant Site Manager.
    - Personally planned and responsible for the following projects:
        - Remediation and Disposal of a radioactive 4000 gal Technetium Oxide waste tank
        - Remediation of the C-400-04 Gold Dissolver Room filled with hazardous radioactive materials
        - Remediation of 168 DOE Material Storage Areas to Maintain NRC Compliance

Lockheed Martin / Martin Marietta – Paducah, KY
1988 to 1999
PROGRAM MANAGER / SECTION SUPERVISOR / PROJECT MANAGER / TECHNICIAN

- Served as Waste Minimization Program Manager, Waste Coordination Technical Team Supervisor, Waste Disposal Manager, Landfill Manager, RCRA Waste Coordinator, and Environmental Sampling Lead Field Technician during an 11-year tenure, at the Paducah Uranium Gaseous Diffusion Plant, Paducah, KY.
- Directed plant wide waste activities for a 2300 employee NRC regulated nuclear facility.
- Supervised 20 technical professionals and directed field supervisors and union personnel.

- Accomplishments included:
    - Primary Martin Marietta Waste Management Interface for DOE Tiger Team inspection
    - Reduced Plant Wide Generation of Radioactive Hazardous Waste from 2200 cft per year to 160 cft per year
    - Received three Lockheed Martin “Excellence Awards”

United States Navy (USNR) – USS Clark (FFG-11) FPO NY
1984 to 1993
LIEUTENANT / ORDNANCE OFFICER / SURFACE WARFARE OFFICER

- Served four years active duty and 5 years active reserve for the USN.
- Responsible for all munitions onboard ship, all fire control radar systems, missiles and torpedo inventory.
- Participated on and completed three Tiger Team inspections prior to two Operational Plant Propulsion Examinations (OPPE) and deployment for fleet training at Guantanamo Bay, Cuba.

EDUCATION

- Chemistry Western Kentucky University, Bowling Green, KY
    - MS Degree
- Chemistry Murray State University, Murray, KY
    - BS Degree
- Specialized Training in the following subject areas:
    - RCRA Waste Material Balance Custodian
    - Radiation Worker I & II Inspection Team Interface

HIGH BRIDGE
ASSOCIATES

David S. Williams

SUMMARY

Mr. Williams' entire working career has been in the heavy industrial and commercial demolition field. After graduating from Western Oregon University he held mostly field roles including equipment operator, foreman, superintendent and project manager. Mr. Williams has managed Northwest Demolition projects all over North America and was instrumental in forming the Northwest Demolition Pacific Division Office in Honolulu. In 2013 Mr. Williams was named VP of operations for the business.

EXPERIENCE

Northwest Demolition & Dismantling Tigard, OR **VP Operations** **1999-Present**

Responsible for the management and execution of complex demolition and environmental projects. Duties include equipment fleet readiness, personnel resource management and strategic management of company assets as it relates to project execution. Other duties include business development and project estimating.

Key Projects:

- Trojan Nuclear Plant Containment Building Demolition, Rainier Oregon
- Kitimat Modernization Aluminum Smelter Decommissioning, Kitimat British Columbia
- Umatilla Chemical Weapons Depot Decommissioning, Umatilla Oregon
- Molybdenum Processing Plant Asset Sale and Mass Demolition, Magna Utah
- Humboldt Bay Nuclear Plant Containment Building Decommissioning, Eureka California
- Foreman Cement Plant Demolition and Site Restoration, Foreman Arkansas
- Early Warning Missile Defense Mass Demolition and Bulk Waste Handling, Clear Alaska
- Keauhou Beach Hotel Demolition and Site Restoration, Kona Hawaii
- Hunters Point Radiologically Contaminated structures and Pier Demolition, San Francisco California
- Particle Accelerator Dismantling and Radiological Separation, Los Alamos New Mexico
- Port of Tacoma Wharfs, Slips and Piers Demolition, Commencement Bay Washington
- Hilo Hospital Hazardous Materials Removal and Mass Demolition, Hilo Hawaii

EDUCATION AND CERTIFICATIONS:

BS Public Administration and Business: Western
Oregon University 1999

40 HR HAZWOPER
30 HR OSHA
Lead/Asbestos
awareness MSHA
surface miner 24HR

Attachment B: PG&E Documents Provided to HBA Independent Review Team

Doc No.	Name	RFI
1	2009 Contingency Tech Pos. Paper.pdf	
2	3rd Party Review Demo Aux Bldg.pdf	
3	3rd Party Review Demo Breakwater 092518.pdf	
4	3rd Party Review Demo Cont Bldg.pdf	
5	3rd Party Review Demo Turb Bldg.pdf	
6	3rd Party Review RPV and Internals Seg 092518.pdf	
7	3rd Party Review SAC Aux Bldg.pdf	
8	3rd Party Review SAC Cont Bldg.pdf	
9	3rd Party Review SAC Turb Bldg.pdf	
10	Copy of 3rdPartyReviewData_092418.xlsx	
11	DCPP Decom Contingency Strategy.pdf	
12	Diablo Canyon Waste Disposal Tables-1.xlsx	
13	HammockSummaryLevel3_092118.pdf	
14	L2BlueSum091218.pdf	
15	Plan 35 Sec Mods 11x17 092518.pdf	
16	Rev. 0 PMP - Building Demolition.pdf	
17	Rev. 0 PMP - RPV and Internals Segmentation.pdf	
18	Rev. 0 PMP - Security Modifications (redacted).pdf	
19	Rev. 0 PMP - Staffing Plan.pdf	
20	Rev. 0 PMP - System and Area Closure.pdf	
21	Scope Specific Costs - HBA-1.xlsx	
22	103 Discharge.pdf	1
23	BW Breakwater.pdf	1
24	Power Block Equipment Location.pdf	1
25	Site Layout SK-002-R0.pdf	1
26	02 - SACP WBS Rev. 0.pdf	2
27	03 - Decon Rev 0 WBS.pdf	2
28	07 - Material Rev 0 WBS.pdf	2
29	15-Source Term WBS Rev. 0.pdf	2
30	2. WBS.xlsx (Work Breakdown Structure List)	2
31	28 - SFPI WBS Rev 0.pdf	2
32	30 - Large Component Removal Rev 0.pdf	2
33	31 - Building Demo WBS Rev. 0.pdf	2

Doc No.	Name	RFI
34	33 - RW Water Process WBS Rev. 0.pdf	2
35	Blue Line Summary Table.xlsx	4
36	Response for RFI 5.docx	5
37	DCPP Pre-Project Planning (Rev. 1a Public).pdf	6
38	Response for RFI 7 and 8.docx	7
39	Response for RFI 7 and 8.docx	8
40	Staffing plan --HBA Copy.pdf	9
41	Staffing plan unprotected--HBA.xlsx	10
42	Plan 2 Attachment 5.pdf	11
43	Plan 2 Attachment 6.xlsx	11
44	Plan 2 Attachment 7.xlsx	11
45	Plan 2 Attachments Tracking.xlsx	11
46	Rev. 0 PMP - Decontamination.pdf	12
47	Rev. 0 PMP - Materials Management.pdf	13
48	Source Term Reduction COPY for HBA.pdf	14
49	Open Air Demolition Criteria COPY for HBA.pdf	15
50	Spent Fuel Pool Island COPY for HBA.pdf	16
51	Rev. 0 PMP - Large Component Removal.pdf	17
52	Rev. 0 PMP - Liquid Radwaste Processing.pdf	18
53	19. SAC_BD_Estimates.xlsx	19
54	DCPP Decom Risk Register.xlsx	20
55	Risk Documents Additional Information.docx	20
56	Risk Documents Additional Information.docx	21
57	Risk Program Document Rev 0.docx	21
58	Updated DCPP Decom Contingency Strategy.pdf	
59	Lev3DCPPSumUnit1100318.pdf	
60	Lev3DCPPSumUnit2Com100318.pdf	
61	RFI 22 Executive Order.pdf	22
62	RFI 22 hbpp waste disposal_Rev_0.pdf	22
63	RFI 23 response.pdf	23
64	RFI 24 DCE Section for Spent Nuclear fuel.pdf	24
65	RFI 24 response.pdf	24
66	HBA RFI on staffing.pdf	25

Doc No.	Name	RFI
67	RFI 26 response.pdf	26
68	2017 DCPP Escalation Factors.xlsm	
69	RFI 27.pdf (Scrap Sales Credit)	27
70	RFI 28.pdf (Allowance for Loss of Demolition Equipment)	28
71	RFI 30.pdf (State Provisions for Repurposing Rubble On-Site as Backfill)	30
72	DCE Section 4.1.1.4 RPVI Rem Disp.pdf	31
73	RFI29_Cashflow_Curves.xlsx	29
74	RFI_32_Response_DCE_Detail.pdf	32
75	RFI 33 Response Staffing Curves.pdf	33
76	DCPP DCE Blue Lines.xlsx	34
77	Diablo Canyon Waste Disposal Tables Rev1.xlsx	35
78	RFI 35.pdf (Waste breakdown by Building)	35
79	RFI 36 - HBA 3rd Party Review.pdf	36
80	RFI 37 - HBA 3rd Party Review.pdf	37
81	L3CP.xer (DCPP Decommissioning Summary Schedule in Primavera P6)	38
82	Final Site Restoration with Breakwater retention.pdf	39
83	L3BW.xer (DCPP Decommissioning Summary Schedule in Primavera P6 w/o Breakwater Demolition)	39
84	RFI 40 Response.pdf (Draft Study of early RVI segmentation and removal)	40
85	Plan 38 Non Rad Water.pdf	41
86	Read First - Plan 38.pdf (Water Project Management Plan)	41
87	Notes for Plan 2 Rev 0 Equipment Adjustments 9.18.18.docx	42
88	Notes for Plan 2 Rev 0 Schedule and Crew Adjustments 9.7.18.docx	42
89	Plan 2 Planning and Implementation crew adj basis 9.7.18.xlsx	42
90	Plan 2 PMO crew adj basis 9.7.18.xlsx	42
91	Draft Contingency Technical Position Paper .pdf (Revision C)	43
92	HBA RFI 45 Level 3 DCPP Sum.plf (P6 Schedule Layout file)	45
93	RFI-46 - HBA 3rd Party Review.pdf (Breakwater Demolition)	46
94	RFI 47 - Basis of Duration Document.pdf	47
95	RFI 47 - HBA 3rd Party Review.pdf (Basis of Demolition Durations)	47
96	RFI 48 – SWRO Facility.pdf	48
97	RFI 49 - GTCC Disposal Costs.pdf	49
98	Revised DCPP DCE Blue Lines 11082018.xlsx	34

Attachment C: DCPP and Other US PWR Decommissioning Projects Schedule Data

Site	Status	Total Duration (yrs) [1]	Fuel on Pad (yrs) [2]	RPV & Internals (yrs) [3]	Power Block Demo (yrs) [4]	Site Restoration (yrs) [5]
DCPP U1	Near Term Planning	14.10	6.65	1.90	2.52	3.50
DCPP U2	Near Term Planning	13.29	6.83	1.63	1.41	3.50
US PWR Plant 1	Near Term Planning	7.42	2.59	3.38	1.61	2.22
US PWR Plant 2	Active / Completed	15.59	6.00		1.81	4.46
US PWR Plant 3	Long Term Planning	11.59	6.00	1.25	5.51	0.08
US PWR Plant 4	Long Term Planning	10.76	5.92	1.42	4.76	0.08
US PWR Plant 5	Long Term Planning	9.18	6.09	1.33	3.00	0.09
US PWR Plant 6	Long Term Planning	8.40	5.48	1.00	1.42	1.50
US PWR Plant 7	Active / Completed	9.00		3.05	3.01	0.69
US PWR Plant 8	Active / Completed	9.00		3.58	3.34	0.83
US PWR Plant 9	Long Term Planning	10.51	6.67	3.09	5.00	2.42
US PWR Plant 10	Long Term Planning	9.34	5.50	3.00	3.92	2.42
US PWR Plant 11	Active/ Completed		6.19			
US PWR Plant 12	Long Term Planning	10.46	5.46	1.58		
US PWR Plant 13	Long Term Planning	9.13	5.46	1.42		
Minimum	w/o DCPP	7.42	2.59	1.00	1.42	0.08
Average	w/o DCPP	10.03	5.58	2.19	3.34	1.48
Maximum	w/o DCPP	15.59	6.67	3.58	5.51	4.46
Std Dev	w/o DCPP	2.09	1.06	1.01	1.46	1.42

Attachment C Notes:

1. **Total Duration**– The period from unit shutdown or the start of DECON to the completion of initial site restoration and the commencement of the ISFSI only period. This comparison is done at the site level.
2. **Fuel on Pad** – The period from unit shutdown to the completion of the transfer of spent fuel to dry storage at the on-site ISFSI. Note DCPP DSS shows one bar representing both units combined cooling periods to the completion of spent fuel transfer. Each DCPP unit was separated and normalized for comparison to other projects.
3. **RPV and Internals** – The period from when field work on reactor vessel internals begins to the completion of the reactor pressure vessel segmentation. DCPP's reactors are represented individually.
4. **Power Block Demo** – The period from when both spent fuel transfer to dry storage and RPV Segmentation are complete through the completion of power block demolition. This comparison focuses on the element of demolition that is on the critical path because this affects the overall project schedule and cost.
5. **Site Restoration** – The period from the end of power block demo to the completion of initial site restoration and the commencement of the ISFSI only period.

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 1

ATTACHMENT B

2017 DIABLO CANYON POWER PLANT

NRC ASSURANCE OF FUNDING LETTER

Pacific Gas and
Electric Company®

Edward D. Halpin
Senior Vice President
Generation and
Chief Nuclear Officer

P.O. Box 56
Avila Beach, CA 93424

805.545.4100
E-Mail: E1H8@pge.com

March 30, 2017

PG&E Letter DCL-17-022

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

10 CFR 50.75(f)

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
<u>Decommissioning Funding Report for Diablo Canyon Power Plant, Units 1 and 2</u>

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) is submitting the decommissioning funding report for Diablo Canyon Power Plant (DCPP), Units 1 and 2, pursuant to the requirements of 10 CFR 50.75(f).

<u>Diablo Canyon Power Plant, Units 1 and 2</u>

At the end of calendar year 2016, the market values of the DCPP Units 1 (3411 MWt) and 2 (3411 MWt) decommissioning trust fund were $1,201.6 million and $1,571.0 million, respectively. PG&E currently has more funds in the DCPP, Units 1 and 2, decommissioning trust fund than required to meet the minimum NRC decommissioning amount of $620.2 million (2017 dollars) for each unit that was calculated pursuant to the requirements of 10 CFR 50.75(c). PG&E continues to fund the trust through collections for additional costs beyond those required in 10 CFR 50.75(c).

<u>Supporting Cost Estimates</u>

TLG Services, Inc. prepared a site-specific decommissioning cost estimate that PG&E submitted to the California Public Utilities Commission (CPUC) in the 2015 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) on March 1, 2016. Based on site-specific cost estimates prepared by TLG Services, Inc., PG&E estimates that the decommissioning costs are about $1,297.0 million for DCPP Unit 1 and $1,276.4 million for Unit 2 in 2017 dollars. These costs do not include site restoration of the facilities ($671.2 million) or spent fuel management costs after shutdown of Units 1 and 2 ($837.5 million).

To assure that sufficient funds will be available for decommissioning, PG&E has established separate external sinking trust fund accounts for DCPP, Units 1 and 2.

Supporting Enclosures

Enclosures 1-6 provide supporting documentation for this report.

Enclosure 1 provides decommissioning funding status information in a format suggested by the Nuclear Energy Institute (NEI) and the NRC.

Enclosure 2 provides information on the escalation of the required decommissioning funding amounts from 1986 dollars to 2017 dollars. As required by 10 CFR 50.75(c)(2), and using NUREG-1577, "Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance," Revision 1, and NUREG-1307, "Report on Waste Burial Charges," Revision 16, the information includes escalation factors for energy, labor, and waste burial costs. NUREG-1307, Revision 16, assumes for plants that have no disposal site available within their designated low-level waste (LLW) compact, that the cost for disposal of Class A LLW is the same as that for the Clive, Utah disposal facility and for Class B and C LLW is the same as that for the Andrews County, Texas disposal facility including accounting for out-of-compact fees. The State of Texas limits the total non-compact waste disposed at the compact waste facility (CWF) in Andrews County, Texas for out-of-compact generators to 30 percent of licensed capacity. DCPP does not have a disposal site available within its designated Southwestern LLW Compact. NUREG-1307, Revision 16, states that, given these considerations, licensees may want to set aside additional decommissioning trust funds to avoid significant future shortfalls in funding and potential enforcement actions. Based on the limited number of CWFs currently available and the potential for limited to no availability at the Texas CWF for DCPP LLW disposal when PG&E begins LLW disposal associated with decommissioning, PG&E has used the formula, coefficients, and adjustment factors from NUREG-1307 Revision 16 in our cost analyses, with the exception of the burial/disposition factor. As allowed per NUREG-1307, Revision 16, PG&E used a burial/disposition adjustment factor higher than the burial/disposition adjustment factor provided in NUREG-1307, Revision 16, for plants that have no disposal site available within their designated LLW Compact. To avoid significant future shortfalls in funding and potential enforcement actions, PG&E used the burial/disposition adjustment factor for compact-affiliated disposal for the South Carolina site. The specific decommissioning cost estimate results in a total cost estimate of no less than the amount estimated by using the parameters presented in NUREG-1307, Revision 16, while accounting for the potential future shortfall in disposal capacity at the CWF in Andrews County, Texas.

Enclosure 3 is the 2015 DCPP Appendix C1, Table C-1 for Unit 1 and 2015 DCPP Appendix C2, Table C-2 for Unit 2 from the TLG Services, Inc. decommissioning cost estimate report prepared in March 2016 for DCPP Units 1 and 2. PG&E then adjusted the TLG Services, Inc. cost estimate to reflect the costs in 2017 dollars per the NDCTP submitted on March 1, 2016, to the CPUC by applying the escalation factors included in the submittal. The report provides cost estimates for decommissioning of both nuclear and non-nuclear facilities, including the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI).

Enclosure 4 is a cash flow for the total decommissioning of DCPP that identifies the monies for NRC scope (removal of radiological contamination), site restoration (including nonradiological work), and the spent fuel management based on the TLG Services, Inc. 2015 Cost Estimate by unit.

Enclosure 5 contains the TLG Services, Inc. decommissioning cost estimate report prepared in March 2016 for DCPP Unit 1 and Unit 2. The report provides cost estimates for the decommissioning of the nuclear, non-nuclear facilities, and spent fuel management, including operation and decommissioning of the ISFSI in 2014 dollars.

Enclosure 6 contains the variance of the 2016 forecast, as submitted in Enclosure 3 of PG&E Letter DCL-15-044, "Decommissioning Funding Report for Diablo Canyon Power Plant, Units 1 and 2," dated March 31, 2015, to the actual expenditures for 2016.

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

Should you have any questions, please contact Mrs. Brooke Winterton at (805) 549-0368.

Sincerely,

Edward D. Halpin
Senior Vice President, Generation and Chief Nuclear Officer

cc: Diablo Distribution
cc/encl: Kriss M. Kennedy, NRC Region IV Administrator
Balwant K. Singal, NRR Senior Project Manager
INPO

Enclosure 1
PG&E Letter DCL-17-022

NRC Decommissioning Funding Status Report

Diablo Canyon Power Plant – Units 1 (3411 MWt) and 2 (3411 MWt)

NRC Decommissioning Funding Status Report
Diablo Canyon Power Plant - Units 1 (3411 MWt) & 2 (3411 MWt)

As provided in 10 CFR 50.75(f)(1), each power reactor licensee is required to report to the NRC on a calendar year basis, beginning on March 31, 1999, and every 2 years thereafter, on the status of its decommissioning funding for each reactor or share of reactor it owns.

Note that Items 3, 4, and 8 are data included in PG&E's Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) filed with the California Public Utilities Commission (CPUC) on March 1, 2016. PG&E does not anticipate a decision on this filing until mid-2017.

1. The minimum decommissioning fund estimate, pursuant to 10 CFR 50.75 (b) and (c)[1]

	$ in Millions
Value in January 2017 dollars	Unit 1 $ 620.2
	Unit 2 $ 620.2

2. The amount accumulated at the end of the calendar year preceding the date of the report for items included in 10 CFR 50.75 (b) and (c). (Alternatively, the total amount accumulated at the end of the calendar year preceding the date of the report can be reported here if the cover letter transmitting the report provides the total estimate and indicates what portion of that estimate is for items not included in 10 CFR 50.75 (b) and (c)).

	$ in Millions
Market Value (December 2016 dollars)	Unit 1 $1,201.6
	Unit 2 $1,571.0

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[1] * The NRC formulas in section 10 CFR 50.75(c) include only those decommissioning costs incurred by licensees to remove a facility or site safely from service and reduce residual radioactivity to levels that permit: (1) release of the property for unrestricted use and termination of the license; or (2) release of the property under restricted conditions and termination of the license. The cost of dismantling or demolishing nonradiological systems and structures is not included in the NRC decommissioning cost estimates. The costs of managing and storing spent fuel on site until transfer to DOE are not included in the cost formulas.

3. A schedule of the annual amounts remaining to be collected include items beyond those required in 10 CFR 50.75 (b) and (c). (The cover letter transmitting the report provides a total cost estimate and indicates the portions of that estimate for items that are not included in 10 CFR 50.75 (b) and (c))

	$ in Millions
Amount Remaining	$953.7
Unit 1 Annual Collection 2017-2024	$62.225
Unit 2 Annual Collection 2017-2025	$53.200

4. The assumptions used regarding escalation in decommissioning cost, rates of earnings on decommissioning funds (anticipates that the portfolio of each trust will be gradually converted to a more conservative all income portfolio beginning in 2024 for Unit 1 and Unit 2), and rates of other factors used in funding projections;

Rate of Return on Qualified Trust Unit 1	
2017	4.49 percent
2018	4.48 percent
2019	4.45 percent
2020	4.42 percent
2021	4.38 percent
2022	4.34 percent
2023	4.29 percent
2024	4.24 percent
2025	4.18 percent
2026	4.08 percent
2027	3.99 percent
2028	3.90 percent
2029	3.82 percent
2030	3.74 percent
2031	3.67 percent
2032	3.60 percent
2033	3.54 percent
2034	3.48 percent
2035	3.42 percent
2036	3.36 percent
2037	3.31 percent
2038	3.26 percent
2039	3.22 percent
2040	3.17 percent
2041	3.13 percent
2042	3.09 percent
2043	3.05 percent

2044	3.01 percent
2045	2.98 percent
2046	2.95 percent
2047	2.91 percent
2048	2.88 percent
2049	2.85 percent
2050	2.83 percent
2051	2.80 percent
2052 – 2059	2.77 percent

Rate of Return on Qualified Trust Unit 2

2017	4.51 percent
2018	4.48 percent
2019	4.45 percent
2020	4.41 percent
2021	4.37 percent
2022	4.32 percent
2023	4.27 percent
2024	4.22 percent
2025	4.17 percent
2026	4.10 percent
2027	4.00 percent
2028	3.92 percent
2029	3.83 percent
2030	3.75 percent
2031	3.68 percent
2032	3.61 percent
2033	3.55 percent
2034	3.48 percent
2035	3.43 percent
2036	3.37 percent
2037	3.32 percent
2038	3.27 percent
2039	3.22 percent
2040	3.18 percent
2041	3.13 percent
2042	3.09 percent
2043	3.05 percent
2044	3.02 percent
2045	2.98 percent
2046	2.95 percent
2047	2.92 percent
2048	2.88 percent
2049	2.85 percent
2050	2.83 percent

2051	2.80 percent
2052 – 2059	2.77 percent

5. Any contracts upon which the licensee is relying pursuant to 10 CFR 50.75(e)(1)(v).

NONE

6. Any modifications to a licensee's current method providing financial assurance occurring since the last submitted report.

NONE

7. Any material changes to trust agreements.

NONE

8. CPUC Submittal in 2017 Dollars in Millions

Total Unit 1 (Decommission 2024)	$ 1,817.5
Scope Excluded from NRC calculations	$ 105.1
Spent Fuel Management	$ 415.4
Total NRC Decommissioning Costs	$ 1,297.0
Total Unit 2 (Decommission 2025)	$ 2,264.6
Scope Excluded from NRC calculations	$ 566.1
Spent Fuel Management	$ 422.1
Total NRC Decommissioning Costs	$ 1,276.4

2017 Decommissioning Estimate Unit 1
(1 page)

2017 Decommissioning Estimate Unit 2
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Composite Escalation
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Development of E Component
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Development of L Component
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Development of B Component
(1 page)

2017 Decommissioning Estimate Unit 1

Nuclear Regulatory Commission
Estimate of Decommission Costs for Pressurized Water Reactor (PWR) Diablo Canyon Power Plant (DCPP) Unit 1 in 2015

	DCPP PWR (millions)	
January 1986 Estimate	$105	
Escalated to 1999	$118.2	(Table 2.1 in NUREG 1307 Revision 10 has no value for 1999 Burial)
Escalated to 2000		(No Submittal Required)
Escalated to 2001	$333.8	($396.7 in 2001 Submittal)
Escalated to 2002		(No Submittal Required)
Escalated to 2003	$347.5	($404.8 in 2003 Submittal)
Escalated to 2004		(No Submittal Required)
Escalated to 2005	$403.5	($427.2 in 2005 Submittal)
Escalated to 2006		(No Submittal Required)
Escalated to 2007	$494.2	($494.8 in 2007 Submittal)
Escalated to 2008		(No Submittal Required)
Escalated to 2009	$539.7	($679.5 in 2009 Submittal)
Escalated to 2010		(No Submittal Required)
Escalated to 2011	$588.1	($546.5 in 2011 Submittal)
Escalated to 2012		(No Submittal Required)
Escalated to 2013	$620.2	($643.0 in 2013 Submittal)
Escalated to 2014		(No Submittal Required)
Escalated to 2015	$623.4	($646.2 in 2015 Submittal)
Escalated to 2016		(No Submittal Required)
Escalated to 2017	$620.2	

Based on 10 CFR 50.75 (c), "Table of Minimum Amounts" (January 1986 dollars).
PWR Greater than or equal to 3400 MWt = $105 million per unit between 1200 MWt and 3400 MWt
(for PWR less than 1200 MWt, use P=1200 MWt $75+0.0088P)

2017 Decommissioning Estimate Unit 2

Nuclear Regulatory Commission
Estimate of Decommission Costs for Pressurized Water Reactor (PWR) Diablo Canyon Power Plant (DCPP) Unit 2 in 2017

	DCPP PWR (millions)	
January 1986 Estimate	$105	
Escalated to 1999	$118.2	(Table 2.1 in NUREG 1307 Revision 10 has no value for 1999 Burial)
Escalated to 2000		(No Submittal Required)
Escalated to 2001	$333.8	($396.7 in 2001 Submittal)
Escalated to 2002		(No Submittal Required)
Escalated to 2003	$347.5	($404.8 in 2003 Submittal)
Escalated to 2004		(No Submittal Required)
Escalated to 2005	$403.5	($427.2 in 2005 Submittal)
Escalated to 2006		(No Submittal Required)
Escalated to 2007	$494.2	($494.8 in 2007 Submittal)
Escalated to 2008		(No Submittal Required)
Escalated to 2009	$539.7	($720.9 in 2009 Submittal)
Escalated to 2010		(No Submittal Required)
Escalated to 2011	$588.1	($546.5 in 2011 Submittal)
Escalated to 2012		(No Submittal Required)
Escalated to 2013	$620.2	($643.0 in 2013 Submittal)
Escalated to 2014		(No Submittal Required)
Escalated to 2015	$623.4	(646.2 in 2015 Submittal)
Escalated to 2016		(No Submittal Required)
Escalated to 2017	$620.2	

Based on 10 CFR 50.75 (c), "Table of Minimum Amounts" (January 1986 dollars).
PWR Greater than or equal to 3400 MWt = $105 million per unit between 1200 MWt and 3400 MWt
(for PWR less than 1200 MWt, use P=1200 MWt $75+0.0088P)

Composite Escalation

Calculating Overall Escalation Rate

PWR	Jan-86	Jan-99	Jan-00	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07	Jan-08	Jan-09	Jan-10	Jan-11	Jan-12	Jan-13	Jan-14	Jan-15	Jan-16	Jan-17	Weight (1)
L (Labor)	1.0000	1.5624	1.6370	0.9365	0.9733	1.0122	1.0445	1.0846	2.0600	2.1218	2.1939	2.2536	2.2784	2.3175	2.3711	2.4061	2.4638	2.5235	2.5812	2.6492	0.65
E (Energy)	1.0000	0.8499	1.0297	1.1850	0.9909	1.2027	1.2164	1.4656	1.8306	1.7950	2.3262	1.7850	2.0766	2.3145	2.6030	2.5667	2.6162	2.2076	1.7624	1.8705	0.13
B (Burial)	1.0000	0.0000	10.8039	10.9840	11.1633	11.3433	13.0733	13.3951	13.7247	14.0626	15.0364	15.6505	16.2646	17.2446	18.2247	18.2247	18.2247	18.2247	18.2247	17.9148	0.22

(1) From NUREG 1307, Revision 16, Report on Waste Burial Charges, Section 3.1, Page 8, where A, B, and C are the fractions of the total 1986 dollar costs that are attributable to labor (0.64), energy (0.14), and burial (0.22), respectively, and sum to 1.0.

PWR
Combined Escalation Rate for:

Jan-86	Jan-99	Jan-00	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07	Jan-08	Jan-09	Jan-10	Jan-11	Jan-12	Jan-13	Jan-14	Jan-15	Jan-16	Jan-17
1.0000	1.1260	3.5748	3.1793	3.2174	3.3098	3.7132	3.8425	4.5964	4.7063	5.0364	5.1400	5.3291	5.6011	5.8890	5.9071	5.9510	5.9367	5.9163	5.9064

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
			PWR wt = 0.58	PWR wt = 0.42	
Jan-86	114.2	82.0	1.0000	1.0000	1.0000
Feb-86	115.0	62.4	1.0070	0.7610	0.9037
Mar-86	114.4	51.3	1.0018	0.6256	0.8438
Apr-86	113.7	49.8	0.9956	0.6073	0.8325
May-86	114.1	47.0	0.9991	0.5732	0.8202
Jun-86	115.3	44.7	1.0096	0.5451	0.8145
Jul-86	116.2	36.4	1.0175	0.4439	0.7766
Aug-86	116.3	40.1	1.0184	0.4890	0.7961
Sep-86	116.3	46.3	1.0184	0.5646	0.8278
Oct-86	113.0	43.1	0.9895	0.5256	0.7947
Nov-86	112.7	43.5	0.9869	0.5305	0.7952
Dec-86	112.3	45.6	0.9834	0.5561	0.8039
Jan-87	110.3	51.4	0.9658	0.6268	0.8235
Feb-87	109.8	53.1	0.9615	0.6476	0.8296
Mar-87	110.2	49.7	0.9650	0.6061	0.8142
Apr-87	109.9	52.0	0.9623	0.6341	0.8245
May-87	111.8	53.3	0.9790	0.6500	0.8408
Jun-87	113.9	55.1	0.9974	0.6720	0.8607
Jul-87	116.2	56.3	1.0175	0.6866	0.8785
Aug-87	115.7	59.4	1.0131	0.7244	0.8919
Sep-87	115.5	56.8	1.0114	0.6927	0.8775
Oct-87	111.0	59.3	0.9720	0.7232	0.8675
Nov-87	109.2	61.2	0.9562	0.7463	0.8681
Dec-87	109.6	58.1	0.9597	0.7085	0.8542
Jan-88	108.8	54.8	0.9527	0.6683	0.8333
Feb-88	109.0	51.5	0.9545	0.6280	0.8174
Mar-88	109.0	49.7	0.9545	0.6061	0.8082
Apr-88	109.1	53.3	0.9553	0.6500	0.8271
May-88	108.9	54.3	0.9536	0.6622	0.8312
Jun-88	117.2	50.6	1.0263	0.6171	0.8544
Jul-88	118.2	46.9	1.0350	0.5720	0.8405
Aug-88	118.3	46.8	1.0359	0.5707	0.8405
Sep-88	118.5	45.9	1.0377	0.5598	0.8369
Oct-88	114.2	42.3	1.0000	0.5159	0.7967
Nov-88	109.2	47.2	0.9562	0.5756	0.7964
Dec-88	110.5	50.6	0.9676	0.6171	0.8204
Jan-89	112.0	54.9	0.9807	0.6695	0.8500
Feb-89	112.0	54.0	0.9807	0.6585	0.8454
Mar-89	112.3	57.3	0.9834	0.6988	0.8638
Apr-89	112.4	61.5	0.9842	0.7500	0.8859
May-89	113.6	57.5	0.9947	0.7012	0.8715
Jun-89	119.8	53.3	1.0490	0.6500	0.8814
Jul-89	122.2	52.7	1.0701	0.6427	0.8906
Aug-89	122.4	53.5	1.0718	0.6524	0.8957
Sep-89	122.5	59.3	1.0727	0.7232	0.9259
Oct-89	117.2	64.0	1.0263	0.7805	0.9230

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-89	113.5	64.4	0.9939	0.7854	0.9063
Dec-89	114.2	68.1	1.0000	0.8305	0.9288
Jan-90	114.9	85.3	1.0061	1.0402	1.0205
Feb-90	115.0	59.4	1.0070	0.7244	0.8883
Mar-90	115.4	60.4	1.0105	0.7366	0.8955
Apr-90	115.1	61.0	1.0079	0.7439	0.8970
May-90	117.0	58.4	1.0245	0.7122	0.8933
Jun-90	123.9	53.0	1.0849	0.6463	0.9007
Jul-90	124.4	51.6	1.0893	0.6293	0.8961
Aug-90	124.6	72.3	1.0911	0.8817	1.0031
Sep-90	125.0	87.3	1.0946	1.0646	1.0820
Oct-90	121.2	104.8	1.0613	1.2780	1.1523
Nov-90	120.2	98.9	1.0525	1.2061	1.1170
Dec-90	118.9	89.3	1.0412	1.0890	1.0613
Jan-91	124.2	82.9	1.0876	1.0110	1.0554
Feb-91	124.3	74.3	1.0884	0.9061	1.0119
Mar-91	124.3	61.6	1.0884	0.7512	0.9468
Apr-91	124.7	60.0	1.0919	0.7317	0.9406
May-91	128.2	59.6	1.1226	0.7268	0.9564
Jun-91	132.6	57.6	1.1611	0.7024	0.9685
Jul-91	134.5	58.1	1.1778	0.7085	0.9807
Aug-91	133.8	62.1	1.1716	0.7573	0.9976
Sep-91	133.8	65.4	1.1716	0.7976	1.0145
Oct-91	128.3	67.6	1.1235	0.8244	0.9979
Nov-91	123.1	71.0	1.0779	0.8659	0.9889
Dec-91	125.1	62.2	1.0954	0.7585	0.9539
Jan-92	125.9	54.4	1.1025	0.6634	0.9181
Feb-92	125.3	57.3	1.0972	0.6988	0.9299
Mar-92	125.8	56.0	1.1016	0.6829	0.9257
Apr-92	124.8	59.0	1.0928	0.7195	0.9360
May-92	128.5	62.1	1.1252	0.7573	0.9707
Jun-92	134.8	65.4	1.1804	0.7976	1.0196
Jul-92	135.6	64.6	1.1874	0.7878	1.0196
Aug-92	135.1	63.3	1.1830	0.7720	1.0104
Sep-92	135.9	65.6	1.1900	0.8000	1.0262
Oct-92	131.2	68.2	1.1489	0.8317	1.0157
Nov-92	125.5	64.2	1.0989	0.7829	0.9662
Dec-92	126.7	59.4	1.1095	0.7244	0.9477
Jan-93	127.1	59.0	1.1130	0.7195	0.9477
Feb-93	126.4	60.4	1.1068	0.7366	0.9513
Mar-93	126.7	63.2	1.1095	0.7707	0.9672
Apr-93	126.8	62.4	1.1103	0.7610	0.9636
May-93	127.5	62.6	1.1165	0.7634	0.9682
Jun-93	136.9	60.8	1.1988	0.7415	1.0067
Jul-93	137.1	57.0	1.2005	0.6951	0.9883
Aug-93	137.2	54.4	1.2014	0.6634	0.9754
Sep-93	137.6	59.3	1.2049	0.7232	1.0026
Oct-93	131.9	65.4	1.1550	0.7976	1.0049

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-93	126.3	61.6	1.1060	0.7512	0.9570
Dec-93	126.0	51.4	1.1033	0.6268	0.9032
Jan-94	126.2	51.5	1.1051	0.6280	0.9047
Feb-94	125.9	57.5	1.1025	0.7012	0.9339
Mar-94	125.8	56.2	1.1016	0.6854	0.9268
Apr-94	125.4	54.7	1.0981	0.6671	0.9171
May-94	126.0	54.7	1.1033	0.6671	0.9201
Jun-94	133.5	54.1	1.1690	0.6598	0.9551
Jul-94	134.5	56.3	1.1778	0.6866	0.9715
Aug-94	134.5	57.5	1.1778	0.7012	0.9776
Sep-94	134.9	57.7	1.1813	0.7037	0.9807
Oct-94	129.1	57.7	1.1305	0.7037	0.9512
Nov-94	127.0	58.8	1.1121	0.7171	0.9462
Dec-94	127.4	54.7	1.1156	0.6671	0.9272
Jan-95	127.6	54.7	1.1173	0.6671	0.9282
Feb-95	128.0	53.3	1.1208	0.6500	0.9231
Mar-95	128.3	54.3	1.1235	0.6622	0.9297
Apr-95	126.4	57.1	1.1068	0.6963	0.9344
May-95	130.2	59.1	1.1401	0.7207	0.9640
Jun-95	135.3	55.8	1.1848	0.6805	0.9730
Jul-95	136.6	53.5	1.1961	0.6524	0.9678
Aug-95	136.5	55.6	1.1953	0.6780	0.9780
Sep-95	133.7	58.2	1.1708	0.7098	0.9771
Oct-95	131.4	57.8	1.1506	0.7049	0.9634
Nov-95	127.6	59.5	1.1173	0.7256	0.9528
Dec-95	127.7	60.6	1.1182	0.7390	0.9590
Jan-96	127.9	62.6	1.1200	0.7634	0.9702
Feb-96	127.1	59.7	1.1130	0.7280	0.9513
Mar-96	127.8	63.5	1.1191	0.7744	0.9743
Apr-96	129.1	74.7	1.1305	0.9110	1.0383
May-96	135.0	72.0	1.1821	0.8780	1.0544
Jun-96	137.5	62.8	1.2040	0.7659	1.0200
Jul-96	136.0	64.3	1.1909	0.7841	1.0201
Aug-96	136.2	66.5	1.1926	0.8110	1.0323
Sep-96	136.2	73.4	1.1926	0.8951	1.0677
Oct-96	131.2	79.7	1.1489	0.9720	1.0746
Nov-96	127.1	76.5	1.1130	0.9329	1.0373
Dec-96	127.7	76.1	1.1182	0.9280	1.0383
Jan-97	128.3	73.7	1.1235	0.8988	1.0291
Feb-97	128.1	72.3	1.1217	0.8817	1.0209
Mar-97	128.2	65.2	1.1226	0.7951	0.9851
Apr-97	127.3	65.3	1.1147	0.7963	0.9810
May-97	129.7	64.2	1.1357	0.7829	0.9876
Jun-97	135.1	60.8	1.1830	0.7415	0.9976
Jul-97	135.9	57.8	1.1900	0.7049	0.9863
Aug-97	134.7	61.5	1.1795	0.7500	0.9991
Sep-97	136.0	60.4	1.1909	0.7366	1.0001
Oct-97	130.1	64.8	1.1392	0.7902	0.9927

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-97	127.9	65.8	1.1200	0.8024	0.9866
Dec-97	128.3	59.4	1.1235	0.7244	0.9559
Jan-98	127.4	54.1	1.1156	0.6598	0.9241
Feb-98	127.2	52.0	1.1138	0.6341	0.9124
Mar-98	126.7	48.3	1.1095	0.5890	0.8909
Apr-98	126.4	50.2	1.1068	0.6122	0.8991
May-98	129.2	50.0	1.1313	0.6098	0.9123
Jun-98	133.8	46.3	1.1716	0.5646	0.9167
Jul-98	134.8	45.0	1.1804	0.5488	0.9151
Aug-98	135.2	44.0	1.1839	0.5366	0.9120
Sep-98	135.2	48.3	1.1839	0.5890	0.9340
Oct-98	130.4	47.4	1.1419	0.5780	0.9051
Nov-98	127.6	46.2	1.1173	0.5634	0.8847
Dec-98	126.6	38.8	1.1086	0.4732	0.8417
Jan-99	126.1	40.9	1.1042	0.4988	0.8499
Feb-99	125.5	38.2	1.0989	0.4659	0.8330
Mar-99	125.5	42.8	1.0989	0.5220	0.8566
Apr-99	125.2	52.5	1.0963	0.6402	0.9048
May-99	127.4	52.6	1.1156	0.6415	0.9165
Jun-99	131.0	52.4	1.1471	0.6390	0.9337
Jul-99	133.9	58.7	1.1725	0.7159	0.9807
Aug-99	133.9	63	1.1725	0.7683	1.0027
Sep-99	134.1	67.6	1.1743	0.8244	1.0273
Oct-99	129.5	65.5	1.1340	0.7988	0.9932
Nov-99	127.5	71.3	1.1165	0.8695	1.0127
Dec-99	126.5	72.9	1.1077	0.8890	1.0159
Jan-00	126.8	75.3	1.1103	0.9183	1.0297
Feb-00	126.7	87.9	1.1095	1.0720	1.0937
Mar-00	126.7	89.7	1.1095	1.0939	1.1029
Apr-00	126.8	83.1	1.1103	1.0134	1.0696
May-00	128.6	82.9	1.1261	1.0110	1.0777
Jun-00	133.6	86.2	1.1699	1.0512	1.1200
Jul-00	136.2	88.7	1.1926	1.0817	1.1461
Aug-00	137.4	91.6	1.2032	1.1171	1.1670
Sep-00	137.8	110.1	1.2067	1.3427	1.2638
Oct-00	134.1	108.6	1.1743	1.3244	1.2373
Nov-00	130.9	108.4	1.1462	1.3220	1.2200
Dec-00	132.7	100.6	1.1620	1.2268	1.1892
Jan-01	136.4	96.1	1.1944	1.1720	1.1850
Feb-01	136.4	91.6	1.1944	1.1171	1.1619
Mar-01	136.5	83.1	1.1953	1.0134	1.1189
Apr-01	135.1	86.2	1.1830	1.0512	1.1277
May-01	136.2	94.2	1.1926	1.1488	1.1742
Jun-01	148.4	90.2	1.2995	1.1000	1.2157
Jul-01	149.5	81.3	1.3091	0.9915	1.1757
Aug-01	148.9	83.2	1.3039	1.0146	1.1824
Sep-01	148.2	93	1.2977	1.1341	1.2290
Oct-01	143.8	76.8	1.2592	0.9366	1.1237

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-01	137.3	70.5	1.2023	0.8598	1.0584
Dec-01	136.9	56.6	1.1988	0.6902	0.9852
Jan-02	136.3	58.3	1.1935	0.7110	0.9909
Feb-02	135.4	59.6	1.1856	0.7268	0.9929
Mar-02	135.7	69.1	1.1883	0.8427	1.0431
Apr-02	135.4	76.4	1.1856	0.9317	1.0790
May-02	137.9	75	1.2075	0.9146	1.0845
Jun-02	143.6	71.4	1.2574	0.8707	1.0950
Jul-02	144.9	75.5	1.2688	0.9207	1.1226
Aug-02	145.0	77.9	1.2697	0.9500	1.1354
Sep-02	145.8	89.5	1.2767	1.0915	1.1989
Oct-02	140.0	95.1	1.2259	1.1598	1.1981
Nov-02	139.5	82.8	1.2215	1.0098	1.1326
Dec-02	139.6	84.6	1.2224	1.0317	1.1423
Jan-03	140.3	95.7	1.2285	1.1671	1.2027
Feb-03	140.6	120.4	1.2312	1.4683	1.3308
Mar-03	143.3	128.9	1.2548	1.5720	1.3880
Apr-03	144.3	98.3	1.2636	1.1988	1.2364
May-03	145.1	85.5	1.2706	1.0427	1.1749
Jun-03	148.3	87.2	1.2986	1.0634	1.1998
Jul-03	151.6	90.1	1.3275	1.0988	1.2314
Aug-03	151.3	94.1	1.3249	1.1476	1.2504
Sep-03	152.0	88.2	1.3310	1.0756	1.2237
Oct-03	147.4	97.8	1.2907	1.1927	1.2495
Nov-03	142.7	93.0	1.2496	1.1341	1.2011
Dec-03	142.9	95.8	1.2513	1.1683	1.2164
Jan-04	143.1	106.8	1.2531	1.3024	1.2738
Feb-04	143.1	100.8	1.2531	1.2293	1.2431
Mar-04	143.1	107.8	1.2531	1.3146	1.2789
Apr-04	143.1	115.2	1.2531	1.4049	1.3168
May-04	144.2	116	1.2627	1.4146	1.3265
Jun-04	152.4	111.5	1.3345	1.3598	1.3451
Jul-04	152.2	119.3	1.3327	1.4549	1.3840
Aug-04	154.0	131.1	1.3485	1.5988	1.4536
Sep-04	154.0	136.8	1.3485	1.6683	1.4828
Oct-04	145.8	161.7	1.2767	1.9720	1.5687
Nov-04	144.9	153.6	1.2688	1.8732	1.5227
Dec-04	146.2	133.8	1.2802	1.6317	1.4278
Jan-05	148.9	138.5	1.3039	1.6890	1.4656
Feb-05	148.0	146	1.2960	1.7805	1.4995
Mar-05	148.1	169.4	1.2968	2.0659	1.6198
Apr-05	148.7	170.9	1.3021	2.0841	1.6306
May-05	151.1	165.3	1.3231	2.0159	1.6141
Jun-05	159.7	180.6	1.3984	2.2024	1.7361
Jul-05	162.1	186.2	1.4194	2.2707	1.7770
Aug-05	162.5	194.5	1.4229	2.3720	1.8215
Sep-05	162.8	209.9	1.4256	2.5598	1.9019
Oct-05	159.5	252.0	1.3967	3.0732	2.1008

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-05	161.1	199.1	1.4107	2.4280	1.8380
Dec-05	161.4	193.6	1.4133	2.3610	1.8113
Jan-06	167.0	191.8	1.4623	2.3390	1.8306
Feb-06	168.6	190.0	1.4764	2.3171	1.8295
Mar-06	167.4	199.2	1.4658	2.4293	1.8705
Apr-06	169.6	221.9	1.4851	2.7061	1.9979
May-06	170.8	231.4	1.4956	2.8220	2.0527
Jun-06	181.2	238.1	1.5867	2.9037	2.1398
Jul-06	181.9	231.6	1.5928	2.8244	2.1101
Aug-06	180.2	241.4	1.5779	2.9439	2.1516
Sep-06	181.0	203.1	1.5849	2.4768	1.9595
Oct-06	171.2	198.1	1.4991	2.4159	1.8842
Nov-06	167.2	198.2	1.4641	2.4171	1.8643
Dec-06	167.8	200.4	1.4694	2.4439	1.8787
Jan-07	171.9	180.0	1.5053	2.1951	1.7950
Feb-07	175.7	191.5	1.5385	2.3354	1.8732
Mar-07	172.1	215.1	1.5070	2.6232	1.9758
Apr-07	173.1	231.8	1.5158	2.8268	2.0664
May-07	179.2	225.3	1.5692	2.7476	2.0641
Jun-07	186.7	222.4	1.6349	2.7122	2.0873
Jul-07	187.0	237.8	1.6375	2.9000	2.1677
Aug-07	187.6	225.5	1.6427	2.7500	2.1078
Sep-07	188.4	238.9	1.6497	2.9134	2.1805
Oct-07	182.7	243.3	1.5998	2.9671	2.1741
Nov-07	180.3	288.2	1.5788	3.5146	2.3919
Dec-07	180.0	266.7	1.5762	3.2524	2.2802
Jan-08	181.9	273.8	1.5928	3.3390	2.3262
Feb-08	180.0	280.2	1.5762	3.4171	2.3494
Mar-08	183.1	339.6	1.6033	4.1415	2.6693
Apr-08	185.2	352.5	1.6217	4.2988	2.7461
May-08	189.5	384.9	1.6594	4.6939	2.9339
Jun-08	191.9	410.5	1.6804	5.0061	3.0772
Jul-08	196.1	423.8	1.7172	5.1683	3.1666
Aug-08	197.1	343.9	1.7259	4.1939	2.7625
Sep-08	195.9	335.1	1.7154	4.0866	2.7113
Oct-08	193.0	279.0	1.6900	3.4024	2.4092
Nov-08	187.7	218.2	1.6436	2.6610	2.0709
Dec-08	188.3	163.0	1.6489	1.9878	1.7912
Jan-09	190.3	159.8	1.6664	1.9488	1.7850
Feb-09	190.3	145.6	1.6664	1.7756	1.7123
Mar-09	187.6	136.8	1.6427	1.6683	1.6535
Apr-09	186.9	159.9	1.6366	1.9500	1.7682
May-09	190.5	158.6	1.6681	1.9341	1.7799
Jun-09	193.3	183.7	1.6926	2.2402	1.9226
Jul-09	196.2	165.2	1.7180	2.0146	1.8426
Aug-09	194.7	196.1	1.7049	2.3915	1.9933
Sep-09	194.9	186.6	1.7067	2.2756	1.9456
Oct-09	189.9	193.3	1.6629	2.3573	1.9545

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-09	186.0	207.8	1.6287	2.5341	2.0090
Dec-09	186.0	197.5	1.6287	2.4085	1.9562
Jan-10	186.3	220.7	1.6313	2.6915	2.0766
Feb-10	186.1	200.2	1.6296	2.4415	1.9706
Mar-10	189.0	217.0	1.6550	2.6463	2.0714
Apr-10	188.8	231.5	1.6532	2.8232	2.1446
May-10	192.0	226.0	1.6813	2.7561	2.1327
Jun-10	197.8	212.4	1.7320	2.5902	2.0925
Jul-10	199.8	209.3	1.7496	2.5524	2.0868
Aug-10	200.8	221.4	1.7583	2.7000	2.1538
Sep-10	200.0	220.0	1.7513	2.6829	2.1426
Oct-10	194.6	235.8	1.7040	2.8756	2.1961
Nov-10	190.9	245.3	1.6716	2.9915	2.2260
Dec-10	191.4	250.0	1.6760	3.0488	2.2526
Jan-11	193.1	260.4	1.6909	3.1756	2.3145
Feb-11	194.4	278.8	1.7023	3.4000	2.4153
Mar-11	195.0	307.5	1.7075	3.7500	2.5654
Apr-11	194.1	325.1	1.6996	3.9646	2.6509
May-11	196.9	315.1	1.7242	3.8427	2.6139
Jun-11	205.7	316.9	1.8012	3.8646	2.6679
Jul-11	215.3	311.5	1.8853	3.7988	2.6890
Aug-11	216.6	296.9	1.8967	3.6207	2.6208
Sep-11	215.8	306.5	1.8897	3.7378	2.6659
Oct-11	206.6	299.6	1.8091	3.6537	2.5838
Nov-11	204.0	322.7	1.7863	3.9354	2.6889
Dec-11	204.4	301.0	1.7898	3.6707	2.5798
Jan-12	201.1	308.8	1.7609	3.7659	2.6030
Feb-12	200.3	316.5	1.7539	3.8598	2.6384
Mar-12	199.8	330.8	1.7496	4.0341	2.7091
Apr-12	198.1	327.1	1.7347	3.9890	2.6815
May-12	201.5	315.6	1.7644	3.8488	2.6399
Jun-12	207.7	284.6	1.8187	3.4707	2.5126
Jul-12	221.5	287.9	1.9396	3.5110	2.5996
Aug-12	222.1	313.4	1.9448	3.8220	2.7332
Sep-12	222.8	330.4	1.9510	4.0293	2.8239
Oct-12	214.1	334.1	1.8748	4.0744	2.7986
Nov-12	212.3	311.6	1.8590	3.8000	2.6742
Dec-12	213.8	303.3	1.8722	3.6988	2.6393
Jan-13	199.2	303.6	1.7443	3.7024	2.5667
Feb-13	199.4	327.7	1.7461	3.9963	2.6912
Mar-13	199.0	308.7	1.7426	3.7646	2.5918
Apr-13	198.8	303.9	1.7408	3.7061	2.5662
May-13	203.5	296.4	1.7820	3.6146	2.5517
Jun-13	211.9	294.9	1.8555	3.5963	2.5867
Jul-13	211.4	300.4	1.8511	3.6634	2.6123
Aug-13	210.4	307.4	1.8424	3.7488	2.6431
Sep-13	210.3	315.3	1.8415	3.8451	2.6830
Oct-13	201.2	306.8	1.7618	3.7415	2.5933

Development of E Component

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.3
Using Regional Indices Series ID: WPU0573 Light Fuel Oils (as of 02/21/2017) and WPU0543 Industrial Electric Power (as of 02/21/2017)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (1982 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1982 = 100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (1986 = 100) (P) = Industrial Energy Power	PPI for Light Fuel Oils (1986 = 100) (F) = Light Fuel Oils	Energy Escalation Factor (E) for PWR (Diablo Canyon)
Nov-13	199.0	295.3	1.7426	3.6012	2.5232
Dec-13	200.5	302.9	1.7557	3.6939	2.5697
Jan-14	215.1	297.5	1.8835	3.6280	2.6162
Feb-14	214.4	309.1	1.8774	3.7695	2.6721
Mar-14	214.8	306.5	1.8809	3.7378	2.6608
Apr-14	210.8	306.7	1.8459	3.7402	2.6415
May-14	215.2	304.4	1.8844	3.7122	2.6521
Jun-14	224.0	296.5	1.9615	3.6159	2.6563
Jul-14	227.5	295.3	1.9921	3.6012	2.6679
Aug-14	227.7	293.9	1.9939	3.5841	2.6618
Sep-14	225.1	291.0	1.9711	3.5488	2.6337
Oct-14	217.0	271.4	1.9002	3.3098	2.4922
Nov-14	210.7	260.9	1.8450	3.1817	2.4064
Dec-14	213.9	218.9	1.8730	2.6695	2.2076
Jan-15	222.4	173.6	1.9475	2.1171	2.0187
Feb-15	221.1	184.3	1.9361	2.2476	2.0669
Mar-15	218.2	185.7	1.9107	2.2646	2.0593
Apr-15	213.3	178.2	1.8678	2.1732	1.9960
May-15	217.0	196.6	1.9002	2.3976	2.1091
Jun-15	237.2	193.4	2.0771	2.3585	2.1953
Jul-15	237.3	187.0	2.0779	2.2805	2.1630
Aug-15	236.8	180.4	2.0736	2.2000	2.1267
Sep-15	234.2	163.1	2.0508	1.9890	2.0248
Oct-15	218.2	165.3	1.9107	2.0159	1.9549
Nov-15	213.4	159.7	1.8687	1.9476	1.9018
Dec-15	214.8	131.1	1.8809	1.5988	1.7624
Jan-16	205.3	114.4	1.7977	1.3951	1.6286
Feb-16	204.3	107.7	1.7890	1.3134	1.5892
Mar-16	204.5	113.8	1.7907	1.3878	1.6215
Apr-16	202.4	116.8	1.7723	1.4244	1.6262
May-16	206.3	137.8	1.8065	1.6805	1.7536
Jun-16	220.4	149.4	1.9299	1.8220	1.8846
Jul-16	226.2	152.2	1.9807	1.8561	1.9284
Aug-16	227.3	143.5	1.9904	1.7500	1.8894
Sep-16	228.1	155.5	1.9974	1.8963	1.9549
Oct-16	216.2	152.8	1.8932	1.8634	1.8807
Nov-16	210.7	151.6	1.8450	1.8488	1.8466
Dec-16	215.0	152.0	1.8827	1.8537	1.8705

Oct 16 through Dec 16 are Preliminary Values from PPI Indices

Based on Base Year 2000 being the indice values Dec 1999, Jan 2017 base will be Dec 2016

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
January 1986 adjusted to reflect NUREG 1307, Revision 16, Scaling Factor for West Labor (Page 11)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Jan-86		
Feb-86		
Mar-86	90.8	1.01114
Apr-86		
May-86		
Jun-86	91.2	1.01559
Jul-86		
Aug-86		
Sep-86	91.6	1.02004
Oct-86		
Nov-86		
Dec-86	92.5	1.03007
Jan-87		
Feb-87		
Mar-87	92.6	1.03118
Apr-87		
May-87		
Jun-87	93.7	1.04343
Jul-87		
Aug-87		
Sep-87	94.1	1.04788
Oct-87		
Nov-87		
Dec-87	95.4	1.06236
Jan-88		
Feb-88		
Mar-88	96.3	1.07238
Apr-88		
May-88		
Jun-88	97	1.08018
Jul-88		
Aug-88		
Sep-88	97.7	1.08797
Oct-88		
Nov-88		
Dec-88	98.8	1.10022
Jan-89		
Feb-89		
Mar-89	100	1.11359
Apr-89		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
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	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
May-89		
Jun-89	101	1.12472
Jul-89		
Aug-89		
Sep-89	101.8	1.13363
Oct-89		
Nov-89		
Dec-89	103.3	1.15033
Jan-90		
Feb-90		
Mar-90	104.5	1.16370
Apr-90		
May-90		
Jun-90	105.6	1.17595
Jul-90		
Aug-90		
Sep-90	106.3	1.18374
Oct-90		
Nov-90		
Dec-90	107.5	1.19710
Jan-91		
Feb-91		
Mar-91	108.9	1.21269
Apr-91		
May-91		
Jun-91	110	1.22494
Jul-91		
Aug-91		
Sep-91	110.9	1.23497
Oct-91		
Nov-91		
Dec-91	111.9	1.24610
Jan-92		
Feb-92		
Mar-92	112.9	1.25724
Apr-92		
May-92		
Jun-92	114.1	1.27060
Jul-92		
Aug-92		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
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	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Sep-92	114.9	1.27951
Oct-92		
Nov-92		
Dec-92	116.2	1.29399
Jan-93		
Feb-93		
Mar-93	116.4	1.29621
Apr-93		
May-93		
Jun-93	117.8	1.31180
Jul-93		
Aug-93		
Sep-93	118.1	1.31514
Oct-93		
Nov-93		
Dec-93	119.4	1.32962
Jan-94		
Feb-94		
Mar-94	120.5	1.34187
Apr-94		
May-94		
Jun-94	121.3	1.35078
Jul-94		
Aug-94		
Sep-94	121.7	1.35523
Oct-94		
Nov-94		
Dec-94	122.6	1.36526
Jan-95		
Feb-95		
Mar-95	123.4	1.37416
Apr-95		
May-95		
Jun-95	123.9	1.37973
Jul-95		
Aug-95		
Sep-95	125	1.39198
Oct-95		
Nov-95		
Dec-95	125.9	1.40200

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
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	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Jan-96		
Feb-96		
Mar-96	127.3	1.41759
Apr-96		
May-96		
Jun-96	128.3	1.42873
Jul-96		
Aug-96		
Sep-96	128.9	1.43541
Oct-96		
Nov-96		
Dec-96	130.3	1.45100
Jan-97		
Feb-97		
Mar-97	131.4	1.46325
Apr-97		
May-97		
Jun-97	132.5	1.47550
Jul-97		
Aug-97		
Sep-97	133.4	1.48552
Oct-97		
Nov-97		
Dec-97	135.2	1.50557
Jan-98		
Feb-98		
Mar-98	136.6	1.52116
Apr-98		
May-98		
Jun-98	138.5	1.54232
Jul-98		
Aug-98		
Sep-98	140	1.55902
Oct-98		
Nov-98		
Dec-98	140.3	1.56236
Jan-99		
Feb-99		
Mar-99	142.1	1.58241
Apr-99		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
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	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
May-99		
Jun-99	143.3	1.59577
Jul-99		
Aug-99		
Sep-99	144.7	1.61136
Oct-99		
Nov-99		
Dec-99	147	1.63697
Jan-00		
Feb-00		
Mar-00	148.8	1.65702
Apr-00		
May-00		
Jun-00	150.8	1.67929
Jul-00		
Aug-00		
Sep-00	151.8	1.69042
Oct-00		
Nov-00		
Dec-00	84.1	0.93653
Jan-01		
Feb-01		
Mar-01	85	0.94655
Apr-01		
May-01		
Jun-01	85.9	0.95657
Jul-01		
Aug-01		
Sep-01	86.9	0.96771
Oct-01		
Nov-01		
Dec-01	87.4	0.97327
Jan-02		
Feb-02		
Mar-02	88.5	0.98552
Apr-02		
May-02		
Jun-02	89.1	0.99220
Jul-02		
Aug-02		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
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	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Sep-02	89.8	1.00000
Oct-02		
Nov-02		
Dec-02	90.9	1.01225
Jan-03		
Feb-03		
Mar-03	90.9	1.01225
Apr-03		
May-03		
Jun-03	92	1.02450
Jul-03		
Aug-03		
Sep-03	93.2	1.03786
Oct-03		
Nov-03		
Dec-03	93.8	1.04454
Jan-04		
Feb-04		
Mar-04	95.3	1.06125
Apr-04		
May-04		
Jun-04	96.2	1.07127
Jul-04		
Aug-04		
Sep-04	96.9	1.07906
Oct-04		
Nov-04		
Dec-04	97.4	1.08463
Jan-05		
Feb-05		
Mar-05	98.4	1.09577
Apr-05		
May-05		
Jun-05	99.3	1.10579
Jul-05		
Aug-05		
Sep-05	99.7	1.11024
Oct-05		
Nov-05		
Dec-05 Note 1	100	2.06000

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
January 1986 adjusted to reflect NUREG 1307, Revision 16, Scaling Factor for West Labor (Page 11)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Jan-06		
Feb-06		
Mar-06	100.6	2.07236
Apr-06		
May-06		
Jun-06	101.8	2.09708
Jul-06		
Aug-06		
Sep-06	102.5	2.11150
Oct-06		
Nov-06		
Dec-06	103	2.12180
Jan-07		
Feb-07		
Mar-07	104.2	2.14652
Apr-07		
May-07		
Jun-07	104.9	2.16094
Jul-07		
Aug-07		
Sep-07	105.7	2.17742
Oct-07		
Nov-07		
Dec-07	106.5	2.19390
Jan-08		
Feb-08		
Mar-08	107.8	2.22068
Apr-08		
May-08		
Jun-08	108.4	2.23304
Jul-08		
Aug-08		
Sep-08	109.3	2.25158
Oct-08		
Nov-08		
Dec-08	109.4	2.25364
Jan-09		
Feb-09		
Mar-09	109.9	2.26394
Apr-09		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
January 1986 adjusted to reflect NUREG 1307, Revision 16, Scaling Factor for West Labor (Page 11)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
May-09		
Jun-09	110	2.26600
Jul-09		
Aug-09		
Sep-09	110.3	2.27218
Oct-09		
Nov-09		
Dec-09	110.6	2.27836
Jan-10		
Feb-10		
Mar-10	111.3	2.29278
Apr-10		
May-10		
Jun-10	111.7	2.30102
Jul-10		
Aug-10		
Sep-10	112.3	2.31338
Oct-10		
Nov-10		
Dec-10	112.5	2.31750
Jan-11		
Feb-11		
Mar-11	113.5	2.33810
Apr-11		
May-11		
Jun-11	114.3	2.35458
Jul-11		
Aug-11		
Sep-11	114.6	2.36076
Oct-11		
Nov-11		
Dec-11	115.1	2.37106
Jan-12		
Feb-12		
Mar-12	115.7	2.38342
Apr-12		
May-12		
Jun-12	116.3	2.39578
Jul-12		
Aug-12		

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
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Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Sep-12	116.8	2.40608
Oct-12		
Nov-12		
Dec-12	116.8	2.40608
Jan-13		
Feb-13		
Mar-13	117.6	2.42256
Apr-13		
May-13		
Jun-13	118.5	2.44110
Jul-13		
Aug-13		
Sep-13	119.2	2.45552
Oct-13		
Nov-13		
Dec-13	119.6	2.46376
Jan-14		
Feb-14		
Mar-14	120.1	2.47406
Apr-14		
May-14		
Jun-14	120.9	2.49054
Jul-14		
Aug-14		
Sep-14	121.9	2.51114
Oct-14		
Nov-14		
Dec-14	122.5	2.52350
Jan-15		
Feb-15		
Mar-15	123.1	2.53586
Apr-15		
May-15		
Jun-15	123.8	2.55028
Jul-15		
Aug-15		
Sep-15	124.6	2.56676
Oct-15		
Nov-15		
Dec-15	125.3	2.58118

Development of L Component

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 16, Section 3.2
Using Regional Indices Series ID: CIU2010000000240I (as of 02/21/2017)
January 1986 adjusted to reflect NUREG 1307, Revision 16, Scaling Factor for West Labor (Page 11)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (1989=100)	Labor Escalation Factor
Dec-85	89.8	1.00000
Jan-16		
Feb-16		
Mar-16	126.2	2.59972
Apr-16		
May-16		
Jun-16	127.2	2.62032
Jul-16		
Aug-16		
Sep-16	127.9	2.63474
Oct-16		
Nov-16		
Dec-16	128.6	2.64916

Enclosure 2
PG&E Letter DCL-17-022

Development of B Component

Development of Burial Escalation

Developed from NUREG-1307, Revision 16

Table 2.1 "VALUES OF B SUB-X AS A FUNCTION OF LLW BURIAL SITE AND YEAR" (Summary for non-Atlantic Compact)

Revised to Bx Values for Generic LLW Disposal Site (Assumed to be same as that provided for the Atlantic Compact for lack of a better alternative at this time.

	PWR Burial Costs (South Carolina)	**PWR Restated to 1986 = 100**
1986	1.678	1.0000
1987		
1988	2.007	1.1961
1989		
1990		
1991	2.494	1.4863
1992		
1993	11.408	6.7986
1994	11.873	7.0757
1995	12.824	7.6424
1996	12.771	7.6108
1997	15.852	9.4470
1998	15.886	9.4672
1999		0.0000
2000	18.129	10.8039
2001		0.0000
2002	18.732	11.1633
2003	19.034	11.3433
2004	21.937	13.0733
2005	22.477	13.3951
2006	23.030	13.7247
2007	23.597	14.0626
2008	25.231	15.0364
2009	26.262	15.6505
2010	27.292	16.2646
2011	28.937	17.2446
2012	30.581	18.2247
2013	30.581	18.2247
2014	30.581	18.2247
2015	30.581	18.2247
2016	30.581	18.2247
2017	30.061	17.9148

Table 2.1 Note (e): Bx values for the generic site are assumed to be the same as that provided for the Atlantic Compact for lack of a better alternative at this time.

Note (f): Effective with NUREG-1307, Revision 8 (Reference3) an alternative disposal option was introduced in which the bulk of the LLW is assumed to be dispositioned by waste vendors and/or disposed of at a non-compact disposal facility.

Note (g): Effective with NUREG1307, Revision 15, the nomenclature for the two disposal options, referred to as "Direct Disposal" and "Direct Disposal with Vendors" in previous revisions of NUREG-1307, is changed to "Compact-Affiliated Disposal. Facility Only" and "Combination of Comapct-Affiliated and Non-Compact Disposal Facilities" to better describe the options.

Note (h): 2013 has no information in NUREG-1307 Revision 15. 2013 is an estimate that is calculated by applying the percent change between 2010 and 2012 and adding to the 2012 base.

Note (i): 2015 The NRC has issued Regulatory Issue Summary 2014-12, "Decommissioning Fund Status Report Calculations Update to Low-Level Waste Burial Charge Information," to inform licensees that they may use low-level waste burial charge data contained in Revision 15 of NUREG-1307, Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities, dated January 2013, when preparing their periodic decommissioning fund status report..

Note (j): Effective with NUREG–1307, Revision 15, the nomenclature for the two disposal options, referred to as "Direct Disposal" and "Direct Disposal with Vendors" in previous revisions of NUREG-1307, was changed to "Compact-Affiliated Disposal Facility Only" and "Combination of Compact-Affiliated and Non-Compact Disposal Facilities" to better describe these options.

Note (k): As allowed per NUREG-1307, Revision 16, PG&E used a burial/disposition adjustment factor higher than the burial/disposition adjustment factor provided in NUREG-1307, Revision 16, for plants that have no disposal site available within their designated LLW Compact. To avoid significant future shortfalls in funding and potential enforcement actions, PG&E used the burial/disposition adjustment factor for compact-affiliated disposal for the South Carolina Site."

Appendix C-1
Diablo Canyon Power Plant Unit 1
Decon Decommissioning Cost Estimate
(9 pages)

Appendix C-2
Diablo Canyon Power Plant Unit 2
Decon Decommissioning Cost Estimate
(9 pages)

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1a - Shutdown through Transition															
Period 1a Direct Decommissioning Activities															
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	245	-	245	245	-	-	-	-
1a.1.2	Notification of Cessation of Operations									a	-	-	-	-	-
1a.1.3	Remove fuel & source material									n/a	-	-	-	-	-
1a.1.4	Notification of Permanent Defueling									a	-	-	-	-	-
1a.1.5	Deactivate plant systems & process waste									a	-	-	-	-	-
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	377	-	377	377	-	-	-	-
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	866	-	866	866	-	-	-	-
1a.1.8	Perform detailed rad survey									a	-	-	-	-	-
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	188	-	188	188	-	-	-	-
1a.1.10	End product description	-	-	-	-	-	-	188	-	188	188	-	-	-	-
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	245	-	245	245	-	-	-	-
1a.1.12	Define major work sequence	-	-	-	-	-	-	1,412	-	1,412	1,412	-	-	-	-
1a.1.13	Perform SER and EA	-	-	-	-	-	-	584	-	584	584	-	-	-	-
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	942	-	942	942	-	-	-	-
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	771	-	771	771	-	-	-	-
1a.1.16	Receive NRC approval of termination plan									a	-	-	-	-	-
											-	-	-	-	-
Activity Specifications											-	-	-	-	-
											-	-	-	-	-
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	927	-	927	927	-	-	-	-
1a.1.17.2	Plant systems	-	-	-	-	-	-	785	-	785	785	-	-	-	-
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	94	-	94	94	-	-	-	-
1a.1.17.4	Reactor internals	-	-	-	-	-	-	1,337	-	1,337	1,337	-	-	-	-
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	1,224	-	1,224	1,224	-	-	-	-
1a.1.17.6	Biological shield	-	-	-	-	-	-	94	-	94	94	-	-	-	-
1a.1.17.7	Steam generators	-	-	-	-	-	-	588	-	588	588	-	-	-	-
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	301	-	301	301	-	-	-	-
1a.1.17.9	Main Turbine	-	-	-	-	-	-	75	-	75	75	-	-	-	-
1a.1.17.10	Main Condensers	-	-	-	-	-	-	75	-	75	75	-	-	-	-
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	588	-	588	588	-	-	-	-
1a.1.17.12	Waste management	-	-	-	-	-	-	866	-	866	866	-	-	-	-
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	169	-	169	169	-	-	-	-
1a.1.17	Total	-	-	-	-	-	-	7,124	-	7,124	-	-	-	-	-
											-	-	-	-	-
Planning & Site Preparations											-	-	-	-	-
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	452	-	452	452	-	-	-	-
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,644	-	3,644	3,280	364	-	-	0
1a.1.20	Design water clean-up system	-	-	-	-	-	-	264	-	264	264	-	-	-	-
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,794	-	2,794	2,514	279	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	232	-	232	232	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	20,328	-	20,328	-	-	-	-	-
											-	-	-	-	-
Period 1a Additional Costs											-	-	-	-	-
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	26,314	-	26,314	19,735	6,578	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	250	125	-	3,849	-	-	4,225	23	227	-	3,849	125
1a.2	Subtotal Period 1a Additional Costs	-	-	250	125	-	3,849	26,314	-	30,538	-	-	-	-	-
											-	-	-	-	-
Period 1a Collateral Costs											-	-	-	-	-
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	1,153	-	1,153	-	-	-	-	1,153
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	3,996	-	3,996	-	-	3,996	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	619	-	619	619	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	5,769	-	5,769	-	-	-	-	-
											-	-	-	-	-
Period 1a Period-Dependent Costs											-	-	-	-	-
1a.4.1	Insurance	-	-	-	-	-	-	1,294	-	1,294	-	-	-	-	1,294
1a.4.2	Property taxes	-	-	-	-	-	-	203	-	203	-	-	-	-	203
1a.4.3	Health physics supplies	-	714	-	-	-	-	-	-	714	-	714	-	-	-
1a.4.4	Heavy equipment rental	-	689	-	-	-	-	-	-	689	-	689	-	-	-
1a.4.5	Disposal of DAW generated	-	-	16	5	-	22	-	-	43	1	14	-	22	5
1a.4.6	Plant energy budget	-	-	-	-	-	-	3,324	-	3,324	-	-	-	-	3,324
1a.4.7	NRC Fees	-	-	-	-	-	-	1,350	-	1,350	-	-	-	-	1,350
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,145	-	1,145	-	-	-	-	1,145
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	963	-	963	-	-	-	-	963
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	664	-	664	-	-	-	-	664
1a.4.11	Severance Related Costs	-	-	-	-	-	-	50,701	-	50,701	-	-	50,701	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	27,673	-	27,673	-	-	27,673	-	-
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	45,392	-	45,392	-	-	45,392	-	-
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,402	16	5	-	22	132,709	-	134,153	-	-	-	-	-
											-	-	-	-	-
1a.0	TOTAL PERIOD 1a COST	-	1,402	266	130	-	3,871	185,118	-	190,788	-	-	-	-	-
											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1a - Shutdown through Transition						
Period 1a Direct Decommissioning Activities						
1a.1.1	Prepare preliminary decommissioning cost	263	-	-	-	-
1a.1.2	Notification of Cessation of Operations	-	-	-	-	-
1a.1.3	Remove fuel & source material	-	-	-	-	-
1a.1.4	Notification of Permanent Defueling	-	-	-	-	-
1a.1.5	Deactivate plant systems & process waste	-	-	-	-	-
1a.1.6	Prepare and submit PSDAR	405	-	-	-	-
1a.1.7	Review plant dwgs & specs.	932	-	-	-	-
1a.1.8	Perform detailed rad survey	-	-	-	-	-
1a.1.9	Estimate by-product inventory	203	-	-	-	-
1a.1.10	End product description	203	-	-	-	-
1a.1.11	Detailed by-product inventory	263	-	-	-	-
1a.1.12	Define major work sequence	1,520	-	-	-	-
1a.1.13	Perform SER and EA	628	-	-	-	-
1a.1.14	Perform Site-Specific Cost Study	1,013	-	-	-	-
1a.1.15	Prepare/submit License Termination Plan	830	-	-	-	-
1a.1.16	Receive NRC approval of termination plan	-	-	-	-	-
		-	-	-	-	-
Activity Specifications		-	-	-	-	-
		-	-	-	-	-
1a.1.17.1	Plant & temporary facilities	997	-	-	-	-
1a.1.17.2	Plant systems	845	-	-	-	-
1a.1.17.3	NSSS Decontamination Flush	101	-	-	-	-
1a.1.17.4	Reactor internals	1,439	-	-	-	-
1a.1.17.5	Reactor vessel	1,317	-	-	-	-
1a.1.17.6	Biological shield	101	-	-	-	-
1a.1.17.7	Steam generators	632	-	-	-	-
1a.1.17.8	Reinforced concrete	324	-	-	-	-
1a.1.17.9	Main Turbine	81	-	-	-	-
1a.1.17.10	Main Condensers	81	-	-	-	-
1a.1.17.11	Plant structures & buildings	632	-	-	-	-
1a.1.17.12	Waste management	932	-	-	-	-
1a.1.17.13	Facility & site closeout	182	-	-	-	-
1a.1.17	Total	-	-	-	-	-
		-	-	-	-	-
Planning & Site Preparations		-	-	-	-	-
1a.1.18	Prepare dismantling sequence	486	-	-	-	-
1a.1.19	Plant prep. & temp. svces	3,530	380	-	-	0
1a.1.20	Design water clean-up system	284	-	-	-	-
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	2,706	292	-	-	-
1a.1.22	Procure casks/liners & containers	249	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Additional Costs		-	-	-	-	-
1a.2.1	Spent Fuel Pool Isolation	21,240	6,865	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	25	237	-	4,456	131
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Collateral Costs		-	-	-	-	-
1a.3.1	Environmental Permits and Fees	-	-	-	-	1,207
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	4,351	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	667	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Period-Dependent Costs		-	-	-	-	-
1a.4.1	Insurance	-	-	-	-	1,355
1a.4.2	Property taxes	-	-	-	-	212
1a.4.3	Health physics supplies	-	745	-	-	-
1a.4.4	Heavy equipment rental	-	719	-	-	-
1a.4.5	Disposal of DAW generated	2	15	-	26	5
1a.4.6	Plant energy budget	-	-	-	-	3,480
1a.4.7	NRC Fees	-	-	-	-	1,413
1a.4.8	Emergency Planning Fees	-	-	-	-	1,198
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	1,008
1a.4.10	ISFSI Operating Costs	-	-	-	-	695
1a.4.11	Severance Related Costs	-	-	55,204	-	-
1a.4.12	Security Staff Cost	-	-	30,131	-	-
1a.4.13	Utility Staff Cost	-	-	49,423	-	-
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
1a.0	TOTAL PERIOD 1a COST	-	-	-	-	-
		-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1b - Decommissioning Preparations											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 1b Direct Decommissioning Activities											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Detailed Work Procedures											-	-	-	-	-	-	-	-	-	-
1b.1.1.1	Plant systems	-	-	-	-	-	-	891	-	891	891	-	-	-	-	959	-	-	-	-
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	188	-	188	188	-	-	-	-	203	-	-	-	-
1b.1.1.3	Reactor internals	-	-	-	-	-	-	471	-	471	471	-	-	-	-	507	-	-	-	-
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	254	-	254	254	-	-	-	-	274	-	-	-	-
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	188	-	188	188	-	-	-	-	203	-	-	-	-
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	188	-	188	188	-	-	-	-	203	-	-	-	-
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	188	-	188	188	-	-	-	-	203	-	-	-	-
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	684	-	684	684	-	-	-	-	736	-	-	-	-
1b.1.1.9	Facility closeout	-	-	-	-	-	-	226	-	226	226	-	-	-	-	243	-	-	-	-
1b.1.1.10	Missile shields	-	-	-	-	-	-	85	-	85	85	-	-	-	-	91	-	-	-	-
1b.1.1.11	Biological shield	-	-	-	-	-	-	226	-	226	226	-	-	-	-	243	-	-	-	-
1b.1.1.12	Steam generators	-	-	-	-	-	-	866	-	866	866	-	-	-	-	932	-	-	-	-
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	188	-	188	188	-	-	-	-	203	-	-	-	-
1b.1.1.14	Main Turbine	-	-	-	-	-	-	294	-	294	294	-	-	-	-	316	-	-	-	-
1b.1.1.15	Main Condensers	-	-	-	-	-	-	294	-	294	294	-	-	-	-	316	-	-	-	-
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	514	-	514	514	-	-	-	-	553	-	-	-	-
1b.1.1.17	Reactor building	-	-	-	-	-	-	514	-	514	514	-	-	-	-	553	-	-	-	-
1b.1.1	Total	-	-	-	-	-	-	6,261	-	6,261	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
1b.1.2	Decon primary loop	1,367	-	-	-	-	-	-	-	1,367	250	1,118	-	-	-	269	1,166	-	-	-
1b.1	Subtotal Period 1b Activity Costs	1,367	-	-	-	-	-	6,261	-	7,628	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 1b Additional Costs											-	-	-	-	-	-	-	-	-	-
1b.2.1	Site Characterization	-	-	-	-	-	-	7,481	-	7,481	4,645	2,837	-	-	0	4,999	2,960	-	-	0
1b.2.2	Hazardous Waste Management	-	-	-	-	-	-	264	-	264	-	-	-	-	264	-	-	-	-	276
1b.2.3	Mixed Waste Management	-	-	-	-	-	-	349	-	349	-	-	-	-	349	-	-	-	-	365
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	8,093	-	8,093	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs											-	-	-	-	-	-	-	-	-	-
1b.3.1	Decon equipment	1,144	-	-	-	-	-	-	-	1,144	-	1,144	-	-	-	-	1,194	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,780	-	1,780	1,780	-	-	-	-	1,916	-	-	-	-
1b.3.3	Process decommissioning water waste	79	-	37	66	-	205	-	-	386	4	112	-	205	66	4	117	-	237	69
1b.3.4	Process decommissioning chemical flush waste	4	-	108	305	-	7,852	-	-	8,269	12	100	-	7,852	305	13	104	-	9,090	319
1b.3.5	Small tool allowance	-	3	-	-	-	-	-	-	3	-	3	-	-	-	-	3	-	-	-
1b.3.6	Pipe cutting equipment	-	1,336	-	-	-	-	-	-	1,336	-	1,336	-	-	-	-	1,394	-	-	-
1b.3.7	Decon rig	1,943	-	-	-	-	-	-	-	1,943	-	1,943	-	-	-	-	2,028	-	-	-
1b.3.8	Environmental Permits and Fees	-	-	-	-	-	-	572	-	572	-	-	-	-	572	-	-	-	-	599
1b.3.9	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	269	-	269	-	-	269	-	-	-	-	293	-	-
1b.3.10	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	623	-	623	623	-	-	-	-	671	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,170	1,339	145	370	-	8,057	3,244	-	16,326	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 1b Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
1b.4.1	Decon supplies	39	-	-	-	-	-	-	-	39	-	39	-	-	-	-	40	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	642	-	642	-	-	-	-	642	-	-	-	-	672
1b.4.3	Property taxes	-	-	-	-	-	-	101	-	101	-	-	-	-	101	-	-	-	-	105
1b.4.4	Health physics supplies	-	396	-	-	-	-	-	-	396	-	396	-	-	-	-	414	-	-	-
1b.4.5	Heavy equipment rental	-	341	-	-	-	-	-	-	341	-	341	-	-	-	-	356	-	-	-
1b.4.6	Disposal of DAW generated	-	-	9	3	-	13	-	-	25	1	8	-	13	3	1	9	-	15	3
1b.4.7	Plant energy budget	-	-	-	-	-	-	3,297	-	3,297	-	-	-	-	3,297	-	-	-	-	3,451
1b.4.8	NRC Fees	-	-	-	-	-	-	391	-	391	-	-	-	-	391	-	-	-	-	410
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	568	-	568	-	-	-	-	568	-	-	-	-	594
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	477	-	477	-	-	-	-	477	-	-	-	-	500
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	329	-	329	-	-	-	-	329	-	-	-	-	345
1b.4.12	Severance Related Costs	-	-	-	-	-	-	2,981	-	2,981	-	-	2,981	-	-	-	-	3,246	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	12,839	-	12,839	-	-	12,839	-	-	-	-	13,979	-	-
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	8,558	-	8,558	8,558	-	-	-	-	9,210	-	-	-	-
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	22,638	-	22,638	-	-	22,638	-	-	-	-	24,649	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	39	738	9	3	-	13	52,821	-	53,622	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
1b.0	TOTAL PERIOD 1b COST	4,576	2,077	154	373	-	8,070	70,419	-	85,670	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 1 TOTALS		4,576	3,479	420	503	-	11,942	255,537	-	276,458	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 2a - Large Component Removal											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2a Direct Decommissioning Activities											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Nuclear Steam Supply System Removal											-	-	-	-	-	-	-	-	-	-
2a.1.1.1	Reactor Coolant Piping	670	491	55	46	-	1,604	-	-	2,865	1,122	93	-	1,604	46	1,208	97	-	1,856	48
2a.1.1.2	Pressurizer Quench Tank	71	50	8	7	-	225	-	-	362	121	9	-	225	7	130	9	-	261	7

Table C-1
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(Thousands of 2014 Dollars)

Table C-1
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DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.1.1.3	Reactor Coolant Pumps & Motors	263	178	182	258	-	1,943	-	-	2,823	491	131	-	1,943	258	529	137	-	2,249	270
2a.1.1.4	Pressurizer	91	100	605	159	-	1,010	-	-	1,966	247	550	-	1,010	159	265	574	-	1,169	167
2a.1.1.5	Steam Generators	863	4,521	3,702	2,471	-	17,238	-	-	28,795	3,136	5,951	-	17,238	2,471	3,375	6,211	-	19,955	2,586
2a.1.1.6	Retired Steam Generator Units	-	-	2,627	2,407	-	17,238	-	-	22,272	1,085	1,542	-	17,238	2,407	1,168	1,609	-	19,955	2,520
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	355	516	281	43	-	897	-	-	2,092	870	282	-	897	43	937	295	-	1,038	45
2a.1.1.8	Reactor Vessel Internals	369	15,437	13,707	2,721	-	50,684	434	-	83,352	8,260	21,687	-	50,684	2,721	8,889	22,633	-	58,674	2,848
2a.1.1.9	Reactor Vessel	276	11,685	3,847	1,165	-	5,952	434	-	23,358	8,166	8,076	-	5,952	1,165	8,789	8,428	-	6,890	1,219
2a.1.1	Totals	2,958	32,979	25,015	9,276	-	96,789	867	-	167,885	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Removal of Major Equipment											-	-	-	-	-	-	-	-	-	-
2a.1.2	Main Turbine/Generator	-	257	-	-	-	-	-	-	257	255	2	-	-	-	275	2	-	-	-
2a.1.3	Main Condensers	-	846	-	-	-	-	-	-	846	815	31	-	-	-	877	32	-	-	-
											-	-	-	-	-	-	-	-	-	-
Cascading Costs from Clean Building Demolition											-	-	-	-	-	-	-	-	-	-
2a.1.4.1	*Reactor	-	1,533	-	-	-	-	-	-	1,533	991	542	-	-	-	1,067	566	-	-	-
2a.1.4.2	Containment Penetration Area	-	95	-	-	-	-	-	-	95	59	35	-	-	-	64	37	-	-	-
2a.1.4.3	Fuel Handling	-	249	-	-	-	-	-	-	249	147	102	-	-	-	158	107	-	-	-
2a.1.4	Totals	-	1,877	-	-	-	-	-	-	1,877	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-	-	-	-	-	-
2a.1.5.1	Auxiliary Steam	-	187	-	-	-	-	-	-	187	181	6	-	-	-	195	6	-	-	-
2a.1.5.2	Auxiliary Steam (RCA)	-	377	47	19	-	690	-	-	1,133	332	92	-	690	19	357	96	-	798	20
2a.1.5.3	Condensate System	-	860	-	-	-	-	-	-	860	835	25	-	-	-	899	27	-	-	-
2a.1.5.4	Condensate System (Insulated)	-	356	-	-	-	-	-	-	356	349	7	-	-	-	376	8	-	-	-
2a.1.5.5	Containment Spray	-	343	138	57	-	2,044	-	-	2,583	327	154	-	2,044	57	352	161	-	2,366	60
2a.1.5.6	Extraction Steam & Heater Drip	-	332	-	-	-	-	-	-	332	322	10	-	-	-	347	11	-	-	-
2a.1.5.7	Feedwater System	-	58	-	-	-	-	-	-	58	57	1	-	-	-	61	1	-	-	-
2a.1.5.8	Feedwater System (Insulated)	-	213	-	-	-	-	-	-	213	207	6	-	-	-	223	6	-	-	-
2a.1.5.9	Feedwater System (RCA Insulated)	-	174	39	16	-	570	-	-	798	161	51	-	570	16	174	53	-	660	17
2a.1.5.10	Feedwater System (RCA)	-	8	2	1	-	30	-	-	41	8	3	-	30	1	8	3	-	35	1
2a.1.5.11	Lube Oil Distribution & Purification	-	146	-	-	-	-	-	-	146	141	5	-	-	-	151	6	-	-	-
2a.1.5.12	Nitrogen & Hydrogen	-	25	-	-	-	-	-	-	25	24	1	-	-	-	26	1	-	-	-
2a.1.5.13	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	-	1	1	0	-	-	-	1	0	-	-	-
2a.1.5.14	Nitrogen & Hydrogen (RCA Insulated)	-	8	0	0	-	6	-	-	14	7	1	-	6	0	8	1	-	7	0
2a.1.5.15	Nitrogen & Hydrogen (RCA)	-	151	7	3	-	110	-	-	271	133	26	-	110	3	143	27	-	127	3
2a.1.5.16	Oily Water Separator & TB Sump	-	51	12	5	-	180	-	-	247	44	19	-	180	5	47	20	-	208	5
2a.1.5.17	Saltwater System	-	241	-	-	-	-	-	-	241	239	2	-	-	-	257	2	-	-	-
2a.1.5.18	Turbine Steam Supply	-	960	-	-	-	-	-	-	960	935	25	-	-	-	1,006	26	-	-	-
2a.1.5.19	Turbine Steam Supply (RCA)	-	1,183	291	121	-	4,293	-	-	5,888	1,096	378	-	4,293	121	1,179	394	-	4,970	126
2a.1.5.20	Turbine and Generator	-	102	-	-	-	-	-	-	102	100	2	-	-	-	107	2	-	-	-
2a.1.5.21	Turbine and Generator (Insulated)	-	34	-	-	-	-	-	-	34	32	1	-	-	-	35	1	-	-	-
2a.1.5	Totals	-	5,811	536	223	-	7,922	-	-	14,491	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2a.1.6	Scaffolding in support of decommissioning	-	3,063	17	5	-	34	-	-	3,119	1,473	1,607	-	34	5	1,585	1,677	-	40	5
											-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	2,958	44,833	25,568	9,504	-	104,746	867	-	188,476	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs											-	-	-	-	-	-	-	-	-	-
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	8,400	-	8,400	-	-	-	-	8,400	-	-	-	-	8,794
2a.2.2	Retired Reactor Head	-	-	301	98	-	2,057	-	-	2,456	164	137	-	2,057	98	176	143	-	2,381	103
2a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	7,407	-	7,407	5,239	-	2,168	-	-	5,639	-	2,360	-	-
2a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	7,136	-	7,136	7,136	-	-	-	-	7,681	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	301	98	-	2,057	22,943	-	25,399	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs											-	-	-	-	-	-	-	-	-	-
2a.3.1	Process decommissioning water waste	118	-	57	102	-	319	-	-	597	6	170	-	319	102	7	177	-	369	107
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	362	-	-	-	-	-	-	362	-	362	-	-	-	-	378	-	-	-
2a.3.4	Environmental Permits and Fees	-	-	-	-	-	-	3,940	-	3,940	-	-	-	-	3,940	-	-	-	-	4,124
2a.3.5	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	2,800	-	2,800	-	-	2,800	-	-	-	-	3,048	-	-
2a.3.6	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	3,133	-	3,133	3,133	-	-	-	-	3,372	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	118	362	57	102	-	319	9,872	-	10,831	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
2a.4.1	Decon supplies	267	-	-	-	-	-	-	-	267	-	267	-	-	-	-	278	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,988	-	1,988	-	-	-	-	1,988	-	-	-	-	2,082
2a.4.3	Property taxes	-	-	-	-	-	-	693	-	693	-	-	-	-	693	-	-	-	-	726
2a.4.4	Health physics supplies	-	4,792	-	-	-	-	-	-	4,792	-	4,792	-	-	-	-	5,001	-	-	-
2a.4.5	Heavy equipment rental	-	9,041	-	-	-	-	-	-	9,041	-	9,041	-	-	-	-	9,435	-	-	-
2a.4.6	Disposal of DAW generated	-	-	143	43	-	204	-	-	390	13	130	-	204	43	14	136	-	236	45
2a.4.7	Plant energy budget	-	-	-	-	-	-	10,789	-	10,789	-	-	-	-	10,789	-	-	-	-	11,294
2a.4.8	NRC Fees	-	-	-	-	-	-	2,445	-	2,445	-	-	-	-	2,445	-	-	-	-	2,560
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,792	-	2,792	-	-	-	-	2,792	-	-	-	-	2,923
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	3,288	-	3,288	-	-	-	-	3,288	-	-	-	-	3,443
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	2,269	-	2,269	-	-	-	-	2,269	-	-	-	-	2,375

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.4.12	Severance Related Costs	-	-	-	-	-	-	11,089	-	11,089	-	-	11,089	-	-
2a.4.13	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	2,263	-	2,263	-	-	-	-	2,263
2a.4.14	Security Staff Cost	-	-	-	-	-	-	80,898	-	80,898	-	-	80,898	-	-
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	94,381	-	94,381	94,381	-	-	-	-
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	140,745	-	140,745	-	-	140,745	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	267	13,833	143	43	-	204	353,641	-	368,131	-	-	-	-	-
											-	-	-	-	-
2a.0	TOTAL PERIOD 2a COST	3,343	59,029	26,070	9,747	-	107,325	387,324	-	592,838	-	-	-	-	-
											-	-	-	-	-
PERIOD 2b - Site Decontamination											-	-	-	-	-
											-	-	-	-	-
Period 2b Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-
2b.1.1.1	Capital Additions 85-2002 (clean)	-	230	-	-	-	-	-	-	230	225	6	-	-	-
2b.1.1.2	Capital Additions 85-2002 (contaminated)	-	665	43	19	-	671	-	-	1,398	621	88	-	671	19
2b.1.1.3	Chemical & Volume Control	1,576	1,708	169	74	-	2,617	-	-	6,143	2,857	595	-	2,617	74
2b.1.1.4	Chemical & Volume Control (Insulated)	579	637	30	13	-	464	-	-	1,723	1,093	154	-	464	13
2b.1.1.5	Component Cooling Water	-	248	-	-	-	-	-	-	248	241	7	-	-	-
2b.1.1.6	Component Cooling Water (RCA)	-	844	170	71	-	2,514	-	-	3,599	763	252	-	2,514	71
2b.1.1.7	Compressed Air	-	220	-	-	-	-	-	-	220	214	6	-	-	-
2b.1.1.8	Compressed Air (Insulated)	-	8	-	-	-	-	-	-	8	8	0	-	-	-
2b.1.1.9	Compressed Air (RCA Insulated)	-	40	2	1	-	30	-	-	73	35	6	-	30	1
2b.1.1.10	Compressed Air (RCA)	-	731	39	16	-	572	-	-	1,358	649	121	-	572	16
2b.1.1.11	Diesel Engine-Generator	-	227	-	-	-	-	-	-	227	222	6	-	-	-
2b.1.1.12	Diesel Engine-Generator (Insulated)	-	14	-	-	-	-	-	-	14	14	1	-	-	-
2b.1.1.13	Electrical (Clean)	-	2,705	-	-	-	-	-	-	2,705	2,638	67	-	-	-
2b.1.1.14	Electrical (Contaminated)	-	863	99	43	-	1,526	-	-	2,531	813	150	-	1,526	43
2b.1.1.15	Electrical (Decontaminated)	-	4,228	-	-	-	-	-	-	4,228	4,178	50	-	-	-
2b.1.1.16	Fire Protection	-	538	141	61	-	2,182	-	-	2,922	506	174	-	2,182	61
2b.1.1.17	Gaseous Radwaste	-	121	6	3	-	98	-	-	228	104	23	-	98	3
2b.1.1.18	HVAC (Clean Insulated)	-	35	-	-	-	-	-	-	35	35	0	-	-	-
2b.1.1.19	HVAC (Clean)	-	463	-	-	-	-	-	-	463	461	2	-	-	-
2b.1.1.20	HVAC (Contaminated Insulated)	-	435	56	25	-	873	-	-	1,389	374	117	-	873	25
2b.1.1.21	HVAC (Contaminated)	-	1,934	282	123	-	4,364	-	-	6,703	1,691	525	-	4,364	123
2b.1.1.22	Liquid Radwaste	1,046	1,088	94	41	-	1,456	-	-	3,725	1,961	267	-	1,456	41
2b.1.1.23	Liquid Radwaste (Insulated)	123	118	6	3	-	91	-	-	340	216	31	-	91	3
2b.1.1.24	Make-up Water	-	457	-	-	-	-	-	-	457	442	15	-	-	-
2b.1.1.25	Make-up Water (Insulated)	-	41	-	-	-	-	-	-	41	40	2	-	-	-
2b.1.1.26	Make-up Water (RCA Insulated)	-	60	5	2	-	79	-	-	148	53	13	-	79	2
2b.1.1.27	Make-up Water (RCA)	-	322	30	13	-	450	-	-	815	279	73	-	450	13
2b.1.1.28	Miscellaneous Reactor Coolant	37	191	10	4	-	151	-	-	393	204	34	-	151	4
2b.1.1.29	Nuclear Steam Supply Sampling	-	256	11	5	-	164	-	-	436	251	15	-	164	5
2b.1.1.30	Nuclear Steam Supply Sampling (Insulated	-	78	1	1	-	21	-	-	100	76	3	-	21	1
2b.1.1.31	Residual Heat Removal	579	467	141	61	-	2,176	-	-	3,424	579	607	-	2,176	61
2b.1.1.32	Safety Injection	-	179	18	8	-	285	-	-	491	171	26	-	285	8
2b.1.1.33	Safety Injection (Insulated)	-	9	1	0	-	11	-	-	21	8	2	-	11	0
2b.1.1.34	Safety Injection (RCA Insulated)	-	57	7	3	-	102	-	-	169	50	14	-	102	3
2b.1.1.35	Safety Injection (RCA)	-	478	62	26	-	919	-	-	1,485	418	122	-	919	26
2b.1.1.36	Service Cooling Water	-	149	-	-	-	-	-	-	149	144	5	-	-	-
2b.1.1.37	Service Cooling Water (RCA)	-	41	5	2	-	75	-	-	123	36	10	-	75	2
2b.1.1	Totals	3,941	20,885	1,430	615	-	21,891	-	-	48,763	-	-	-	-	-
											-	-	-	-	-
2b.1.2	Scaffolding in support of decommissioning	-	3,829	21	6	-	43	-	-	3,899	1,841	2,009	-	43	6
											-	-	-	-	-
Decontamination of Site Buildings											-	-	-	-	-
2b.1.3.1	*Reactor	1,687	3,581	1,294	6,445	-	34,468	-	-	47,475	4,393	2,169	-	34,468	6,445
2b.1.3.2	Capital Additions 85-2004	58	40	8	3	-	115	-	-	224	92	14	-	115	3
2b.1.3.3	Containment Penetration Area	575	306	28	32	-	445	-	-	1,386	787	122	-	445	32
2b.1.3	Totals	2,319	3,927	1,330	6,481	-	35,029	-	-	49,085	-	-	-	-	-
											-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	6,260	28,641	2,781	7,103	-	56,963	-	-	101,748	-	-	-	-	-
											-	-	-	-	-
Period 2b Additional Costs											-	-	-	-	-
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,441	-	1,441	-	-	-	-	1,441
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	1,441	-	1,441	-	-	-	-	-
											-	-	-	-	-
Period 2b Collateral Costs											-	-	-	-	-
2b.3.1	Process decommissioning water waste	229	-	112	199	-	621	-	-	1,160	12	329	-	621	199
2b.3.2	Process decommissioning chemical flush waste	6	-	177	501	-	1,824	-	-	2,509	19	164	-	1,824	501
2b.3.3	Small tool allowance	-	486	-	-	-	-	-	-	486	-	486	-	-	-
2b.3.4	Environmental Permits and Fees	-	-	-	-	-	-	676	-	676	-	-	-	-	676
2b.3	Subtotal Period 2b Collateral Costs	235	486	289	700	-	2,445	676	-	4,831	-	-	-	-	-
											-	-	-	-	-
Period 2b Period-Dependent Costs											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.4.12	-	-	12,074	-	-
2a.4.13	-	-	-	-	2,369
2a.4.14	-	-	88,082	-	-
2a.4.15	101,576	-	-	-	-
2a.4.16	-	-	153,244	-	-
2a.4	-	-	-	-	-
	-	-	-	-	-
2a.0	-	-	-	-	-
	-	-	-	-	-
PERIOD 2b - Site Decontamination	-	-	-	-	-
	-	-	-	-	-
Period 2b Direct Decommissioning Activities	-	-	-	-	-
	-	-	-	-	-
Disposal of Plant Systems	-	-	-	-	-
2b.1.1.1	242	6	-	-	-
2b.1.1.2	669	91	-	776	20
2b.1.1.3	3,075	621	-	3,029	77
2b.1.1.4	1,176	160	-	537	14
2b.1.1.5	259	7	-	-	-
2b.1.1.6	821	263	-	2,910	74
2b.1.1.7	230	6	-	-	-
2b.1.1.8	8	0	-	-	-
2b.1.1.9	38	7	-	35	1
2b.1.1.10	698	126	-	662	17
2b.1.1.11	238	6	-	-	-
2b.1.1.12	15	1	-	-	-
2b.1.1.13	2,839	70	-	-	-
2b.1.1.14	875	156	-	1,766	45
2b.1.1.15	4,496	52	-	-	-
2b.1.1.16	544	181	-	2,526	64
2b.1.1.17	112	24	-	114	3
2b.1.1.18	38	0	-	-	-
2b.1.1.19	496	2	-	-	-
2b.1.1.20	403	123	-	1,011	26
2b.1.1.21	1,820	548	-	5,051	128
2b.1.1.22	2,110	279	-	1,685	43
2b.1.1.23	232	32	-	105	3
2b.1.1.24	476	16	-	-	-
2b.1.1.25	43	2	-	-	-
2b.1.1.26	57	13	-	92	2
2b.1.1.27	301	76	-	521	13
2b.1.1.28	220	35	-	175	4
2b.1.1.29	271	16	-	190	5
2b.1.1.30	82	3	-	24	1
2b.1.1.31	623	634	-	2,519	64
2b.1.1.32	184	27	-	330	8
2b.1.1.33	9	2	-	13	0
2b.1.1.34	54	14	-	118	3
2b.1.1.35	450	127	-	1,064	27
2b.1.1.36	155	5	-	-	-
2b.1.1.37	39	10	-	87	2
2b.1.1	-	-	-	-	-
	-	-	-	-	-
2b.1.2	1,981	2,097	-	50	7
	-	-	-	-	-
Decontamination of Site Buildings	-	-	-	-	-
2b.1.3.1	4,727	2,263	-	39,901	6,748
2b.1.3.2	99	15	-	133	3
2b.1.3.3	847	127	-	516	34
2b.1.3	-	-	-	-	-
	-	-	-	-	-
2b.1	-	-	-	-	-
	-	-	-	-	-
Period 2b Additional Costs	-	-	-	-	-
2b.2.1	-	-	-	-	1,509
2b.2	-	-	-	-	-
	-	-	-	-	-
Period 2b Collateral Costs	-	-	-	-	-
2b.3.1	13	343	-	718	208
2b.3.2	21	171	-	2,112	525
2b.3.3	-	507	-	-	-
2b.3.4	-	-	-	-	708
2b.3	-	-	-	-	-
	-	-	-	-	-
Period 2b Period-Dependent Costs	-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2b.4.1	Decon supplies	953	-	-	-	-	-	-	-	953	-	953	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	341	-	341	-	-	-	-	341
2b.4.3	Property taxes	-	-	-	-	-	-	119	-	119	-	-	-	-	119
2b.4.4	Health physics supplies	-	2,605	-	-	-	-	-	-	2,605	-	2,605	-	-	-
2b.4.5	Heavy equipment rental	-	1,536	-	-	-	-	-	-	1,536	-	1,536	-	-	-
2b.4.6	Disposal of DAW generated	-	-	80	24	-	113	-	-	217	7	73	-	113	24
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,462	-	1,462	-	-	-	-	1,462
2b.4.8	NRC Fees	-	-	-	-	-	-	420	-	420	-	-	-	-	420
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	479	-	479	-	-	-	-	479
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	564	-	564	-	-	-	-	564
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	134	-	134	-	-	-	-	134
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	389	-	389	-	-	-	-	389
2b.4.13	Severance Related Costs	-	-	-	-	-	-	10,905	-	10,905	-	-	10,905	-	-
2b.4.14	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	774	-	774	-	-	-	-	774
2b.4.15	Security Staff Cost	-	-	-	-	-	-	13,478	-	13,478	-	-	13,478	-	-
2b.4.16	DOC Staff Cost	-	-	-	-	-	-	8,392	-	8,392	8,392	-	-	-	-
2b.4.17	Utility Staff Cost	-	-	-	-	-	-	13,058	-	13,058	-	-	13,058	-	-
2b.4	Subtotal Period 2b Period-Dependent Costs	953	4,141	80	24	-	113	50,514	-	55,825	-	-	-	-	-
											-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	7,448	33,267	3,150	7,827	-	59,521	52,632	-	163,846	-	-	-	-	-
											-	-	-	-	-
PERIOD 2c - Spent fuel delay prior to SFP decon											-	-	-	-	-
											-	-	-	-	-
Period 2c Direct Decommissioning Activities											-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 2c Additional Costs											-	-	-	-	-
No additional costs in this period											-	-	-	-	-
2c.2	Subtotal Period 2c Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 2c Collateral Costs											-	-	-	-	-
2c.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	49,231	-	49,231	12,308	36,923	-	-	(0)
2c.3.2	Environmental Permits and Fees	-	-	-	-	-	-	5,197	-	5,197	-	-	-	-	5,197
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	54,428	-	54,428	-	-	-	-	-
											-	-	-	-	-
Period 2c Period-Dependent Costs											-	-	-	-	-
2c.4.1	Insurance	-	-	-	-	-	-	2,623	-	2,623	-	-	-	-	2,623
2c.4.2	Property taxes	-	-	-	-	-	-	914	-	914	-	-	-	-	914
2c.4.3	Health physics supplies	-	1,166	-	-	-	-	-	-	1,166	-	1,166	-	-	-
2c.4.4	Disposal of DAW generated	-	-	45	13	-	63	-	-	121	4	40	-	63	13
2c.4.5	Plant energy budget	-	-	-	-	-	-	11,236	-	11,236	-	-	-	-	11,236
2c.4.6	NRC Fees	-	-	-	-	-	-	2,812	-	2,812	-	-	-	-	2,812
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,684	-	3,684	-	-	-	-	3,684
2c.4.8	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,027	-	1,027	-	-	-	-	1,027
2c.4.9	ISFSI Operating Costs	-	-	-	-	-	-	2,993	-	2,993	-	-	-	-	2,993
2c.4.10	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	57,473	-	57,473	-	-	-	-	57,473
2c.4.11	Security Staff Cost	-	-	-	-	-	-	103,273	-	103,273	-	-	103,273	-	-
2c.4.12	Utility Staff Cost	-	-	-	-	-	-	16,468	-	16,468	-	-	16,468	-	-
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,166	45	13	-	63	202,504	-	203,791	-	-	-	-	-
											-	-	-	-	-
2c.0	TOTAL PERIOD 2c COST	-	1,166	45	13	-	63	256,932	-	258,219	-	-	-	-	-
											-	-	-	-	-
PERIOD 2d - Decontamination Following Wet Fuel Storage											-	-	-	-	-
											-	-	-	-	-
Period 2d Direct Decommissioning Activities											-	-	-	-	-
2d.1.1	Remove spent fuel racks	1,032	80	186	41	-	1,447	-	-	2,786	1,050	248	-	1,447	41
											-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-
2d.1.2.1	Electrical (Contaminated) - FHB	-	251	15	7	-	233	-	-	505	234	32	-	233	7
2d.1.2.2	Electrical (Decontaminated) - FHB	-	1,561	144	60	-	2,130	-	-	3,895	1,413	292	-	2,130	60
2d.1.2.3	Fire Protection (RCA)	-	340	31	13	-	465	-	-	849	296	76	-	465	13
2d.1.2.4	HVAC (Contaminated) - FHB	-	460	64	28	-	997	-	-	1,550	400	124	-	997	28
2d.1.2.5	Spent Fuel Pit Cooling	-	130	53	23	-	817	-	-	1,022	126	56	-	817	23
2d.1.2.6	Spent Fuel Pit Cooling - FHB	-	181	57	25	-	876	-	-	1,138	173	64	-	876	25
2d.1.2	Totals	-	2,922	365	155	-	5,517	-	-	8,959	-	-	-	-	-
											-	-	-	-	-
Decontamination of Site Buildings											-	-	-	-	-
2d.1.3.1	Fuel Handling	1,450	1,220	68	47	-	633	-	-	3,418	2,543	195	-	633	47
2d.1.3	Totals	1,450	1,220	68	47	-	633	-	-	3,418	-	-	-	-	-
											-	-	-	-	-
2d.1.4	Scaffolding in support of decommissioning	-	766	4	1	-	9	-	-	780	368	402	-	9	1
											-	-	-	-	-
2d.1	Subtotal Period 2d Activity Costs	2,482	4,988	623	244	-	7,606	-	-	15,943	-	-	-	-	-
											-	-	-	-	-
Period 2d Additional Costs											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
-	995	-	-	-
-	-	-	-	357
-	-	-	-	125
-	2,719	-	-	-
-	1,603	-	-	-
8	76	-	131	25
-	-	-	-	1,530
-	-	-	-	439
-	-	-	-	502
-	-	-	-	591
-	-	-	-	140
-	-	-	-	408
-	-	11,873	-	-
-	-	-	-	810
-	-	14,674	-	-
9,032	-	-	-	-
-	-	14,218	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
13,246	38,534	-	-	(0)
-	-	-	-	5,441
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	2,746
-	-	-	-	957
-	1,217	-	-	-
4	42	-	73	14
-	-	-	-	11,763
-	-	-	-	2,944
-	-	-	-	3,856
-	-	-	-	1,076
-	-	-	-	3,134
-	-	-	-	60,168
-	-	112,444	-	-
-	-	17,931	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
1,130	259	-	1,675	43
-	-	-	-	-
-	-	-	-	-
252	34	-	269	7
1,521	305	-	2,466	63
318	79	-	538	14
431	130	-	1,154	29
136	59	-	946	24
186	67	-	1,014	26
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
2,737	204	-	733	49
-	-	-	-	-
-	-	-	-	-
396	419	-	10	1
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,208	-	1,208	1,012	196	-	-	0
2d.2.2	Remedial Action Surveys	-	-	-	-	-	-	1,132	-	1,132	-	-	-	-	1,132
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	2,340	-	2,340	-	-	-	-	-
											-	-	-	-	-
Period 2d Collateral Costs											-	-	-	-	-
2d.3.1	Process decommissioning water waste	77	-	40	72	-	225	-	-	414	4	113	-	225	72
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	100	-	-	-	-	-	-	100	-	100	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	171	63	-	350	-	-	585	16	156	-	350	63
2d.3.5	Environmental Permits and Fees	-	-	-	-	-	-	531	-	531	-	-	-	-	531
2d.3	Subtotal Period 2d Collateral Costs	77	100	212	135	-	575	531	-	1,629	-	-	-	-	-
											-	-	-	-	-
Period 2d Period-Dependent Costs											-	-	-	-	-
2d.4.1	Decon supplies	287	-	-	-	-	-	-	-	287	-	287	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	268	-	268	-	-	-	-	268
2d.4.3	Property taxes	-	-	-	-	-	-	93	-	93	-	-	-	-	93
2d.4.4	Health physics supplies	-	714	-	-	-	-	-	-	714	-	714	-	-	-
2d.4.5	Heavy equipment rental	-	1,206	-	-	-	-	-	-	1,206	-	1,206	-	-	-
2d.4.6	Disposal of DAW generated	-	-	34	10	-	48	-	-	92	3	31	-	48	10
2d.4.7	Plant energy budget	-	-	-	-	-	-	612	-	612	-	-	-	-	612
2d.4.8	NRC Fees	-	-	-	-	-	-	280	-	280	-	-	-	-	280
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	188	-	188	-	-	-	-	188
2d.4.10	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	480	-	480	-	-	-	-	480
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	210	-	210	-	-	-	-	210
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	306	-	306	-	-	-	-	306
2d.4.13	Severance Related Costs	-	-	-	-	-	-	8,329	-	8,329	-	-	8,329	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1,657	-	1,657	-	-	1,657	-	-
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	4,420	-	4,420	4,420	-	-	-	-
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	6,170	-	6,170	-	-	6,170	-	-
2d.4	Subtotal Period 2d Period-Dependent Costs	287	1,920	34	10	-	48	23,013	-	25,312	-	-	-	-	-
											-	-	-	-	-
2d.0	TOTAL PERIOD 2d COST	2,846	7,007	869	389	-	8,229	25,884	-	45,225	-	-	-	-	-
											-	-	-	-	-
PERIOD 2e - Delay before License Termination											-	-	-	-	-
											-	-	-	-	-
Period 2e Direct Decommissioning Activities											-	-	-	-	-
No direct activities in this period											-	-	-	-	-
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 2e Additional Costs											-	-	-	-	-
No additional costs in this period											-	-	-	-	-
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 2e Collateral Costs											-	-	-	-	-
2e.3.1	Environmental Permits and Fees	-	-	-	-	-	-	948	-	948	-	-	-	-	948
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	948	-	948	-	-	-	-	-
											-	-	-	-	-
Period 2e Period-Dependent Costs											-	-	-	-	-
2e.4.1	Insurance	-	-	-	-	-	-	427	-	427	-	-	-	-	427
2e.4.2	Property taxes	-	-	-	-	-	-	167	-	167	-	-	-	-	167
2e.4.3	Health physics supplies	-	105	-	-	-	-	-	-	105	-	105	-	-	-
2e.4.4	Disposal of DAW generated	-	-	2	1	-	3	-	-	6	0	2	-	3	1
2e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	238	-	238	-	-	-	-	238
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	336	-	336	-	-	-	-	336
2e.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,333	-	1,333	-	-	-	-	1,333
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	546	-	546	-	-	-	-	546
2e.4.10	Security Staff Cost	-	-	-	-	-	-	3,462	-	3,462	-	-	3,462	-	-
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	1,289	-	1,289	-	-	1,289	-	-
2e.4	Subtotal Period 2e Period-Dependent Costs	-	105	2	1	-	3	7,798	-	7,909	-	-	-	-	-
											-	-	-	-	-
2e.0	TOTAL PERIOD 2e COST	-	105	2	1	-	3	8,746	-	8,857	-	-	-	-	-
											-	-	-	-	-
PERIOD 2f - License Termination											-	-	-	-	-
											-	-	-	-	-
Period 2f Direct Decommissioning Activities											-	-	-	-	-
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	262	-	262	209	52	-	-	(0)
2f.1.2	Terminate license									a	-	-	-	-	-
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	262	-	262	-	-	-	-	-
											-	-	-	-	-
Period 2f Additional Costs											-	-	-	-	-
2f.2.1	License Termination Survey	-	-	-	-	-	-	13,951	-	13,951	13,755	196	-	-	0
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	13,951	-	13,951	-	-	-	-	-
											-	-	-	-	-
Period 2f Collateral Costs											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2d.2.1	License Termination Survey Planning	1,089	205	-	-	0
2d.2.2	Remedial Action Surveys	-	-	-	-	1,185
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 2d Collateral Costs		-	-	-	-	-
2d.3.1	Process decommissioning water waste	5	118	-	260	75
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-
2d.3.3	Small tool allowance	-	104	-	-	-
2d.3.4	Decommissioning Equipment Disposition	17	163	-	406	66
2d.3.5	Environmental Permits and Fees	-	-	-	-	556
2d.3	Subtotal Period 2d Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 2d Period-Dependent Costs		-	-	-	-	-
2d.4.1	Decon supplies	-	300	-	-	-
2d.4.2	Insurance	-	-	-	-	280
2d.4.3	Property taxes	-	-	-	-	98
2d.4.4	Health physics supplies	-	745	-	-	-
2d.4.5	Heavy equipment rental	-	1,258	-	-	-
2d.4.6	Disposal of DAW generated	3	32	-	56	11
2d.4.7	Plant energy budget	-	-	-	-	641
2d.4.8	NRC Fees	-	-	-	-	293
2d.4.9	Emergency Planning Fees	-	-	-	-	197
2d.4.10	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	503
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	220
2d.4.12	ISFSI Operating Costs	-	-	-	-	320
2d.4.13	Severance Related Costs	-	-	9,068	-	-
2d.4.14	Security Staff Cost	-	-	1,804	-	-
2d.4.15	DOC Staff Cost	4,757	-	-	-	-
2d.4.16	Utility Staff Cost	-	-	6,718	-	-
2d.4	Subtotal Period 2d Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
2d.0	TOTAL PERIOD 2d COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 2e - Delay before License Termination		-	-	-	-	-
		-	-	-	-	-
Period 2e Direct Decommissioning Activities		-	-	-	-	-
No direct activities in this period		-	-	-	-	-
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 2e Additional Costs		-	-	-	-	-
No additional costs in this period		-	-	-	-	-
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 2e Collateral Costs		-	-	-	-	-
2e.3.1	Environmental Permits and Fees	-	-	-	-	992
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 2e Period-Dependent Costs		-	-	-	-	-
2e.4.1	Insurance	-	-	-	-	447
2e.4.2	Property taxes	-	-	-	-	175
2e.4.3	Health physics supplies	-	110	-	-	-
2e.4.4	Disposal of DAW generated	0	2	-	3	1
2e.4.5	Plant energy budget	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	250
2e.4.7	Emergency Planning Fees	-	-	-	-	352
2e.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	1,396
2e.4.9	ISFSI Operating Costs	-	-	-	-	571
2e.4.10	Security Staff Cost	-	-	3,770	-	-
2e.4.11	Utility Staff Cost	-	-	1,403	-	-
2e.4	Subtotal Period 2e Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
2e.0	TOTAL PERIOD 2e COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 2f - License Termination		-	-	-	-	-
		-	-	-	-	-
Period 2f Direct Decommissioning Activities		-	-	-	-	-
2f.1.1	ORISE confirmatory survey	225	55	-	-	(0)
2f.1.2	Terminate license	-	-	-	-	-
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 2f Additional Costs		-	-	-	-	-
2f.2.1	License Termination Survey	14,803	205	-	-	0
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 2f Collateral Costs		-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,780	-	1,780	1,780	-	-	-	-
2f.3.2	Environmental Permits and Fees	-	-	-	-	-	-	869	-	869	-	-	-	-	869
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	2,649	-	2,649	-	-	-	-	-
											-	-	-	-	-
Period 2f Period-Dependent Costs											-	-	-	-	-
2f.4.1	Insurance	-	-	-	-	-	-	391	-	391	-	-	-	-	391
2f.4.2	Property taxes	-	-	-	-	-	-	153	-	153	-	-	-	-	153
2f.4.3	Health physics supplies	-	929	-	-	-	-	-	-	929	-	929	-	-	-
2f.4.4	Disposal of DAW generated	-	-	9	3	-	12	-	-	24	1	8	-	12	3
2f.4.5	Plant energy budget	-	-	-	-	-	-	501	-	501	-	-	-	-	501
2f.4.6	NRC Fees	-	-	-	-	-	-	521	-	521	-	-	-	-	521
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	308	-	308	-	-	-	-	308
2f.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,219	-	1,219	-	-	-	-	1,219
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	500	-	500	-	-	-	-	500
2f.4.10	Security Staff Cost	-	-	-	-	-	-	3,521	-	3,521	-	-	3,521	-	-
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	6,162	-	6,162	6,162	-	-	-	-
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	6,977	-	6,977	-	-	6,977	-	-
2f.4	Subtotal Period 2f Period-Dependent Costs	-	929	9	3	-	12	20,253	-	21,206	-	-	-	-	-
											-	-	-	-	-
2f.0	TOTAL PERIOD 2f COST	-	929	9	3	-	12	37,114	-	38,067	-	-	-	-	-
											-	-	-	-	-
PERIOD 2 TOTALS		13,637	101,505	30,144	17,980	-	175,153	768,631	-	1,107,050	-	-	-	-	-
											-	-	-	-	-
											-	-	-	-	-
PERIOD 3b - Site Restoration											-	-	-	-	-
											-	-	-	-	-
Period 3b Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Demolition of Remaining Site Buildings											-	-	-	-	-
3b.1.1.1	*Reactor	-	8,731	-	-	-	-	-	-	8,731	5,660	3,071	-	-	-
3b.1.1.2	Capital Additions 85-2004	-	388	-	-	-	-	-	-	388	270	118	-	-	-
3b.1.1.3	Containment Penetration Area	-	887	-	-	-	-	-	-	887	554	333	-	-	-
3b.1.1.4	Miscellaneous	-	37	-	-	-	-	-	-	37	22	15	-	-	-
3b.1.1.5	Turbine	-	4,734	-	-	-	-	-	-	4,734	3,276	1,458	-	-	-
3b.1.1.6	Turbine Pedestal	-	1,705	-	-	-	-	-	-	1,705	953	752	-	-	-
3b.1.1.7	Fuel Handling	-	2,403	-	-	-	-	-	-	2,403	1,416	988	-	-	-
3b.1.1	Totals	-	18,886	-	-	-	-	-	-	18,886	-	-	-	-	-
											-	-	-	-	-
Site Closeout Activities											-	-	-	-	-
3b.1.2	Grade & landscape site	-	2,839	-	-	-	-	-	-	2,839	383	2,456	-	-	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	294	-	294	294	-	-	-	-
3b.1	Subtotal Period 3b Activity Costs	-	21,725	-	-	-	-	294	-	22,019	-	-	-	-	-
											-	-	-	-	-
Period 3b Additional Costs											-	-	-	-	-
3b.2.1	Concrete Crushing	-	555	-	-	-	-	3	-	557	168	387	-	-	3
3b.2.2	Cofferdam Construction and Teardown	-	581	-	-	-	-	-	-	581	260	321	-	-	-
3b.2.3	Soil / Sediment Control Plant Area	-	1,620	-	-	-	-	-	-	1,620	776	844	-	-	-
3b.2.4	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	7,131	-	7,131	-	-	-	-	7,131
3b.2.5	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	6,044	-	6,044	-	-	-	-	6,044
3b.2.6	FSS Manager	-	-	-	-	-	-	756	-	756	756	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	2,755	-	-	-	-	13,933	-	16,688	-	-	-	-	-
											-	-	-	-	-
Period 3b Collateral Costs											-	-	-	-	-
3b.3.1	Small tool allowance	-	253	-	-	-	-	-	-	253	-	253	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	253	-	-	-	-	-	-	253	-	-	-	-	-
											-	-	-	-	-
Period 3b Period-Dependent Costs											-	-	-	-	-
3b.4.1	Insurance	-	-	-	-	-	-	643	-	643	-	-	-	-	643
3b.4.2	Property taxes	-	-	-	-	-	-	502	-	502	-	-	-	-	502
3b.4.3	Heavy equipment rental	-	9,218	-	-	-	-	-	-	9,218	-	9,218	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	823	-	823	-	-	-	-	823
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	359	-	359	-	-	-	-	359
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	1,012	-	1,012	-	-	-	-	1,012
3b.4.7	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	4,018	-	4,018	-	-	-	-	4,018
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,645	-	1,645	-	-	-	-	1,645
3b.4.9	Security Staff Cost	-	-	-	-	-	-	11,566	-	11,566	-	-	11,566	-	-
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	18,387	-	18,387	18,387	-	-	-	-
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	9,955	-	9,955	-	-	9,955	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	-	9,218	-	-	-	-	48,911	-	58,129	-	-	-	-	-
											-	-	-	-	-
3b.0	TOTAL PERIOD 3b COST	-	33,951	-	-	-	-	63,138	-	97,088	-	-	-	-	-
											-	-	-	-	-
PERIOD 3c - Fuel Storage Operations/Shipping											-	-	-	-	-
											-	-	-	-	-
Period 3c Direct Decommissioning Activities											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
1,916	-	-	-	-
-	-	-	-	910
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	410
-	-	-	-	160
-	970	-	-	-
1	8	-	14	3
-	-	-	-	524
-	-	-	-	545
-	-	-	-	322
-	-	-	-	1,276
-	-	-	-	524
-	-	3,834	-	-
6,632	-	-	-	-
-	-	7,596	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
6,091	3,205	-	-	-
291	124	-	-	-
596	348	-	-	-
24	16	-	-	-
3,525	1,522	-	-	-
1,026	785	-	-	-
1,524	1,031	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
412	2,563	-	-	-
316	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
180	404	-	-	3
280	335	-	-	-
835	881	-	-	-
-	-	-	-	7,465
-	-	-	-	6,327
814	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	264	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	673
-	-	-	-	526
-	9,620	-	-	-
-	-	-	-	862
-	-	-	-	376
-	-	-	-	1,060
-	-	-	-	4,207
-	-	-	-	1,722
-	-	12,593	-	-
19,789	-	-	-	-
-	-	10,839	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
	No direct activities in this period										-	-	-	-	-
3c.1	Subtotal Period 3c Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3c Additional Costs										-	-	-	-	-
	No additional costs in this period										-	-	-	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3c Collateral Costs										-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3c Period-Dependent Costs										-	-	-	-	-
3c.4.1	Insurance	-	-	-	-	-	-	5,876	-	5,876	-	-	-	-	5,876
3c.4.2	Property taxes	-	-	-	-	-	-	4,589	-	4,589	-	-	-	-	4,589
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4,697	-	4,697	-	-	-	-	4,697
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	9,246	-	9,246	-	-	-	-	9,246
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	37,101	-	37,101	-	-	-	-	37,101
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	15,026	-	15,026	-	-	-	-	15,026
3c.4.8	Security Staff Cost	-	-	-	-	-	-	80,154	-	80,154	-	-	80,154	-	-
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	18,436	-	18,436	-	-	18,436	-	-
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	175,126	-	175,126	-	-	-	-	-
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	175,126	-	175,126	-	-	-	-	-
PERIOD 3d - GTCC shipping											-	-	-	-	-
	Period 3d Direct Decommissioning Activities										-	-	-	-	-
	Nuclear Steam Supply System Removal										-	-	-	-	-
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	2,861	-	-	11,570	-	-	14,431	-	2,861	-	-	11,570
3d.1.1	Totals	-	-	2,861	-	-	11,570	-	-	14,431	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	2,861	-	-	11,570	-	-	14,431	-	-	-	-	-
	Period 3d Additional Costs										-	-	-	-	-
	No additional costs in this period										-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3d Collateral Costs										-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3d Period-Dependent Costs										-	-	-	-	-
3d.4.1	Insurance	-	-	-	-	-	-	12	-	12	-	-	-	-	12
3d.4.2	Property taxes	-	-	-	-	-	-	9	-	9	-	-	-	-	9
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	-	-	31	-	31	-	-	-	-	31
3d.4.5	Security Staff Cost	-	-	-	-	-	-	165	-	165	-	-	165	-	-
3d.4.6	Utility Staff Cost	-	-	-	-	-	-	38	-	38	-	-	38	-	-
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	255	-	255	-	-	-	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	2,861	-	-	11,570	255	-	14,686	-	-	-	-	-
PERIOD 3e - ISFSI Decontamination											-	-	-	-	-
	Period 3e Direct Decommissioning Activities										-	-	-	-	-
	No direct activities in this period										-	-	-	-	-
3e.1	Subtotal Period 3e Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3e Additional Costs										-	-	-	-	-
3e.2.1	License Termination ISFSI	-	165	10	18	-	666	1,490	-	2,349	44	131	-	666	1,509
3e.2	Subtotal Period 3e Additional Costs	-	165	10	18	-	666	1,490	-	2,349	-	-	-	-	-
	Period 3e Collateral Costs										-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Period 3e Period-Dependent Costs										-	-	-	-	-
3e.4.1	Insurance	-	-	-	-	-	-	107	-	107	-	-	-	-	107
3e.4.2	Property taxes	-	-	-	-	-	-	80	-	80	-	-	-	-	80
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	191	-	191	-	-	191	-	-
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	250	-	250	-	-	250	-	-
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	628	-	628	-	-	-	-	-
3e.0	TOTAL PERIOD 3e COST	-	165	10	18	-	666	2,118	-	2,976	-	-	-	-	-
PERIOD 3f - ISFSI Site Restoration											-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
	No direct activities in this period	-	-	-	-	-
3c.1	Subtotal Period 3c Activity Costs	-	-	-	-	-
	Period 3c Additional Costs	-	-	-	-	-
	No additional costs in this period	-	-	-	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	-	-
	Period 3c Collateral Costs	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-
	Period 3c Period-Dependent Costs	-	-	-	-	-
3c.4.1	Insurance	-	-	-	-	6,152
3c.4.2	Property taxes	-	-	-	-	4,805
3c.4.3	Plant energy budget	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	4,917
3c.4.5	Emergency Planning Fees	-	-	-	-	9,679
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	38,841
3c.4.7	ISFSI Operating Costs	-	-	-	-	15,731
3c.4.8	Security Staff Cost	-	-	87,272	-	-
3c.4.9	Utility Staff Cost	-	-	20,074	-	-
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-
PERIOD 3d - GTCC shipping		-	-	-	-	-
	Period 3d Direct Decommissioning Activities	-	-	-	-	-
	Nuclear Steam Supply System Removal	-	-	-	-	-
3d.1.1.1	Vessel & Internals GTCC Disposal	-	2,986	-	-	12,112
3d.1.1	Totals	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	-	-	-
	Period 3d Additional Costs	-	-	-	-	-
	No additional costs in this period	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-
	Period 3d Collateral Costs	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-
	Period 3d Period-Dependent Costs	-	-	-	-	-
3d.4.1	Insurance	-	-	-	-	13
3d.4.2	Property taxes	-	-	-	-	10
3d.4.3	Plant energy budget	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	32
3d.4.5	Security Staff Cost	-	-	180	-	-
3d.4.6	Utility Staff Cost	-	-	41	-	-
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	-	-	-
PERIOD 3e - ISFSI Decontamination		-	-	-	-	-
	Period 3e Direct Decommissioning Activities	-	-	-	-	-
	No direct activities in this period	-	-	-	-	-
3e.1	Subtotal Period 3e Activity Costs	-	-	-	-	-
	Period 3e Additional Costs	-	-	-	-	-
3e.2.1	License Termination ISFSI	47	136	-	771	1,579
3e.2	Subtotal Period 3e Additional Costs	-	-	-	-	-
	Period 3e Collateral Costs	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-
	Period 3e Period-Dependent Costs	-	-	-	-	-
3e.4.1	Insurance	-	-	-	-	112
3e.4.2	Property taxes	-	-	-	-	84
3e.4.3	Plant energy budget	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	208	-	-
3e.4.5	Utility Staff Cost	-	-	272	-	-
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-
3e.0	TOTAL PERIOD 3e COST	-	-	-	-	-
PERIOD 3f - ISFSI Site Restoration		-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
											-	-	-	-	-
Period 3f Direct Decommissioning Activities											-	-	-	-	-
	No direct activities in this period										-	-	-	-	-
3f.1	Subtotal Period 3f Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3f Additional Costs											-	-	-	-	-
3f.2.1	Demolition and Site Restoration ISFSI	-	1,994	-	-	-	-	3,339	-	5,333	1,583	411	-	-	3,339
3f.2.2	Soil / Sediment Control ISFSI Area	-	25	-	-	-	-	-	-	25	12	13	-	-	-
3f.2	Subtotal Period 3f Additional Costs	-	2,019	-	-	-	-	3,339	-	5,359	-	-	-	-	-
											-	-	-	-	-
Period 3f Collateral Costs											-	-	-	-	-
3f.3.1	Small tool allowance	-	30	-	-	-	-	-	-	30	-	30	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	30	-	-	-	-	-	-	30	-	-	-	-	-
											-	-	-	-	-
Period 3f Period-Dependent Costs											-	-	-	-	-
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	34	-	34	-	-	-	-	34
3f.4.3	Heavy equipment rental	-	69	-	-	-	-	-	-	69	-	69	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	28	-	28	-	-	-	-	28
3f.4.5	Security Staff Cost	-	-	-	-	-	-	33	-	33	-	-	33	-	-
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	93	-	93	-	-	93	-	-
3f.4	Subtotal Period 3f Period-Dependent Costs	-	69	-	-	-	-	188	-	256	-	-	-	-	-
											-	-	-	-	-
3f.0	TOTAL PERIOD 3f COST	-	2,118	-	-	-	-	3,527	-	5,645	-	-	-	-	-
											-	-	-	-	-
PERIOD 3 TOTALS		-	36,234	2,871	18	-	12,236	244,163	-	295,522	-	-	-	-	-
											-	-	-	-	-
TOTAL COST TO DECOMMISSION		18,214	141,218	33,435	18,502	-	199,331	1,268,331	-	1,679,030	324,340	156,089	713,655	187,761	297,185

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
1,704	429	-	-	3,496
13	14	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	31	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	35
-	72	-	-	-
-	-	-	-	29
-	-	36	-	-
-	-	101	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
349,067	162,899	777,032	217,356	311,119

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1a - Shutdown through Transition															
Period 1a Direct Decommissioning Activities															
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	105	-	105	105	-	-	-	-
1a.1.2	Notification of Cessation of Operations									a	-	-	-	-	-
1a.1.3	Remove fuel & source material									n/a	-	-	-	-	-
1a.1.4	Notification of Permanent Defueling									a	-	-	-	-	-
1a.1.5	Deactivate plant systems & process waste									a	-	-	-	-	-
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	162	-	162	162	-	-	-	-
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	372	-	372	372	-	-	-	-
1a.1.8	Perform detailed rad survey									a	-	-	-	-	-
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1a.1.10	End product description	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	105	-	105	105	-	-	-	-
1a.1.12	Define major work sequence	-	-	-	-	-	-	606	-	606	606	-	-	-	-
1a.1.13	Perform SER and EA	-	-	-	-	-	-	250	-	250	250	-	-	-	-
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	404	-	404	404	-	-	-	-
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	331	-	331	331	-	-	-	-
1a.1.16	Receive NRC approval of termination plan									a	-	-	-	-	-
											-	-	-	-	-
Activity Specifications											-	-	-	-	-
											-	-	-	-	-
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	397	-	397	397	-	-	-	-
1a.1.17.2	Plant systems	-	-	-	-	-	-	337	-	337	337	-	-	-	-
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	40	-	40	40	-	-	-	-
1a.1.17.4	Reactor internals	-	-	-	-	-	-	573	-	573	573	-	-	-	-
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	525	-	525	525	-	-	-	-
1a.1.17.6	Biological shield	-	-	-	-	-	-	40	-	40	40	-	-	-	-
1a.1.17.7	Steam generators	-	-	-	-	-	-	252	-	252	252	-	-	-	-
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	129	-	129	129	-	-	-	-
1a.1.17.9	Main Turbine	-	-	-	-	-	-	32	-	32	32	-	-	-	-
1a.1.17.10	Main Condensers	-	-	-	-	-	-	32	-	32	32	-	-	-	-
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	252	-	252	252	-	-	-	-
1a.1.17.12	Waste management	-	-	-	-	-	-	372	-	372	372	-	-	-	-
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	73	-	73	73	-	-	-	-
1a.1.17	Total	-	-	-	-	-	-	3,055	-	3,055	-	-	-	-	-
											-	-	-	-	-
Planning & Site Preparations											-	-	-	-	-
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	194	-	194	194	-	-	-	-
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,651	-	3,651	3,286	365	-	-	(0)
1a.1.20	Design water clean-up system	-	-	-	-	-	-	113	-	113	113	-	-	-	-
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,799	-	2,799	2,519	280	-	-	(0)
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	99	-	99	99	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	12,407	-	12,407	-	-	-	-	-
											-	-	-	-	-
Period 1a Additional Costs											-	-	-	-	-
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	17,577	-	17,577	13,182	4,394	-	-	0
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	251	125	-	3,860	-	-	4,236	23	228	-	3,860	125
1a.2	Subtotal Period 1a Additional Costs	-	-	251	125	-	3,860	17,577	-	21,813	-	-	-	-	-
											-	-	-	-	-
Period 1a Collateral Costs											-	-	-	-	-
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	1,155	-	1,155	-	-	-	-	1,155
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	4,124	-	4,124	-	-	4,124	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	1,912	-	1,912	1,912	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	7,192	-	7,192	-	-	-	-	-
											-	-	-	-	-
Period 1a Period-Dependent Costs											-	-	-	-	-
1a.4.1	Insurance	-	-	-	-	-	-	1,296	-	1,296	-	-	-	-	1,296
1a.4.2	Property taxes	-	-	-	-	-	-	203	-	203	-	-	-	-	203
1a.4.3	Health physics supplies	-	674	-	-	-	-	-	-	674	-	674	-	-	-
1a.4.4	Heavy equipment rental	-	690	-	-	-	-	-	-	690	-	690	-	-	-
1a.4.5	Disposal of DAW generated	-	-	15	4	-	21	-	-	40	1	13	-	21	4
1a.4.6	Plant energy budget	-	-	-	-	-	-	3,331	-	3,331	-	-	-	-	3,331
1a.4.7	NRC Fees	-	-	-	-	-	-	954	-	954	-	-	-	-	954
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,146	-	1,146	-	-	-	-	1,146
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	964	-	964	-	-	-	-	964
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	665	-	665	-	-	-	-	665
1a.4.11	Severance Related Costs	-	-	-	-	-	-	55,913	-	55,913	-	-	55,913	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	25,941	-	25,941	-	-	25,941	-	-
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	36,368	-	36,368	-	-	36,368	-	-
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,364	15	4	-	21	126,782	-	128,186	-	-	-	-	-
											-	-	-	-	-
1a.0	TOTAL PERIOD 1a COST	-	1,364	265	130	-	3,881	163,957	-	169,597	-	-	-	-	-
											-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1a - Shutdown through Transition						
Period 1a Direct Decommissioning Activities						
1a.1.1	Prepare preliminary decommissioning cost	113	-	-	-	-
1a.1.2	Notification of Cessation of Operations	-	-	-	-	-
1a.1.3	Remove fuel & source material	-	-	-	-	-
1a.1.4	Notification of Permanent Defueling	-	-	-	-	-
1a.1.5	Deactivate plant systems & process waste	-	-	-	-	-
1a.1.6	Prepare and submit PSDAR	174	-	-	-	-
1a.1.7	Review plant dwgs & specs.	400	-	-	-	-
1a.1.8	Perform detailed rad survey	-	-	-	-	-
1a.1.9	Estimate by-product inventory	87	-	-	-	-
1a.1.10	End product description	87	-	-	-	-
1a.1.11	Detailed by-product inventory	113	-	-	-	-
1a.1.12	Define major work sequence	652	-	-	-	-
1a.1.13	Perform SER and EA	269	-	-	-	-
1a.1.14	Perform Site-Specific Cost Study	435	-	-	-	-
1a.1.15	Prepare/submit License Termination Plan	356	-	-	-	-
1a.1.16	Receive NRC approval of termination plan	-	-	-	-	-
		-	-	-	-	-
Activity Specifications		-	-	-	-	-
		-	-	-	-	-
1a.1.17.1	Plant & temporary facilities	428	-	-	-	-
1a.1.17.2	Plant systems	362	-	-	-	-
1a.1.17.3	NSSS Decontamination Flush	43	-	-	-	-
1a.1.17.4	Reactor internals	617	-	-	-	-
1a.1.17.5	Reactor vessel	565	-	-	-	-
1a.1.17.6	Biological shield	43	-	-	-	-
1a.1.17.7	Steam generators	271	-	-	-	-
1a.1.17.8	Reinforced concrete	139	-	-	-	-
1a.1.17.9	Main Turbine	35	-	-	-	-
1a.1.17.10	Main Condensers	35	-	-	-	-
1a.1.17.11	Plant structures & buildings	271	-	-	-	-
1a.1.17.12	Waste management	400	-	-	-	-
1a.1.17.13	Facility & site closeout	78	-	-	-	-
1a.1.17	Total	-	-	-	-	-
		-	-	-	-	-
Planning & Site Preparations		-	-	-	-	-
1a.1.18	Prepare dismantling sequence	209	-	-	-	-
1a.1.19	Plant prep. & temp. svces	3,536	381	-	-	(0)
1a.1.20	Design water clean-up system	122	-	-	-	-
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	2,711	292	-	-	(0)
1a.1.22	Procure casks/liners & containers	107	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Additional Costs		-	-	-	-	-
1a.2.1	Spent Fuel Pool Isolation	14,187	4,586	-	-	0
1a.2.2	Disposal of Contaminated Tools & Equipment	25	238	-	4,469	131
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Collateral Costs		-	-	-	-	-
1a.3.1	Environmental Permits and Fees	-	-	-	-	1,210
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	4,491	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	2,058	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 1a Period-Dependent Costs		-	-	-	-	-
1a.4.1	Insurance	-	-	-	-	1,356
1a.4.2	Property taxes	-	-	-	-	213
1a.4.3	Health physics supplies	-	703	-	-	-
1a.4.4	Heavy equipment rental	-	720	-	-	-
1a.4.5	Disposal of DAW generated	1	14	-	24	5
1a.4.6	Plant energy budget	-	-	-	-	3,487
1a.4.7	NRC Fees	-	-	-	-	999
1a.4.8	Emergency Planning Fees	-	-	-	-	1,200
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	1,010
1a.4.10	ISFSI Operating Costs	-	-	-	-	697
1a.4.11	Severance Related Costs	-	-	60,879	-	-
1a.4.12	Security Staff Cost	-	-	28,245	-	-
1a.4.13	Utility Staff Cost	-	-	39,598	-	-
1a.4	Subtotal Period 1a Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
1a.0	TOTAL PERIOD 1a COST	-	-	-	-	-
		-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1b - Decommissioning Preparations											-	-	-	-	-
											-	-	-	-	-
Period 1b Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Detailed Work Procedures											-	-	-	-	-
1b.1.1.1	Plant systems	-	-	-	-	-	-	382	-	382	382	-	-	-	-
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1b.1.1.3	Reactor internals	-	-	-	-	-	-	202	-	202	202	-	-	-	-
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	109	-	109	109	-	-	-	-
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	293	-	293	293	-	-	-	-
1b.1.1.9	Facility closeout	-	-	-	-	-	-	97	-	97	97	-	-	-	-
1b.1.1.10	Missile shields	-	-	-	-	-	-	36	-	36	36	-	-	-	-
1b.1.1.11	Biological shield	-	-	-	-	-	-	97	-	97	97	-	-	-	-
1b.1.1.12	Steam generators	-	-	-	-	-	-	372	-	372	372	-	-	-	-
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	81	-	81	81	-	-	-	-
1b.1.1.14	Main Turbine	-	-	-	-	-	-	126	-	126	126	-	-	-	-
1b.1.1.15	Main Condensers	-	-	-	-	-	-	126	-	126	126	-	-	-	-
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	220	-	220	220	-	-	-	-
1b.1.1.17	Reactor building	-	-	-	-	-	-	220	-	220	220	-	-	-	-
1b.1.1	Total	-	-	-	-	-	-	2,685	-	2,685	-	-	-	-	-
											-	-	-	-	-
1b.1.2	Decon primary loop	1,374	-	-	-	-	-	-	-	1,374	251	1,123	-	-	-
1b.1	Subtotal Period 1b Activity Costs	1,374	-	-	-	-	-	2,685	-	4,058	-	-	-	-	-
											-	-	-	-	-
Period 1b Additional Costs											-	-	-	-	-
1b.2.1	Site Characterization	-	-	-	-	-	-	3,209	-	3,209	1,993	1,217	-	-	0
1b.2.2	Hazardous Waste Management	-	-	-	-	-	-	264	-	264	-	-	-	-	264
1b.2.3	Mixed Waste Management	-	-	-	-	-	-	349	-	349	-	-	-	-	349
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	3,823	-	3,823	-	-	-	-	-
											-	-	-	-	-
Period 1b Collateral Costs											-	-	-	-	-
1b.3.1	Decon equipment	1,147	-	-	-	-	-	-	-	1,147	-	1,147	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,784	-	1,784	1,784	-	-	-	-
1b.3.3	Process decommissioning water waste	79	-	37	66	-	206	-	-	388	4	112	-	206	66
1b.3.4	Process decommissioning chemical flush waste	4	-	108	305	-	7,875	-	-	8,292	12	100	-	7,875	305
1b.3.5	Small tool allowance	-	3	-	-	-	-	-	-	3	-	3	-	-	-
1b.3.6	Pipe cutting equipment	-	1,339	-	-	-	-	-	-	1,339	-	1,339	-	-	-
1b.3.7	Decon rig	1,947	-	-	-	-	-	-	-	1,947	-	1,947	-	-	-
1b.3.8	Environmental Permits and Fees	-	-	-	-	-	-	573	-	573	-	-	-	-	573
1b.3.9	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	857	-	857	-	-	857	-	-
1b.3.10	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	746	-	746	746	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,177	1,342	145	371	-	8,081	3,960	-	17,076	-	-	-	-	-
											-	-	-	-	-
Period 1b Period-Dependent Costs											-	-	-	-	-
1b.4.1	Decon supplies	39	-	-	-	-	-	-	-	39	-	39	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	642	-	642	-	-	-	-	642
1b.4.3	Property taxes	-	-	-	-	-	-	101	-	101	-	-	-	-	101
1b.4.4	Health physics supplies	-	367	-	-	-	-	-	-	367	-	367	-	-	-
1b.4.5	Heavy equipment rental	-	342	-	-	-	-	-	-	342	-	342	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	2	-	12	-	-	23	1	8	-	12	2
1b.4.7	Plant energy budget	-	-	-	-	-	-	3,303	-	3,303	-	-	-	-	3,303
1b.4.8	NRC Fees	-	-	-	-	-	-	264	-	264	-	-	-	-	264
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	568	-	568	-	-	-	-	568
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	478	-	478	-	-	-	-	478
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	330	-	330	-	-	-	-	330
1b.4.12	Security Staff Cost	-	-	-	-	-	-	12,864	-	12,864	-	-	12,864	-	-
1b.4.13	DOC Staff Cost	-	-	-	-	-	-	6,075	-	6,075	6,075	-	-	-	-
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	18,035	-	18,035	-	-	18,035	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	39	709	8	2	-	12	42,661	-	43,431	-	-	-	-	-
											-	-	-	-	-
1b.0	TOTAL PERIOD 1b COST	4,589	2,051	153	374	-	8,093	53,129	-	68,388	-	-	-	-	-
											-	-	-	-	-
PERIOD 1 TOTALS		4,589	3,415	418	503	-	11,974	217,086	-	237,985	-	-	-	-	-
											-	-	-	-	-
PERIOD 2a - Large Component Removal											-	-	-	-	-
											-	-	-	-	-
Period 2a Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Nuclear Steam Supply System Removal											-	-	-	-	-
2a.1.1.1	Reactor Coolant Piping	673	492	55	46	-	1,608	-	-	2,874	1,127	94	-	1,608	46
2a.1.1.2	Pressurizer Quench Tank	71	50	8	7	-	226	-	-	363	121	9	-	226	7
2a.1.1.3	Reactor Coolant Pumps & Motors	264	179	182	259	-	1,948	-	-	2,831	493	131	-	1,948	259

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
PERIOD 1b - Decommissioning Preparations		-	-	-	-	-
		-	-	-	-	-
Period 1b Direct Decommissioning Activities		-	-	-	-	-
		-	-	-	-	-
Detailed Work Procedures		-	-	-	-	-
1b.1.1.1	Plant systems	411	-	-	-	-
1b.1.1.2	NSSS Decontamination Flush	87	-	-	-	-
1b.1.1.3	Reactor internals	217	-	-	-	-
1b.1.1.4	Remaining buildings	117	-	-	-	-
1b.1.1.5	CRD cooling assembly	87	-	-	-	-
1b.1.1.6	CRD housings & ICI tubes	87	-	-	-	-
1b.1.1.7	Incore instrumentation	87	-	-	-	-
1b.1.1.8	Reactor vessel	316	-	-	-	-
1b.1.1.9	Facility closeout	104	-	-	-	-
1b.1.1.10	Missile shields	39	-	-	-	-
1b.1.1.11	Biological shield	104	-	-	-	-
1b.1.1.12	Steam generators	400	-	-	-	-
1b.1.1.13	Reinforced concrete	87	-	-	-	-
1b.1.1.14	Main Turbine	136	-	-	-	-
1b.1.1.15	Main Condensers	136	-	-	-	-
1b.1.1.16	Auxiliary building	237	-	-	-	-
1b.1.1.17	Reactor building	237	-	-	-	-
1b.1.1	Total	-	-	-	-	-
		-	-	-	-	-
1b.1.2	Decon primary loop	270	1,172	-	-	-
1b.1	Subtotal Period 1b Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 1b Additional Costs		-	-	-	-	-
1b.2.1	Site Characterization	2,144	1,270	-	-	0
1b.2.2	Hazardous Waste Management	-	-	-	-	276
1b.2.3	Mixed Waste Management	-	-	-	-	366
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 1b Collateral Costs		-	-	-	-	-
1b.3.1	Decon equipment	-	1,197	-	-	-
1b.3.2	DOC staff relocation expenses	1,919	-	-	-	-
1b.3.3	Process decommissioning water waste	4	117	-	238	69
1b.3.4	Process decommissioning chemical flush waste	13	104	-	9,117	320
1b.3.5	Small tool allowance	-	3	-	-	-
1b.3.6	Pipe cutting equipment	-	1,397	-	-	-
1b.3.7	Decon rig	-	2,032	-	-	-
1b.3.8	Environmental Permits and Fees	-	-	-	-	600
1b.3.9	GTCC Storage Permitting (PG&E Labor)	-	-	933	-	-
1b.3.10	GTCC Storage Permitting (Contractor)	803	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 1b Period-Dependent Costs		-	-	-	-	-
1b.4.1	Decon supplies	-	41	-	-	-
1b.4.2	Insurance	-	-	-	-	673
1b.4.3	Property taxes	-	-	-	-	105
1b.4.4	Health physics supplies	-	383	-	-	-
1b.4.5	Heavy equipment rental	-	357	-	-	-
1b.4.6	Disposal of DAW generated	1	8	-	14	3
1b.4.7	Plant energy budget	-	-	-	-	3,458
1b.4.8	NRC Fees	-	-	-	-	277
1b.4.9	Emergency Planning Fees	-	-	-	-	595
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	501
1b.4.11	ISFSI Operating Costs	-	-	-	-	345
1b.4.12	Security Staff Cost	-	-	14,006	-	-
1b.4.13	DOC Staff Cost	6,538	-	-	-	-
1b.4.14	Utility Staff Cost	-	-	19,636	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
1b.0	TOTAL PERIOD 1b COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 1 TOTALS		-	-	-	-	-
		-	-	-	-	-
PERIOD 2a - Large Component Removal		-	-	-	-	-
		-	-	-	-	-
Period 2a Direct Decommissioning Activities		-	-	-	-	-
		-	-	-	-	-
Nuclear Steam Supply System Removal		-	-	-	-	-
2a.1.1.1	Reactor Coolant Piping	1,213	98	-	1,862	48
2a.1.1.2	Pressurizer Quench Tank	131	9	-	262	7
2a.1.1.3	Reactor Coolant Pumps & Motors	531	137	-	2,255	271

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.1.1.4	Pressurizer	92	95	512	139	-	1,021	-	-	1,859	239	460	-	1,021	139
2a.1.1.5	Steam Generators	867	4,535	3,707	2,475	-	17,287	-	-	28,872	3,144	5,965	-	17,287	2,475
2a.1.1.6	Retired Steam Generator Units	-	-	2,631	2,412	-	17,287	-	-	22,330	1,087	1,544	-	17,287	2,412
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	356	518	282	43	-	899	-	-	2,098	873	283	-	899	43
2a.1.1.8	Reactor Vessel Internals	319	15,232	13,216	2,055	-	32,606	407	-	63,834	7,680	21,493	-	32,606	2,055
2a.1.1.9	Reactor Vessel	277	11,466	3,594	1,168	-	5,979	407	-	22,890	7,638	8,105	-	5,979	1,168
2a.1.1	Totals	2,919	32,566	24,188	8,603	-	78,863	813	-	147,953	-	-	-	-	-
											-	-	-	-	-
Removal of Major Equipment											-	-	-	-	-
2a.1.2	Main Turbine/Generator	-	257	-	-	-	-	-	-	257	256	2	-	-	-
2a.1.3	Main Condensers	-	848	-	-	-	-	-	-	848	817	31	-	-	-
											-	-	-	-	-
Cascading Costs from Clean Building Demolition											-	-	-	-	-
2a.1.4.1	*Reactor	-	1,536	-	-	-	-	-	-	1,536	993	543	-	-	-
2a.1.4.2	Auxiliary	-	928	-	-	-	-	-	-	928	589	339	-	-	-
2a.1.4.3	Containment Penetration Area	-	95	-	-	-	-	-	-	95	59	35	-	-	-
2a.1.4.4	Radwaste Storage	-	118	-	-	-	-	-	-	118	76	42	-	-	-
2a.1.4.5	Fuel Handling	-	250	-	-	-	-	-	-	250	147	102	-	-	-
2a.1.4	Totals	-	2,927	-	-	-	-	-	-	2,927	-	-	-	-	-
											-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-
2a.1.5.1	Auxiliary Steam	-	96	-	-	-	-	-	-	96	93	3	-	-	-
2a.1.5.2	Auxiliary Steam (RCA)	-	194	23	10	-	340	-	-	567	172	45	-	340	10
2a.1.5.3	Building Services (Non-Power Block)	-	9	-	-	-	-	-	-	9	9	0	-	-	-
2a.1.5.4	Condensate System	-	785	-	-	-	-	-	-	785	762	23	-	-	-
2a.1.5.5	Condensate System (Insulated)	-	348	-	-	-	-	-	-	348	341	7	-	-	-
2a.1.5.6	Containment Spray	-	324	134	56	-	1,979	-	-	2,492	309	148	-	1,979	56
2a.1.5.7	Extraction Steam & Heater Drip	-	292	-	-	-	-	-	-	292	283	9	-	-	-
2a.1.5.8	Feedwater System	-	85	-	-	-	-	-	-	85	84	1	-	-	-
2a.1.5.9	Feedwater System (Insulated)	-	205	-	-	-	-	-	-	205	200	5	-	-	-
2a.1.5.10	Feedwater System (RCA Insulated)	-	164	38	16	-	566	-	-	785	153	50	-	566	16
2a.1.5.11	Feedwater System (RCA)	-	8	2	1	-	30	-	-	41	7	3	-	30	1
2a.1.5.12	NSSS Sampling	-	225	8	3	-	119	-	-	354	224	8	-	119	3
2a.1.5.13	NSSS Sampling (Insulated)	-	66	1	0	-	11	-	-	79	66	1	-	11	0
2a.1.5.14	Nitrogen & Hydrogen	-	24	-	-	-	-	-	-	24	24	1	-	-	-
2a.1.5.15	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	-	1	1	0	-	-	-
2a.1.5.16	Nitrogen & Hydrogen (RCA Insulated)	-	8	0	0	-	5	-	-	13	7	1	-	5	0
2a.1.5.17	Nitrogen & Hydrogen (RCA)	-	143	7	3	-	98	-	-	250	127	23	-	98	3
2a.1.5.18	Oily Water Separator & TB Sump	-	41	8	3	-	119	-	-	171	38	11	-	119	3
2a.1.5.19	Saltwater System	-	229	-	-	-	-	-	-	229	227	2	-	-	-
2a.1.5.20	Turbine Steam Supply	-	966	-	-	-	-	-	-	966	941	25	-	-	-
2a.1.5.21	Turbine Steam Supply (RCA)	-	1,210	305	127	-	4,508	-	-	6,149	1,121	393	-	4,508	127
2a.1.5.22	Turbine and Generator	-	103	-	-	-	-	-	-	103	101	2	-	-	-
2a.1.5.23	Turbine and Generator (Insulated)	-	30	-	-	-	-	-	-	30	29	1	-	-	-
2a.1.5	Totals	-	5,556	525	218	-	7,775	-	-	14,074	-	-	-	-	-
											-	-	-	-	-
2a.1.6	Scaffolding in support of decommissioning	-	6,024	37	11	-	76	-	-	6,148	3,163	2,898	-	76	11
											-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	2,919	48,177	24,750	8,833	-	86,714	813	-	172,206	-	-	-	-	-
											-	-	-	-	-
Period 2a Additional Costs											-	-	-	-	-
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	7,603	-	7,603	-	-	-	-	7,603
2a.2.2	Retired Reactor Head	-	-	301	98	-	2,063	-	-	2,462	164	137	-	2,063	98
2a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	7,422	-	7,422	5,250	-	2,172	-	-
2a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	7,150	-	7,150	7,150	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	301	98	-	2,063	22,175	-	24,637	-	-	-	-	-
											-	-	-	-	-
Period 2a Collateral Costs											-	-	-	-	-
2a.3.1	Process decommissioning water waste	124	-	60	107	-	333	-	-	624	6	178	-	333	107
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	390	-	-	-	-	-	-	390	-	390	-	-	-
2a.3.4	Environmental Permits and Fees	-	-	-	-	-	-	3,561	-	3,561	-	-	-	-	3,561
2a.3.5	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	2,096	-	2,096	-	-	2,096	-	-
2a.3.6	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	1,726	-	1,726	1,726	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	124	390	60	107	-	333	7,383	-	8,397	-	-	-	-	-
											-	-	-	-	-
Period 2a Period-Dependent Costs											-	-	-	-	-
2a.4.1	Decon supplies	241	-	-	-	-	-	-	-	241	-	241	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,796	-	1,796	-	-	-	-	1,796
2a.4.3	Property taxes	-	-	-	-	-	-	626	-	626	-	-	-	-	626
2a.4.4	Health physics supplies	-	4,630	-	-	-	-	-	-	4,630	-	4,630	-	-	-
2a.4.5	Heavy equipment rental	-	8,172	-	-	-	-	-	-	8,172	-	8,172	-	-	-
2a.4.6	Disposal of DAW generated	-	-	151	45	-	214	-	-	410	14	137	-	214	45
2a.4.7	Plant energy budget	-	-	-	-	-	-	9,752	-	9,752	-	-	-	-	9,752
2a.4.8	NRC Fees	-	-	-	-	-	-	1,537	-	1,537	-	-	-	-	1,537

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.1.1.4	Pressurizer	258	480	-	1,182	145
2a.1.1.5	Steam Generators	3,384	6,225	-	20,012	2,591
2a.1.1.6	Retired Steam Generator Units	1,170	1,611	-	20,012	2,525
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	940	295	-	1,041	45
2a.1.1.8	Reactor Vessel Internals	8,266	22,430	-	37,746	2,151
2a.1.1.9	Reactor Vessel	8,221	8,459	-	6,921	1,223
2a.1.1	Totals	-	-	-	-	-
		-	-	-	-	-
Removal of Major Equipment		-	-	-	-	-
2a.1.2	Main Turbine/Generator	275	2	-	-	-
2a.1.3	Main Condensers	879	32	-	-	-
		-	-	-	-	-
Cascading Costs from Clean Building Demolition		-	-	-	-	-
2a.1.4.1	*Reactor	1,069	567	-	-	-
2a.1.4.2	Auxiliary	634	354	-	-	-
2a.1.4.3	Containment Penetration Area	64	37	-	-	-
2a.1.4.4	Radwaste Storage	82	43	-	-	-
2a.1.4.5	Fuel Handling	159	107	-	-	-
2a.1.4	Totals	-	-	-	-	-
		-	-	-	-	-
Disposal of Plant Systems		-	-	-	-	-
2a.1.5.1	Auxiliary Steam	100	3	-	-	-
2a.1.5.2	Auxiliary Steam (RCA)	185	47	-	394	10
2a.1.5.3	Building Services (Non-Power Block)	9	0	-	-	-
2a.1.5.4	Condensate System	820	24	-	-	-
2a.1.5.5	Condensate System (Insulated)	367	7	-	-	-
2a.1.5.6	Containment Spray	333	155	-	2,290	58
2a.1.5.7	Extraction Steam & Heater Drip	305	9	-	-	-
2a.1.5.8	Feedwater System	91	1	-	-	-
2a.1.5.9	Feedwater System (Insulated)	215	5	-	-	-
2a.1.5.10	Feedwater System (RCA Insulated)	165	52	-	655	17
2a.1.5.11	Feedwater System (RCA)	8	3	-	34	1
2a.1.5.12	NSSS Sampling	242	8	-	137	3
2a.1.5.13	NSSS Sampling (Insulated)	71	1	-	13	0
2a.1.5.14	Nitrogen & Hydrogen	26	1	-	-	-
2a.1.5.15	Nitrogen & Hydrogen (Insulated)	1	0	-	-	-
2a.1.5.16	Nitrogen & Hydrogen (RCA Insulated)	7	1	-	6	0
2a.1.5.17	Nitrogen & Hydrogen (RCA)	137	24	-	113	3
2a.1.5.18	Oily Water Separator & TB Sump	41	11	-	138	4
2a.1.5.19	Saltwater System	244	2	-	-	-
2a.1.5.20	Turbine Steam Supply	1,013	26	-	-	-
2a.1.5.21	Turbine Steam Supply (RCA)	1,207	410	-	5,218	133
2a.1.5.22	Turbine and Generator	108	2	-	-	-
2a.1.5.23	Turbine and Generator (Insulated)	31	1	-	-	-
2a.1.5	Totals	-	-	-	-	-
		-	-	-	-	-
2a.1.6	Scaffolding in support of decommissioning	3,404	3,025	-	88	12
		-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 2a Additional Costs		-	-	-	-	-
2a.2.1	Remedial Action Surveys	-	-	-	-	7,959
2a.2.2	Retired Reactor Head	177	143	-	2,388	103
2a.2.3	PG&E RPV Staff Support Team	5,650	-	2,365	-	-
2a.2.4	DOC RPV Staff Support Team	7,695	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 2a Collateral Costs		-	-	-	-	-
2a.3.1	Process decommissioning water waste	7	186	-	385	112
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-
2a.3.3	Small tool allowance	-	407	-	-	-
2a.3.4	Environmental Permits and Fees	-	-	-	-	3,728
2a.3.5	GTCC Storage Permitting (PG&E Labor)	-	-	2,282	-	-
2a.3.6	GTCC Storage Permitting (Contractor)	1,858	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 2a Period-Dependent Costs		-	-	-	-	-
2a.4.1	Decon supplies	-	252	-	-	-
2a.4.2	Insurance	-	-	-	-	1,881
2a.4.3	Property taxes	-	-	-	-	655
2a.4.4	Health physics supplies	-	4,832	-	-	-
2a.4.5	Heavy equipment rental	-	8,529	-	-	-
2a.4.6	Disposal of DAW generated	15	143	-	248	47
2a.4.7	Plant energy budget	-	-	-	-	10,209
2a.4.8	NRC Fees	-	-	-	-	1,609

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,523	-	2,523	-	-	-	-	2,523
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,973	-	2,973	-	-	-	-	2,973
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	2,051	-	2,051	-	-	-	-	2,051
2a.4.12	Severance Related Costs	-	-	-	-	-	-	7,297	-	7,297	-	-	7,297	-	-
2a.4.13	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	3,043	-	3,043	-	-	-	-	3,043
2a.4.14	Security Staff Cost	-	-	-	-	-	-	70,989	-	70,989	-	-	70,989	-	-
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	85,313	-	85,313	85,313	-	-	-	-
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	130,685	-	130,685	-	-	130,685	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	241	12,802	151	45	-	214	318,584	-	332,037	-	-	-	-	-
											-	-	-	-	-
2a.0	TOTAL PERIOD 2a COST	3,285	61,370	25,261	9,083	-	89,324	348,955	-	537,278	-	-	-	-	-
											-	-	-	-	-
PERIOD 2b - Site Decontamination											-	-	-	-	-
											-	-	-	-	-
Period 2b Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-
2b.1.1.1	Capital Additions 85-2002 (Clean)	-	568	-	-	-	-	-	-	568	561	7	-	-	-
2b.1.1.2	Capital Additions 85-2002 (contaminated)	-	670	61	27	-	951	-	-	1,710	615	117	-	951	27
2b.1.1.3	Chemical & Volume Control	1,464	1,484	145	63	-	2,251	-	-	5,408	2,571	523	-	2,251	63
2b.1.1.4	Chemical & Volume Control (Insulated)	529	594	28	12	-	432	-	-	1,595	1,009	142	-	432	12
2b.1.1.5	Component Cooling Water	-	241	-	-	-	-	-	-	241	234	7	-	-	-
2b.1.1.6	Component Cooling Water (RCA)	-	817	171	71	-	2,524	-	-	3,583	739	249	-	2,524	71
2b.1.1.7	Compressed Air	-	149	-	-	-	-	-	-	149	145	5	-	-	-
2b.1.1.8	Compressed Air (Insulated)	-	8	-	-	-	-	-	-	8	8	0	-	-	-
2b.1.1.9	Compressed Air (RCA Insulated)	-	40	2	1	-	32	-	-	75	36	6	-	32	1
2b.1.1.10	Compressed Air (RCA)	-	730	41	17	-	610	-	-	1,398	656	115	-	610	17
2b.1.1.11	Diesel Engine-Generator	-	174	-	-	-	-	-	-	174	170	3	-	-	-
2b.1.1.12	Diesel Engine-Generator (Insulated)	-	4	-	-	-	-	-	-	4	4	0	-	-	-
2b.1.1.13	Electrical (Clean)	-	3,963	-	-	-	-	-	-	3,963	3,865	99	-	-	-
2b.1.1.14	Electrical (Contaminated)	-	492	47	21	-	736	-	-	1,296	462	78	-	736	21
2b.1.1.15	Electrical (RCA)	-	2,389	-	-	-	-	-	-	2,389	2,359	30	-	-	-
2b.1.1.16	Fire Protection	-	509	139	61	-	2,157	-	-	2,866	479	170	-	2,157	61
2b.1.1.17	Gaseous Radwaste	-	184	16	7	-	249	-	-	456	167	33	-	249	7
2b.1.1.18	HVAC (Clean Insulated)	-	49	-	-	-	-	-	-	49	49	0	-	-	-
2b.1.1.19	HVAC (Clean)	-	533	-	-	-	-	-	-	533	531	2	-	-	-
2b.1.1.20	HVAC (Contaminated Insulated)	-	328	39	17	-	605	-	-	989	281	86	-	605	17
2b.1.1.21	HVAC (Contaminated)	-	1,461	198	86	-	3,064	-	-	4,808	1,275	383	-	3,064	86
2b.1.1.22	Liquid Radwaste	655	625	65	28	-	1,011	-	-	2,385	1,211	135	-	1,011	28
2b.1.1.23	Liquid Radwaste (Insulated)	53	60	3	1	-	45	-	-	163	102	14	-	45	1
2b.1.1.24	Lube Oil Distribution & Purification	-	160	-	-	-	-	-	-	160	155	5	-	-	-
2b.1.1.25	Make-up Water	-	311	-	-	-	-	-	-	311	302	9	-	-	-
2b.1.1.26	Make-up Water (Insulated)	-	30	-	-	-	-	-	-	30	29	1	-	-	-
2b.1.1.27	Make-up Water (RCA Insulated)	-	44	5	2	-	70	-	-	121	40	9	-	70	2
2b.1.1.28	Make-up Water (RCA)	-	225	27	11	-	398	-	-	661	200	52	-	398	11
2b.1.1.29	Mechanical Department Equipment	-	2	-	-	-	-	-	-	2	2	0	-	-	-
2b.1.1.30	Miscellaneous Reactor Coolant	37	198	10	4	-	153	-	-	403	211	34	-	153	4
2b.1.1.31	Nuclear Steam Supply Sampling	-	29	1	1	-	22	-	-	53	25	6	-	22	1
2b.1.1.32	Nuclear Steam Supply Sampling (Insulated	-	13	1	0	-	9	-	-	23	11	2	-	9	0
2b.1.1.33	Residual Heat Removal	560	426	139	61	-	2,157	-	-	3,343	525	600	-	2,157	61
2b.1.1.34	Safety Injection	-	174	18	8	-	285	-	-	485	167	26	-	285	8
2b.1.1.35	Safety Injection (Insulated)	-	8	1	0	-	11	-	-	20	7	1	-	11	0
2b.1.1.36	Safety Injection (RCA Insulated)	-	53	7	3	-	102	-	-	164	47	13	-	102	3
2b.1.1.37	Safety Injection (RCA)	-	440	62	26	-	914	-	-	1,442	386	116	-	914	26
2b.1.1.38	Service Cooling Water	-	176	-	-	-	-	-	-	176	170	6	-	-	-
2b.1.1.39	Service Cooling Water (RCA)	-	51	7	3	-	101	-	-	162	45	12	-	101	3
2b.1.1.40	Sewer System Expansion	-	60	-	-	-	-	-	-	60	59	1	-	-	-
2b.1.1	Totals	3,298	18,472	1,234	531	-	18,890	-	-	42,424	-	-	-	-	-
											-	-	-	-	-
2b.1.2	Scaffolding in support of decommissioning	-	7,530	46	14	-	95	-	-	7,686	3,954	3,623	-	95	14
											-	-	-	-	-
Decontamination of Site Buildings											-	-	-	-	-
2b.1.3.1	*Reactor	1,695	3,591	1,295	6,458	-	34,568	-	-	47,607	4,408	2,173	-	34,568	6,458
2b.1.3.2	Auxiliary	2,342	1,053	71	112	-	940	-	-	4,518	3,021	445	-	940	112
2b.1.3.3	Capital Additions 85-2004	748	239	11	23	-	151	-	-	1,171	881	117	-	151	23
2b.1.3.4	Containment Penetration Area	577	307	28	33	-	447	-	-	1,391	790	122	-	447	33
2b.1.3.5	Radwaste Storage	15	88	4	11	-	48	-	-	166	83	25	-	48	11
2b.1.3	Totals	5,376	5,278	1,410	6,636	-	36,153	-	-	54,853	-	-	-	-	-
											-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	8,674	31,280	2,690	7,180	-	55,139	-	-	104,963	-	-	-	-	-
											-	-	-	-	-
Period 2b Additional Costs											-	-	-	-	-
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,291	-	2,291	-	-	-	-	2,291
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	2,291	-	2,291	-	-	-	-	-
											-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2a.4.9	-	-	-	-	2,641
2a.4.10	-	-	-	-	3,112
2a.4.11	-	-	-	-	2,147
2a.4.12	-	-	7,945	-	-
2a.4.13	-	-	-	-	3,185
2a.4.14	-	-	77,294	-	-
2a.4.15	91,817	-	-	-	-
2a.4.16	-	-	142,290	-	-
2a.4	-	-	-	-	-
	-	-	-	-	-
2a.0	-	-	-	-	-
	-	-	-	-	-
PERIOD 2b - Site Decontamination	-	-	-	-	-
	-	-	-	-	-
Period 2b Direct Decommissioning Activities	-	-	-	-	-
	-	-	-	-	-
Disposal of Plant Systems	-	-	-	-	-
2b.1.1.1	604	8	-	-	-
2b.1.1.2	662	122	-	1,101	28
2b.1.1.3	2,766	545	-	2,606	66
2b.1.1.4	1,086	148	-	500	13
2b.1.1.5	252	7	-	-	-
2b.1.1.6	796	259	-	2,922	74
2b.1.1.7	156	5	-	-	-
2b.1.1.8	8	0	-	-	-
2b.1.1.9	39	6	-	37	1
2b.1.1.10	706	120	-	706	18
2b.1.1.11	183	4	-	-	-
2b.1.1.12	4	0	-	-	-
2b.1.1.13	4,159	103	-	-	-
2b.1.1.14	497	82	-	852	22
2b.1.1.15	2,539	31	-	-	-
2b.1.1.16	515	177	-	2,497	63
2b.1.1.17	180	35	-	288	7
2b.1.1.18	53	0	-	-	-
2b.1.1.19	571	2	-	-	-
2b.1.1.20	303	89	-	700	18
2b.1.1.21	1,373	400	-	3,547	90
2b.1.1.22	1,303	140	-	1,170	30
2b.1.1.23	110	15	-	52	1
2b.1.1.24	167	6	-	-	-
2b.1.1.25	325	9	-	-	-
2b.1.1.26	31	1	-	-	-
2b.1.1.27	43	10	-	81	2
2b.1.1.28	215	54	-	460	12
2b.1.1.29	2	0	-	-	-
2b.1.1.30	227	36	-	177	5
2b.1.1.31	27	6	-	26	1
2b.1.1.32	12	3	-	11	0
2b.1.1.33	565	626	-	2,497	63
2b.1.1.34	179	27	-	330	8
2b.1.1.35	7	1	-	13	0
2b.1.1.36	50	13	-	118	3
2b.1.1.37	416	121	-	1,058	27
2b.1.1.38	183	6	-	-	-
2b.1.1.39	49	13	-	117	3
2b.1.1.40	64	1	-	-	-
2b.1.1	-	-	-	-	-
	-	-	-	-	-
2b.1.2	4,255	3,781	-	110	15
	-	-	-	-	-
Decontamination of Site Buildings	-	-	-	-	-
2b.1.3.1	4,744	2,268	-	40,017	6,761
2b.1.3.2	3,251	464	-	1,089	117
2b.1.3.3	948	123	-	174	24
2b.1.3.4	850	128	-	517	34
2b.1.3.5	89	26	-	55	11
2b.1.3	-	-	-	-	-
	-	-	-	-	-
2b.1	-	-	-	-	-
	-	-	-	-	-
Period 2b Additional Costs	-	-	-	-	-
2b.2.1	-	-	-	-	2,398
2b.2	-	-	-	-	-
	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
Period 2b Collateral Costs											-	-	-	-	-	-	-	-	-	-
2b.3.1	Process decommissioning water waste	246	-	119	213	-	665	-	-	1,243	13	352	-	665	213	14	368	-	770	223
2b.3.2	Process decommissioning chemical flush waste	5	-	156	441	-	1,606	-	-	2,209	17	144	-	1,606	441	18	151	-	1,860	462
2b.3.3	Small tool allowance	-	531	-	-	-	-	-	-	531	-	531	-	-	-	-	554	-	-	-
2b.3.4	Environmental Permits and Fees	-	-	-	-	-	-	1,073	-	1,073	-	-	-	-	1,073	-	-	-	-	1,123
2b.3	Subtotal Period 2b Collateral Costs	251	531	275	654	-	2,271	1,073	-	5,056	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
2b.4.1	Decon supplies	1,892	-	-	-	-	-	-	-	1,892	-	1,892	-	-	-	-	1,974	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	541	-	541	-	-	-	-	541	-	-	-	-	567
2b.4.3	Property taxes	-	-	-	-	-	-	189	-	189	-	-	-	-	189	-	-	-	-	198
2b.4.4	Health physics supplies	-	3,148	-	-	-	-	-	-	3,148	-	3,148	-	-	-	-	3,286	-	-	-
2b.4.5	Heavy equipment rental	-	2,438	-	-	-	-	-	-	2,438	-	2,438	-	-	-	-	2,544	-	-	-
2b.4.6	Disposal of DAW generated	-	-	105	32	-	150	-	-	287	10	96	-	150	32	10	100	-	174	33
2b.4.7	Plant energy budget	-	-	-	-	-	-	2,320	-	2,320	-	-	-	-	2,320	-	-	-	-	2,429
2b.4.8	NRC Fees	-	-	-	-	-	-	463	-	463	-	-	-	-	463	-	-	-	-	485
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	760	-	760	-	-	-	-	760	-	-	-	-	796
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	896	-	896	-	-	-	-	896	-	-	-	-	938
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	212	-	212	-	-	-	-	212	-	-	-	-	222
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	618	-	618	-	-	-	-	618	-	-	-	-	647
2b.4.13	Severance Related Costs	-	-	-	-	-	-	11,148	-	11,148	-	-	11,148	-	-	-	-	12,138	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	21,391	-	21,391	-	-	21,391	-	-	-	-	23,291	-	-
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	18,904	-	18,904	18,904	-	-	-	-	20,345	-	-	-	-
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	28,595	-	28,595	-	-	28,595	-	-	-	-	31,134	-	-
2b.4	Subtotal Period 2b Period-Dependent Costs	1,892	5,586	105	32	-	150	86,038	-	93,803	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	10,817	37,397	3,071	7,866	-	57,560	89,402	-	206,113	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 2c - Spent fuel delay prior to SFP decon											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2c Direct Decommissioning Activities											-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2c Additional Costs											-	-	-	-	-	-	-	-	-	-
	No additional costs in this period										-	-	-	-	-	-	-	-	-	-
2c.2	Subtotal Period 2c Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2c Collateral Costs											-	-	-	-	-	-	-	-	-	-
2c.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	40,431	-	40,431	10,108	30,323	-	-	0	10,878	31,646	-	-	0
2c.3.2	Environmental Permits and Fees	-	-	-	-	-	-	5,198	-	5,198	-	-	-	-	5,198	-	-	-	-	5,441
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	45,628	-	45,628	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
2c.4.1	Insurance	-	-	-	-	-	-	2,622	-	2,622	-	-	-	-	2,622	-	-	-	-	2,745
2c.4.2	Property taxes	-	-	-	-	-	-	914	-	914	-	-	-	-	914	-	-	-	-	957
2c.4.3	Health physics supplies	-	1,331	-	-	-	-	-	-	1,331	-	1,331	-	-	-	-	1,389	-	-	-
2c.4.4	Disposal of DAW generated	-	-	49	15	-	70	-	-	133	4	45	-	70	15	5	46	-	81	15
2c.4.5	Plant energy budget	-	-	-	-	-	-	11,237	-	11,237	-	-	-	-	11,237	-	-	-	-	11,764
2c.4.6	NRC Fees	-	-	-	-	-	-	1,934	-	1,934	-	-	-	-	1,934	-	-	-	-	2,024
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,682	-	3,682	-	-	-	-	3,682	-	-	-	-	3,855
2c.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,056	-	1,056	-	-	-	-	1,056	-	-	-	-	1,105
2c.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,027	-	1,027	-	-	-	-	1,027	-	-	-	-	1,076
2c.4.10	ISFSI Operating Costs	-	-	-	-	-	-	2,994	-	2,994	-	-	-	-	2,994	-	-	-	-	3,134
2c.4.11	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	47,200	-	47,200	-	-	-	-	47,200	-	-	-	-	49,413
2c.4.12	Security Staff Cost	-	-	-	-	-	-	119,359	-	119,359	-	-	119,359	-	-	-	-	129,959	-	-
2c.4.13	Utility Staff Cost	-	-	-	-	-	-	50,222	-	50,222	-	-	50,222	-	-	-	-	54,682	-	-
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,331	49	15	-	70	242,246	-	243,711	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2c.0	TOTAL PERIOD 2c COST	-	1,331	49	15	-	70	287,875	-	289,339	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 2d - Decontamination Following Wet Fuel Storage											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2d Direct Decommissioning Activities											-	-	-	-	-	-	-	-	-	-
2d.1.1	Remove spent fuel racks	1,037	80	186	41	-	1,451	-	-	2,796	1,054	249	-	1,451	41	1,135	260	-	1,680	43
											-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems											-	-	-	-	-	-	-	-	-	-
2d.1.2.1	Electrical (Contaminated) - FHB	-	151	9	4	-	137	-	-	301	141	19	-	137	4	152	20	-	159	4
2d.1.2.2	Electrical (RCA)-FHB	-	927	84	35	-	1,250	-	-	2,297	840	172	-	1,250	35	904	179	-	1,447	37
2d.1.2.3	Fire Protection (RCA)	-	362	43	18	-	639	-	-	1,062	320	85	-	639	18	344	89	-	740	19
2d.1.2.4	HVAC (Contaminated) - FHB	-	326	42	18	-	648	-	-	1,034	283	85	-	648	18	305	89	-	750	19
2d.1.2.5	Spent Fuel Pit Cooling	-	131	54	23	-	829	-	-	1,037	128	57	-	829	23	138	60	-	960	24
2d.1.2.6	Spent Fuel Pit Cooling - FHB	-	181	58	25	-	892	-	-	1,156	174	65	-	892	25	187	67	-	1,032	26
2d.1.2	Totals	-	2,079	289	123	-	4,395	-	-	6,886	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Decontamination of Site Buildings											-	-	-	-	-	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
2d.1.3.1	Fuel Handling	1,456	1,224	69	47	-	635	-	-	3,430	2,552	196	-	635	47	2,747	205	-	735	49
2d.1.3	Totals	1,456	1,224	69	47	-	635	-	-	3,430	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2d.1.4	Scaffolding in support of decommissioning	-	1,506	9	3	-	19	-	-	1,537	791	725	-	19	3	851	756	-	22	3
											-	-	-	-	-	-	-	-	-	-
2d.1	Subtotal Period 2d Activity Costs	2,493	4,889	554	214	-	6,500	-	-	14,649	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2d Additional Costs											-	-	-	-	-	-	-	-	-	-
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,212	-	1,212	1,016	197	-	-	-	1,093	205	-	-	-
2d.2.2	Remedial Action Surveys	-	-	-	-	-	-	1,135	-	1,135	-	-	-	-	1,135	-	-	-	-	1,189
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	2,348	-	2,348	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2d Collateral Costs											-	-	-	-	-	-	-	-	-	-
2d.3.1	Process decommissioning water waste	77	-	40	72	-	225	-	-	414	4	113	-	225	72	5	118	-	260	75
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	94	-	-	-	-	-	-	94	-	94	-	-	-	-	98	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	172	64	-	351	-	-	587	16	156	-	351	64	17	163	-	407	67
2d.3.5	Environmental Permits and Fees	-	-	-	-	-	-	532	-	532	-	-	-	-	532	-	-	-	-	557
2d.3	Subtotal Period 2d Collateral Costs	77	94	212	136	-	576	532	-	1,627	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2d Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
2d.4.1	Decon supplies	288	-	-	-	-	-	-	-	288	-	288	-	-	-	-	301	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	268	-	268	-	-	-	-	268	-	-	-	-	281
2d.4.3	Property taxes	-	-	-	-	-	-	93	-	93	-	-	-	-	93	-	-	-	-	98
2d.4.4	Health physics supplies	-	719	-	-	-	-	-	-	719	-	719	-	-	-	-	750	-	-	-
2d.4.5	Heavy equipment rental	-	1,208	-	-	-	-	-	-	1,208	-	1,208	-	-	-	-	1,261	-	-	-
2d.4.6	Disposal of DAW generated	-	-	46	14	-	65	-	-	125	4	42	-	65	14	4	44	-	75	14
2d.4.7	Plant energy budget	-	-	-	-	-	-	613	-	613	-	-	-	-	613	-	-	-	-	642
2d.4.8	NRC Fees	-	-	-	-	-	-	193	-	193	-	-	-	-	193	-	-	-	-	202
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	188	-	188	-	-	-	-	188	-	-	-	-	197
2d.4.10	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	748	-	748	-	-	-	-	748	-	-	-	-	783
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	210	-	210	-	-	-	-	210	-	-	-	-	220
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	306	-	306	-	-	-	-	306	-	-	-	-	321
2d.4.13	Severance Related Costs	-	-	-	-	-	-	9,810	-	9,810	-	-	9,810	-	-	-	-	10,681	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	2,155	-	2,155	-	-	2,155	-	-	-	-	2,347	-	-
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	6,412	-	6,412	6,412	-	-	-	-	6,901	-	-	-	-
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	10,332	-	10,332	-	-	10,332	-	-	-	-	11,249	-	-
2d.4	Subtotal Period 2d Period-Dependent Costs	288	1,927	46	14	-	65	31,329	-	33,669	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2d.0	TOTAL PERIOD 2d COST	2,858	6,910	812	363	-	7,141	34,209	-	52,293	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 2f - License Termination											-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2f Direct Decommissioning Activities											-	-	-	-	-	-	-	-	-	-
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	262	-	262	210	52	-	-	(0)	226	55	-	-	(0)
2f.1.2	Terminate license									a	-	-	-	-	-	-	-	-	-	-
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	262	-	262	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs											-	-	-	-	-	-	-	-	-	-
2f.2.1	License Termination Survey	-	-	-	-	-	-	21,796	-	21,796	21,599	197	-	-	-	23,246	205	-	-	-
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	21,796	-	21,796	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2f Collateral Costs											-	-	-	-	-	-	-	-	-	-
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,784	-	1,784	1,784	-	-	-	-	1,919	-	-	-	-
2f.3.2	Environmental Permits and Fees	-	-	-	-	-	-	870	-	870	-	-	-	-	870	-	-	-	-	911
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	2,654	-	2,654	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs											-	-	-	-	-	-	-	-	-	-
2f.4.1	Insurance	-	-	-	-	-	-	392	-	392	-	-	-	-	392	-	-	-	-	410
2f.4.2	Property taxes	-	-	-	-	-	-	153	-	153	-	-	-	-	153	-	-	-	-	160
2f.4.3	Health physics supplies	-	1,231	-	-	-	-	-	-	1,231	-	1,231	-	-	-	-	1,284	-	-	-
2f.4.4	Disposal of DAW generated	-	-	9	3	-	12	-	-	24	1	8	-	12	3	1	8	-	14	3
2f.4.5	Plant energy budget	-	-	-	-	-	-	502	-	502	-	-	-	-	502	-	-	-	-	525
2f.4.6	NRC Fees	-	-	-	-	-	-	346	-	346	-	-	-	-	346	-	-	-	-	362
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	308	-	308	-	-	-	-	308	-	-	-	-	323
2f.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,222	-	1,222	-	-	-	-	1,222	-	-	-	-	1,279
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	501	-	501	-	-	-	-	501	-	-	-	-	525
2f.4.10	Security Staff Cost	-	-	-	-	-	-	3,528	-	3,528	-	-	3,528	-	-	-	-	3,841	-	-
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	6,174	-	6,174	6,174	-	-	-	-	6,644	-	-	-	-
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	6,990	-	6,990	-	-	6,990	-	-	-	-	7,611	-	-
2f.4	Subtotal Period 2f Period-Dependent Costs	-	1,231	9	3	-	12	20,117	-	21,371	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
2f.0	TOTAL PERIOD 2f COST	-	1,231	9	3	-	12	44,829	-	46,083	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-	-	-
PERIOD 2 TOTALS		16,960	108,238	29,202	17,330	-	154,107	805,269	-	1,131,106	-	-	-	-	-	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
											-	-	-	-	-
											-	-	-	-	-
	PERIOD 3b - Site Restoration										-	-	-	-	-
											-	-	-	-	-
	Period 3b Direct Decommissioning Activities										-	-	-	-	-
											-	-	-	-	-
	Demolition of Remaining Site Buildings										-	-	-	-	-
3b.1.1.1	*Reactor	-	8,748	-	-	-	-	-	-	8,748	5,671	3,077	-	-	-
3b.1.1.2	Administration	-	1,400	-	-	-	-	-	-	1,400	892	508	-	-	-
3b.1.1.3	Auxiliary	-	8,502	-	-	-	-	-	-	8,502	5,386	3,116	-	-	-
3b.1.1.4	Capital Additions 85-2004	-	5,631	-	-	-	-	-	-	5,631	3,919	1,712	-	-	-
3b.1.1.5	Chemical Storage	-	6	-	-	-	-	-	-	6	4	2	-	-	-
3b.1.1.6	Chlorination	-	12	-	-	-	-	-	-	12	8	4	-	-	-
3b.1.1.7	Circulating Water Tunnels	-	1,478	-	-	-	-	-	-	1,478	960	518	-	-	-
3b.1.1.8	Cold Machine Shop	-	520	-	-	-	-	-	-	520	328	192	-	-	-
3b.1.1.9	Communication	-	6	-	-	-	-	-	-	6	4	2	-	-	-
3b.1.1.10	Condensate Polishing/Technical Support	-	1,127	-	-	-	-	-	-	1,127	789	338	-	-	-
3b.1.1.11	Containment Penetration Area	-	889	-	-	-	-	-	-	889	555	334	-	-	-
3b.1.1.12	Discharge Structure	-	1,214	-	-	-	-	-	-	1,214	702	512	-	-	-
3b.1.1.13	Fabrication Shop	-	157	-	-	-	-	-	-	157	104	53	-	-	-
3b.1.1.14	Fire Pump House	-	7	-	-	-	-	-	-	7	5	2	-	-	-
3b.1.1.15	Hazardous Waste Storage Facility	-	52	-	-	-	-	-	-	52	37	15	-	-	-
3b.1.1.16	Intake Structure	-	6,882	-	-	-	-	-	-	6,882	3,916	2,965	-	-	-
3b.1.1.17	Maintenance Shop	-	480	-	-	-	-	-	-	480	299	181	-	-	-
3b.1.1.18	Miscellaneous Structures	-	83	-	-	-	-	-	-	83	57	26	-	-	-
3b.1.1.19	NPO Permanent Warehouse	-	1,787	-	-	-	-	-	-	1,787	1,194	593	-	-	-
3b.1.1.20	Ponds	-	3	-	-	-	-	-	-	3	2	1	-	-	-
3b.1.1.21	Portable Fire Pump & Fuel Cart	-	2	-	-	-	-	-	-	2	1	1	-	-	-
3b.1.1.22	Pretreatment	-	13	-	-	-	-	-	-	13	9	4	-	-	-
3b.1.1.23	Radwaste Storage	-	2,302	-	-	-	-	-	-	2,302	1,486	816	-	-	-
3b.1.1.24	Radwaste Storage Facility (Additional)	-	64	-	-	-	-	-	-	64	52	13	-	-	-
3b.1.1.25	Rotor Warehouse	-	1,098	-	-	-	-	-	-	1,098	815	283	-	-	-
3b.1.1.26	Security	-	447	-	-	-	-	-	-	447	326	121	-	-	-
3b.1.1.27	Security Buildings (additional)	-	70	-	-	-	-	-	-	70	56	14	-	-	-
3b.1.1.28	Security Modifications (2010 to 2015)	-	1,138	-	-	-	-	-	-	1,138	797	341	-	-	-
3b.1.1.29	Simulator	-	541	-	-	-	-	-	-	541	357	184	-	-	-
3b.1.1.30	Steam Generator Storage Facility	-	1,178	-	-	-	-	-	-	1,178	740	438	-	-	-
3b.1.1.31	Telephone Terminal	-	3	-	-	-	-	-	-	3	2	1	-	-	-
3b.1.1.32	Turbine	-	7,190	-	-	-	-	-	-	7,190	4,921	2,269	-	-	-
3b.1.1.33	Turbine Pedestal	-	1,709	-	-	-	-	-	-	1,709	955	754	-	-	-
3b.1.1.34	Vehicle Maintenance	-	45	-	-	-	-	-	-	45	31	14	-	-	-
3b.1.1.35	Waste Water Holding & Treatment Facility	-	30	-	-	-	-	-	-	30	20	9	-	-	-
3b.1.1.36	Fuel Handling	-	2,408	-	-	-	-	-	-	2,408	1,419	989	-	-	-
3b.1.1	Totals	-	57,218	-	-	-	-	-	-	57,218	-	-	-	-	-
											-	-	-	-	-
	Site Closeout Activities										-	-	-	-	-
3b.1.2	Grade & landscape site	-	2,844	-	-	-	-	-	-	2,844	384	2,461	-	-	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	126	-	126	126	-	-	-	-
3b.1	Subtotal Period 3b Activity Costs	-	60,062	-	-	-	-	126	-	60,188	-	-	-	-	-
											-	-	-	-	-
	Period 3b Additional Costs										-	-	-	-	-
3b.2.1	Backfill Structures & Concrete Removal (out of state disposal	-	30,060	-	-	-	-	54,056	-	84,117	51,580	32,537	-	-	(0)
3b.2.2	Breakwater Demolition and Removal (out of state disposal)	-	100,299	-	-	-	-	205,205	-	305,503	186,867	118,637	-	-	(0)
3b.2.3	Cofferdam Construction and Teardown	-	582	-	-	-	-	-	-	582	260	322	-	-	-
3b.2.4	Concrete Crushing	-	1,793	-	-	-	-	9	-	1,801	542	1,251	-	-	9
3b.2.5	Disposal of Galbestos Siding	-	-	-	-	-	-	512	-	512	-	-	-	-	512
3b.2.6	Disposition of Mobile Barriers (out of state disposal)	-	204	-	-	-	-	574	-	779	490	289	-	-	(0)
3b.2.7	Soil / Sediment Control Plant Area	-	1,623	-	-	-	-	-	-	1,623	778	846	-	-	-
3b.2.8	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	7,144	-	7,144	-	-	-	-	7,144
3b.2.9	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	9,538	-	9,538	-	-	-	-	9,538
3b.2.10	FSS Manager	-	-	-	-	-	-	757	-	757	757	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	134,561	-	-	-	-	277,797	-	412,358	-	-	-	-	-
											-	-	-	-	-
	Period 3b Collateral Costs										-	-	-	-	-
3b.3.1	Small tool allowance	-	1,412	-	-	-	-	-	-	1,412	-	1,412	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	1,412	-	-	-	-	-	-	1,412	-	-	-	-	-
											-	-	-	-	-
	Period 3b Period-Dependent Costs										-	-	-	-	-
3b.4.1	Insurance	-	-	-	-	-	-	644	-	644	-	-	-	-	644
3b.4.2	Property taxes	-	-	-	-	-	-	503	-	503	-	-	-	-	503
3b.4.3	Heavy equipment rental	-	9,236	-	-	-	-	-	-	9,236	-	9,236	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	825	-	825	-	-	-	-	825
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	360	-	360	-	-	-	-	360
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	1,014	-	1,014	-	-	-	-	1,014
3b.4.7	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	4,026	-	4,026	-	-	-	-	4,026

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
		-	-	-	-	-
		-	-	-	-	-
	PERIOD 3b - Site Restoration	-	-	-	-	-
		-	-	-	-	-
	Period 3b Direct Decommissioning Activities	-	-	-	-	-
		-	-	-	-	-
	Demolition of Remaining Site Buildings	-	-	-	-	-
3b.1.1.1	*Reactor	6,103	3,212	-	-	-
3b.1.1.2	Administration	960	530	-	-	-
3b.1.1.3	Auxiliary	5,797	3,252	-	-	-
3b.1.1.4	Capital Additions 85-2004	4,218	1,787	-	-	-
3b.1.1.5	Chemical Storage	4	2	-	-	-
3b.1.1.6	Chlorination	9	4	-	-	-
3b.1.1.7	Circulating Water Tunnels	1,033	541	-	-	-
3b.1.1.8	Cold Machine Shop	353	201	-	-	-
3b.1.1.9	Communication	4	2	-	-	-
3b.1.1.10	Condensate Polishing/Technical Support	849	353	-	-	-
3b.1.1.11	Containment Penetration Area	597	348	-	-	-
3b.1.1.12	Discharge Structure	755	534	-	-	-
3b.1.1.13	Fabrication Shop	112	55	-	-	-
3b.1.1.14	Fire Pump House	5	2	-	-	-
3b.1.1.15	Hazardous Waste Storage Facility	40	15	-	-	-
3b.1.1.16	Intake Structure	4,215	3,095	-	-	-
3b.1.1.17	Maintenance Shop	322	189	-	-	-
3b.1.1.18	Miscellaneous Structures	61	27	-	-	-
3b.1.1.19	NPO Permanent Warehouse	1,285	619	-	-	-
3b.1.1.20	Ponds	2	1	-	-	-
3b.1.1.21	Portable Fire Pump & Fuel Cart	1	1	-	-	-
3b.1.1.22	Pretreatment	10	4	-	-	-
3b.1.1.23	Radwaste Storage	1,600	852	-	-	-
3b.1.1.24	Radwaste Storage Facility (Additional)	55	13	-	-	-
3b.1.1.25	Rotor Warehouse	877	295	-	-	-
3b.1.1.26	Security	350	127	-	-	-
3b.1.1.27	Security Buildings (additional)	60	14	-	-	-
3b.1.1.28	Security Modifications (2010 to 2015)	858	356	-	-	-
3b.1.1.29	Simulator	384	192	-	-	-
3b.1.1.30	Steam Generator Storage Facility	797	457	-	-	-
3b.1.1.31	Telephone Terminal	3	1	-	-	-
3b.1.1.32	Turbine	5,296	2,368	-	-	-
3b.1.1.33	Turbine Pedestal	1,028	787	-	-	-
3b.1.1.34	Vehicle Maintenance	33	14	-	-	-
3b.1.1.35	Waste Water Holding & Treatment Facility	22	10	-	-	-
3b.1.1.36	Fuel Handling	1,527	1,033	-	-	-
3b.1.1	Totals	-	-	-	-	-
		-	-	-	-	-
	Site Closeout Activities	-	-	-	-	-
3b.1.2	Grade & landscape site	413	2,568	-	-	-
3b.1.3	Final report to NRC	136	-	-	-	-
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-
		-	-	-	-	-
	Period 3b Additional Costs	-	-	-	-	-
3b.2.1	Backfill Structures & Concrete Removal (out of state disposal	55,512	33,956	-	-	(0)
3b.2.2	Breakwater Demolition and Removal (out of state disposal)	201,113	123,813	-	-	(0)
3b.2.3	Cofferdam Construction and Teardown	280	336	-	-	-
3b.2.4	Concrete Crushing	583	1,305	-	-	9
3b.2.5	Disposal of Galbestos Siding	-	-	-	-	537
3b.2.6	Disposition of Mobile Barriers (out of state disposal)	527	302	-	-	(0)
3b.2.7	Soil / Sediment Control Plant Area	837	883	-	-	-
3b.2.8	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	7,479
3b.2.9	Scrap Metal Transportation (out of state)	-	-	-	-	9,986
3b.2.10	FSS Manager	815	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-
		-	-	-	-	-
	Period 3b Collateral Costs	-	-	-	-	-
3b.3.1	Small tool allowance	-	1,473	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	-	-	-	-
		-	-	-	-	-
	Period 3b Period-Dependent Costs	-	-	-	-	-
3b.4.1	Insurance	-	-	-	-	674
3b.4.2	Property taxes	-	-	-	-	527
3b.4.3	Heavy equipment rental	-	9,639	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	864
3b.4.5	NRC ISFSI Fees	-	-	-	-	376
3b.4.6	Emergency Planning Fees	-	-	-	-	1,061
3b.4.7	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	4,215

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,648	-	1,648	-	-	-	-	1,648
3b.4.9	Security Staff Cost	-	-	-	-	-	-	11,598	-	11,598	-	-	11,598	-	-
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	18,423	-	18,423	18,423	-	-	-	-
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	9,974	-	9,974	-	-	9,974	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	-	9,236	-	-	-	-	49,014	-	58,249	-	-	-	-	-
											-	-	-	-	-
3b.0	TOTAL PERIOD 3b COST	-	205,270	-	-	-	-	326,937	-	532,207	-	-	-	-	-
											-	-	-	-	-
PERIOD 3c - Fuel Storage Operations/Shipping											-	-	-	-	-
											-	-	-	-	-
Period 3c Direct Decommissioning Activities											-	-	-	-	-
3c.1	Subtotal Period 3c Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3c Additional Costs											-	-	-	-	-
	No additional costs in this period										-	-	-	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3c Collateral Costs											-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3c Period-Dependent Costs											-	-	-	-	-
3c.4.1	Insurance	-	-	-	-	-	-	5,887	-	5,887	-	-	-	-	5,887
3c.4.2	Property taxes	-	-	-	-	-	-	4,597	-	4,597	-	-	-	-	4,597
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4,705	-	4,705	-	-	-	-	4,705
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	9,262	-	9,262	-	-	-	-	9,262
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	37,186	-	37,186	-	-	-	-	37,186
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	15,061	-	15,061	-	-	-	-	15,061
3c.4.8	Security Staff Cost	-	-	-	-	-	-	80,339	-	80,339	-	-	80,339	-	-
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	18,479	-	18,479	-	-	18,479	-	-
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	175,516	-	175,516	-	-	-	-	-
											-	-	-	-	-
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	175,516	-	175,516	-	-	-	-	-
											-	-	-	-	-
PERIOD 3d - GTCC shipping											-	-	-	-	-
											-	-	-	-	-
Period 3d Direct Decommissioning Activities											-	-	-	-	-
											-	-	-	-	-
Nuclear Steam Supply System Removal											-	-	-	-	-
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	2,869	-	-	11,592	-	-	14,462	-	2,869	-	-	11,592
3d.1.1	Totals	-	-	2,869	-	-	11,592	-	-	14,462	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	2,869	-	-	11,592	-	-	14,462	-	-	-	-	-
											-	-	-	-	-
Period 3d Additional Costs											-	-	-	-	-
	No additional costs in this period										-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3d Collateral Costs											-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3d Period-Dependent Costs											-	-	-	-	-
3d.4.1	Insurance	-	-	-	-	-	-	12	-	12	-	-	-	-	12
3d.4.2	Property taxes	-	-	-	-	-	-	9	-	9	-	-	-	-	9
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	-	-	31	-	31	-	-	-	-	31
3d.4.5	Security Staff Cost	-	-	-	-	-	-	165	-	165	-	-	165	-	-
3d.4.6	Utility Staff Cost	-	-	-	-	-	-	38	-	38	-	-	38	-	-
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	256	-	256	-	-	-	-	-
											-	-	-	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	2,869	-	-	11,592	256	-	14,718	-	-	-	-	-
											-	-	-	-	-
PERIOD 3e - ISFSI Decontamination											-	-	-	-	-
											-	-	-	-	-
Period 3e Direct Decommissioning Activities											-	-	-	-	-
3e.1	Subtotal Period 3e Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3e Additional Costs											-	-	-	-	-
3e.2.1	License Termination ISFSI	-	165	10	18	-	668	1,495	-	2,356	44	131	-	668	1,513
3e.2	Subtotal Period 3e Additional Costs	-	165	10	18	-	668	1,495	-	2,356	-	-	-	-	-
											-	-	-	-	-
Period 3e Collateral Costs											-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3e Period-Dependent Costs											-	-	-	-	-
3e.4.1	Insurance	-	-	-	-	-	-	107	-	107	-	-	-	-	107

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Activity Index	Activity Description	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
3b.4.8	ISFSI Operating Costs	-	-	-	-	1,725
3b.4.9	Security Staff Cost	-	-	12,627	-	-
3b.4.10	DOC Staff Cost	19,827	-	-	-	-
3b.4.11	Utility Staff Cost	-	-	10,860	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
3b.0	TOTAL PERIOD 3b COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 3c - Fuel Storage Operations/Shipping		-	-	-	-	-
		-	-	-	-	-
Period 3c Direct Decommissioning Activities		-	-	-	-	-
3c.1	Subtotal Period 3c Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 3c Additional Costs		-	-	-	-	-
	No additional costs in this period	-	-	-	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 3c Collateral Costs		-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 3c Period-Dependent Costs		-	-	-	-	-
3c.4.1	Insurance	-	-	-	-	6,163
3c.4.2	Property taxes	-	-	-	-	4,813
3c.4.3	Plant energy budget	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	4,926
3c.4.5	Emergency Planning Fees	-	-	-	-	9,696
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	38,930
3c.4.7	ISFSI Operating Costs	-	-	-	-	15,767
3c.4.8	Security Staff Cost	-	-	87,473	-	-
3c.4.9	Utility Staff Cost	-	-	20,120	-	-
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 3d - GTCC shipping		-	-	-	-	-
		-	-	-	-	-
Period 3d Direct Decommissioning Activities		-	-	-	-	-
		-	-	-	-	-
Nuclear Steam Supply System Removal		-	-	-	-	-
3d.1.1.1	Vessel & Internals GTCC Disposal	-	2,995	-	-	12,136
3d.1.1	Totals	-	-	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 3d Additional Costs		-	-	-	-	-
	No additional costs in this period	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 3d Collateral Costs		-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 3d Period-Dependent Costs		-	-	-	-	-
3d.4.1	Insurance	-	-	-	-	13
3d.4.2	Property taxes	-	-	-	-	10
3d.4.3	Plant energy budget	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	32
3d.4.5	Security Staff Cost	-	-	180	-	-
3d.4.6	Utility Staff Cost	-	-	41	-	-
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-
		-	-	-	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	-	-	-
		-	-	-	-	-
PERIOD 3e - ISFSI Decontamination		-	-	-	-	-
		-	-	-	-	-
Period 3e Direct Decommissioning Activities		-	-	-	-	-
3e.1	Subtotal Period 3e Activity Costs	-	-	-	-	-
		-	-	-	-	-
Period 3e Additional Costs		-	-	-	-	-
3e.2.1	License Termination ISFSI	47	137	-	773	1,584
3e.2	Subtotal Period 3e Additional Costs	-	-	-	-	-
		-	-	-	-	-
Period 3e Collateral Costs		-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-
		-	-	-	-	-
Period 3e Period-Dependent Costs		-	-	-	-	-
3e.4.1	Insurance	-	-	-	-	112

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
3e.4.2	Property taxes	-	-	-	-	-	-	80	-	80	-	-	-	-	80
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	192	-	192	-	-	192	-	-
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	250	-	250	-	-	250	-	-
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	629	-	629	-	-	-	-	-
											-	-	-	-	-
3e.0	TOTAL PERIOD 3e COST	-	165	10	18	-	668	2,124	-	2,985	-	-	-	-	-
											-	-	-	-	-
PERIOD 3f - ISFSI Site Restoration											-	-	-	-	-
											-	-	-	-	-
Period 3f Direct Decommissioning Activities											-	-	-	-	-
3f.1	Subtotal Period 3f Activity Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
											-	-	-	-	-
Period 3f Additional Costs											-	-	-	-	-
3f.2.1	Demolition and Site Restoration ISFSI	-	1,998	-	-	-	-	3,346	-	5,344	1,586	412	-	-	3,346
3f.2.2	Area Soil / Sediment Control ISFSI	-	25	-	-	-	-	-	-	25	12	13	-	-	-
3f.2	Subtotal Period 3f Additional Costs	-	2,023	-	-	-	-	3,346	-	5,369	-	-	-	-	-
											-	-	-	-	-
Period 3f Collateral Costs											-	-	-	-	-
3f.3.1	Small tool allowance	-	30	-	-	-	-	-	-	30	-	30	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	30	-	-	-	-	-	-	30	-	-	-	-	-
											-	-	-	-	-
Period 3f Period-Dependent Costs											-	-	-	-	-
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	34	-	34	-	-	-	-	34
3f.4.3	Heavy equipment rental	-	69	-	-	-	-	-	-	69	-	69	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	28	-	28	-	-	-	-	28
3f.4.5	Security Staff Cost	-	-	-	-	-	-	33	-	33	-	-	33	-	-
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	93	-	93	-	-	93	-	-
3f.4	Subtotal Period 3f Period-Dependent Costs	-	69	-	-	-	-	188	-	257	-	-	-	-	-
											-	-	-	-	-
3f.0	TOTAL PERIOD 3f COST	-	2,122	-	-	-	-	3,534	-	5,656	-	-	-	-	-
											-	-	-	-	-
PERIOD 3 TOTALS		-	207,558	2,879	18	-	12,260	508,366	-	731,081	-	-	-	-	-
											-	-	-	-	-
TOTAL COST TO DECOMMISSION		**21,549**	**319,210**	**32,500**	**17,851**	**-**	**178,340**	**1,530,721**	**-**	**2,100,172**	**578,140**	**317,881**	**752,034**	**166,748**	**285,369**

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2017 Dollars)

Contractor Labor	Eqp&Mat	PG&E Labor	Disposal	Other
-	-	-	-	84
-	-	-	-	-
-	-	209	-	-
-	-	273	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
1,707	430	-	-	3,503
13	14	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	31	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	36
-	72	-	-	-
-	-	-	-	29
-	-	36	-	-
-	-	101	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
622,216	**331,750**	**818,819**	**193,031**	**298,749**

Diablo Canyon Power Plant – Unit 1
Decommissioning Cash Flow
Estimated in 2017 Dollars

(1 page)

Diablo Canyon Power Plant – Unit 2
Decommissioning Cash Flow
Estimated in 2017 Dollars

(1 page)

Diablo Canyon Power Plant - Unit 1

Decommissioning Cash Flow (Note 1)
Estimated in 2017 Dollars

Year	NRC Scope (Radiological)	Non-NRC Scope (Non-Radiological)	Spent Fuel Management	Total	Cummulative Decommissioning Estimate	Trust Account Funding
2016	$250,623			$250,623	$250,623	
2017	$9,489,525	$69,010		$9,558,535	$9,809,158	
2018	$11,071,864	$30,990		$11,102,855	$20,912,012	
2019	$8,287,484			$8,287,484	$29,199,496	
2020	$8,169,522			$8,169,522	$37,369,018	
2021	$17,828,330			$17,828,330	$55,197,348	
2022	$12,718,892			$12,718,892	$67,916,240	
2023	$7,047,544			$7,047,544	$74,963,784	
2024	$7,947,139	$150,557	$476,916	$8,574,612	$83,538,396	
2025	$149,791,131	$1,185,391	$2,901,241	$153,877,763	$237,416,159	
2026	$183,575,330	$1,840,504	$3,135,747	$188,551,580	$425,967,740	
2027	$184,491,740	$1,486,006	$3,252,038	$189,229,784	$615,197,524	
2028	$184,997,197	$1,490,077	$3,260,948	$189,748,222	$804,945,746	
2029	$210,817,604	$5,326,510	$3,427,366	$219,571,480	$1,024,517,226	
2030	$108,978,938	$5,489,406	$28,617,184	$143,085,527	$1,167,602,753	$1,201,582,914 Market Value
2031	$20,294,496	$0	$40,854,564	$61,149,060	$1,228,751,813	
2032	$20,350,097	$0	$40,966,494	$61,316,591	$1,290,068,404	
2033	$20,294,496	$0	$40,854,564	$61,149,060	$1,351,217,464	
2034	$34,191,926	$0	$34,502,881	$68,694,807	$1,419,912,271	
2035	$37,147,569	$0	$2,641,874	$39,789,443	$1,459,701,714	
2036	$39,894,774	$4,354,982	$3,532,902	$47,782,658	$1,507,484,372	
2037	$456,142	$33,116,011	$8,197,161	$41,769,314	$1,549,253,687	
2038	$456,142	$33,116,011	$8,197,161	$41,769,314	$1,591,023,001	
2039	$157,463	$11,431,828	$8,255,387	$19,844,678	$1,610,867,679	
2040	$0	$0	$8,308,785	$8,308,785	$1,619,176,464	
2041	$0	$0	$8,286,083	$8,286,083	$1,627,462,546	
2042	$0	$0	$8,286,083	$8,286,083	$1,635,748,629	
2043	$0	$0	$8,286,083	$8,286,083	$1,644,034,712	
2044	$0	$0	$8,308,785	$8,308,785	$1,652,343,497	
2045	$0	$0	$8,286,083	$8,286,083	$1,660,629,580	
2046	$0	$0	$8,286,083	$8,286,083	$1,668,915,663	
2047	$0	$0	$8,286,083	$8,286,083	$1,677,201,746	
2048	$0	$0	$8,308,785	$8,308,785	$1,685,510,530	
2049	$0	$0	$8,286,083	$8,286,083	$1,693,796,613	
2050	$0	$0	$8,286,083	$8,286,083	$1,702,082,696	
2051	$0	$0	$8,286,083	$8,286,083	$1,710,368,779	
2052	$0	$0	$8,308,785	$8,308,785	$1,718,677,564	
2053	$0	$0	$8,286,083	$8,286,083	$1,726,963,647	
2054	$0	$0	$8,286,083	$8,286,083	$1,735,249,730	
2055	$0	$0	$8,286,083	$8,286,083	$1,743,535,813	
2056	$0	$0	$8,308,785	$8,308,785	$1,751,844,597	
2057	$0	$0	$8,286,083	$8,286,083	$1,760,130,680	
2058	$0	$0	$8,286,083	$8,286,083	$1,768,416,763	
2059	$0	$0	$8,286,083	$8,286,083	$1,776,702,846	
2060	$0	$0	$8,308,785	$8,308,785	$1,785,011,630	
2061	$15,098,364	$0	$8,176,076	$23,274,440	$1,808,286,070	
2062	$3,208,945	$5,959,990	$0	$9,168,935	$1,817,455,006	
TOTAL	$1,297,013,277	$105,047,275	$415,394,454	$1,817,455,006		

NOTES:

1) Cash Flow is based on construction of Independent Spent Fuel Storage Installation (ISFSI) and assumes Department of Energy (DOE) Used Fuel Repository opens in 2028.
2) Trust Account Value of $1,201.6 million Market Value as of 12/31/16.

Enclosure 4
PG&E Letter DCL-17-022

Diablo Canyon Power Plant - Unit 2

Decommissioning Cash Flow (Note 1)
Estimated in 2017 Dollars

Year	NRC Scope (Radiological)	Non-NRC Scope (Non-Radiological)	Spent Fuel Management	Total	Cummulative Decommissioning Estimate	Trust Account Funding
2016	$241,031			$241,031	$241,031	
2017	$9,524,814	$69,010		$9,593,823	$9,834,854	
2018	$11,080,044	$30,990		$11,111,034	$20,945,888	
2019	$8,287,484			$8,287,484	$29,233,371	
2020	$8,169,522			$8,169,522	$37,402,893	
2021	$17,828,330			$17,828,330	$55,231,223	
2022	$12,718,892			$12,718,892	$67,950,115	
2023	$7,047,544			$7,047,544	$74,997,659	
2024	$7,125,147			$7,125,147	$82,122,806	
2025	$34,639,417	$137,736	$1,019,160	$35,796,313	$117,919,119	
2026	$114,860,760	$639,314	$2,906,199	$118,406,272	$236,325,392	
2027	$179,013,274	$1,464,672	$3,496,283	$183,974,229	$420,299,621	
2028	$185,192,365	$1,531,514	$3,606,375	$190,330,254	$610,629,875	
2029	$184,686,375	$1,527,330	$3,596,521	$189,810,226	$800,440,101	
2030	$220,404,389	$8,259,371	$2,795,270	$231,459,030	$1,031,899,131	
2031	$57,583,521	$1,566,465	$36,590,997	$95,740,983	$1,127,640,114	
2032	$26,271,695	$0	$42,875,009	$69,146,703	$1,196,786,817	
2033	$26,199,914	$0	$42,757,864	$68,957,778	$1,265,744,595	
2034	$26,199,914	$0	$42,757,864	$68,957,778	$1,334,702,373	
2035	$59,342,012	$0	$28,754,357	$88,096,369	$1,422,798,742	
2036	$60,709,855	$30,739,547	$3,584,129	$95,033,531	$1,517,832,273	$1,570,994,710 Market Value
2037	$383,855	$219,998,721	$8,215,581	$228,598,157	$1,746,430,431	
2038	$383,855	$219,998,721	$8,215,581	$228,598,157	$1,975,028,588	
2039	$129,354	$74,136,555	$8,272,569	$82,538,478	$2,057,567,066	
2040	$0	$0	$8,324,278	$8,324,278	$2,065,891,344	
2041	$0	$0	$8,301,534	$8,301,534	$2,074,192,878	
2042	$0	$0	$8,301,534	$8,301,534	$2,082,494,411	
2043	$0	$0	$8,301,534	$8,301,534	$2,090,795,945	
2044	$0	$0	$8,324,278	$8,324,278	$2,099,120,223	
2045	$0	$0	$8,301,534	$8,301,534	$2,107,421,756	
2046	$0	$0	$8,301,534	$8,301,534	$2,115,723,290	
2047	$0	$0	$8,301,534	$8,301,534	$2,124,024,824	
2048	$0	$0	$8,324,278	$8,324,278	$2,132,349,101	
2049	$0	$0	$8,301,534	$8,301,534	$2,140,650,635	
2050	$0	$0	$8,301,534	$8,301,534	$2,148,952,168	
2051	$0	$0	$8,301,534	$8,301,534	$2,157,253,702	
2052	$0	$0	$8,324,278	$8,324,278	$2,165,577,980	
2053	$0	$0	$8,301,534	$8,301,534	$2,173,879,513	
2054	$0	$0	$8,301,534	$8,301,534	$2,182,181,047	
2055	$0	$0	$8,301,534	$8,301,534	$2,190,482,581	
2056	$0	$0	$8,324,278	$8,324,278	$2,198,806,858	
2057	$0	$0	$8,301,534	$8,301,534	$2,207,108,392	
2058	$0	$0	$8,301,534	$8,301,534	$2,215,409,926	
2059	$0	$0	$8,301,534	$8,301,534	$2,223,711,459	
2060	$0	$0	$8,324,278	$8,324,278	$2,232,035,737	
2061	$15,130,548	$0	$8,191,330	$23,321,878	$2,255,357,615	
2062	$3,218,242	$5,971,551	$0	$9,189,794	$2,264,547,409	
TOTAL	$1,276,372,152	$566,071,499	$422,103,757	$2,264,547,409		

NOTES:

1) Cash Flow is based on construction of ISFSI and assumes DOE Used Fuel Repository opens in 2028.
2) Trust Account Value of $1,571.0 million Market Value as of 12/31/16.

Enclosure 5
PG&E Letter DCL-17-022

Pacific Gas and Electric Company
Chapter 2
Attachment A
2016 TLG Diablo Canyon Units 1 & 2 Decommissioning Cost Study

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 2

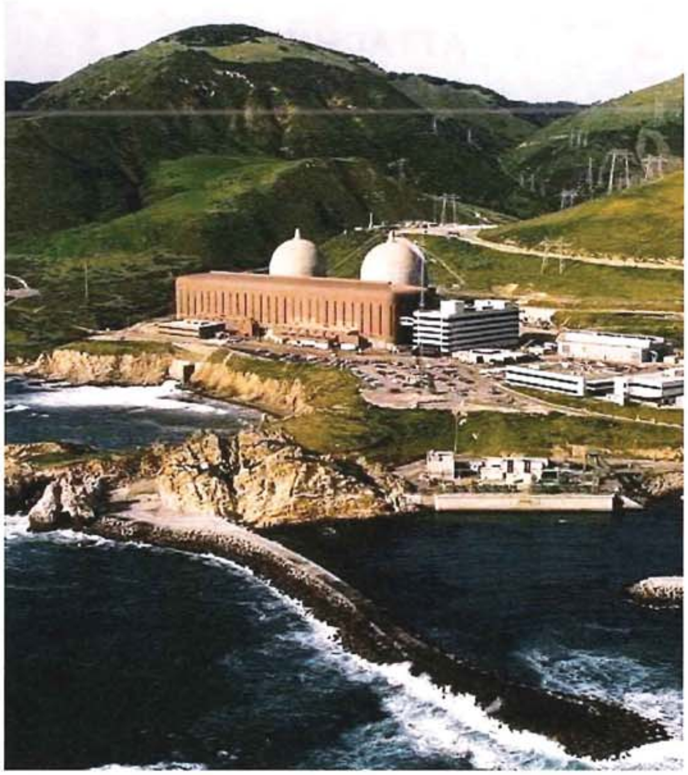
ATTACHMENT A

2016 TLG DIABLO CANYON UNITS 1 & 2 DECOMMISSIONING COST STUDY

DECOMMISSIONING COST ANALYSIS

for the

DIABLO CANYON POWER PLANT



prepared for

Pacific Gas and Electric Company

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

February 2016

APPROVALS

Project Manager	**Geoffrey M. Griffiths**	02/24/2016 **Date**
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Technical Manager	**Francis W. Seymore**	2/24/16 **Date**

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REVISION LOG

No.	Date	Item Revised	Reason for Revision
0	02/24/2016	n/a	Original Issue

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Diablo Canyon Power Plant (Diablo Canyon) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The estimates are designed to provide the Pacific Gas and Electric Company (PG&E) with the information to assess its current decommissioning liability, as it relates to Diablo Canyon.

The analysis relies upon site-specific, technical information from an evaluation prepared in 2012,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements. The plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, were reviewed for this analysis. Significant "physical" changes were limited to some additional security modifications made to the station in the past three year interval. The estimate was also revised to reflect the following significant changes from the previous evaluation:

- Consistent with PG&E's interpretation of the California governor's executive order on the moratorium on disposing of decommissioned materials in the State of California[2], costs to account for transporting and disposing of decommissioned materials to an out-of-state disposal facility have been added.
- PG&E's experience segmenting the Humboldt Bay Unit 3 reactor and industry experience segmenting the Zion Nuclear Station reactor vessels have been incorporated into the estimate.
- Permitting costs associated with constructing a Greater-Than-Class-C storage pad, as well as other expected permitting expenses and environmental fees have been incorporated into the estimate.
- Maintaining security staff levels near operating staff levels while spent fuel is stored in the spent fuel pools was re-affirmed. The cost associated with maintaining these staff levels has been incorporated into the estimate.

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[1] "Decommissioning Cost Analysis for the Diablo Canyon Power Plant," Document P01-1648-001, Rev. 0, TLG Services, Inc., December 2012.

[2] California governor Executive Order D-62-02. Decommissioned materials are materials that meet US NRC release criteria, but have low residual levels of radioactivity.

- Cost impact of a delay in DOE's start of spent fuel pickup from commercial generators from 2024 to 2028.
- Complying with expected re-licensing requirements after the ISFSI license is renewed.

The analysis is not a detailed engineering evaluation, but an estimate prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Diablo Canyon; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The costs to decommission Diablo Canyon for the scenarios evaluated are tabulated at the end of this section. Costs are reported in 2014 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

A complete discussion of the assumptions relied upon in this analysis is provided in Section 3, along with schedules of annual expenditures for each scenario. A sequence of significant project activities is provided in Section 4 with a timeline for each scenario. Detailed cost reports used to generate the summary tables contained within this document are provided in Appendices C through E.

Consistent with the 2012 analysis, the current cost estimates assume that the shutdown of the nuclear units are scheduled and pre-planned events (e.g., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). The estimates include the continued operation of the Fuel Handling Buildings as interim wet fuel storage facilities for approximately ten years after operations cease. [3] During this time period, it is assumed that the spent fuel residing in the pools will be transferred to an independent spent fuel storage installation (ISFSI) located on the site.

The ISFSI will remain operational until the DOE is able to complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility).[4] DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owner with information about how it will ultimately perform. In

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[3] The current Part 72 ISFSI license does not allow dry cask storage of spent fuel with burnups above 62 GWD/metric ton. It is assumed that PG&E can amend the Part 72 license to store the higher burnup fuel, but that as a condition of the amendment it will require longer decay times (10 years) before storing the spent fuel in the casks.

[4] Projected expenditures for spent fuel management identified in the cost analyses do not consider the outcome of the litigation with the DOE with regard to the delays incurred by PG&E in the timely removal of spent fuel from the site.

the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. (It is recognized that the canisters may not be licensed or licensable for transportation when DOE performs.) If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

Alternatives and Regulations

The Nuclear Regulatory Commission (NRC) provided general decommissioning requirements in a rule adopted on June 27, 1988. [5] In this rule, the NRC set forth technical and financial criteria for decommissioning licensed nuclear facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[6]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[7] Decommissioning is required to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.
>
> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[8] As with the SAFSTOR alternative, decommissioning is currently required to be

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[5] U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988

[6] Ibid. Page FR24022, Column 3

[7] Ibid.

[8] Ibid. Page FR24023, Column 2

> completed within 60 years, although longer time periods will also be considered when necessary to protect public health and safety.
>
> The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred pending the completion of additional research studies (e.g., on engineered barriers).

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.[9] The amendments allowed for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 revised rule that relate to initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and process described in the amended regulations. The format and content of the estimate is also consistent with the recommendations of Regulatory Guide 1.202, issued in February 2005.[10]

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.[11] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial

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[9] U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61, (p 39278 et seq.), July 29, 1996

[10] "Standard Format and Content of Decommissioning Cost Estimates of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, U.S. Nuclear Regulatory Commission, February 2005

[11] U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011

reporting and assurances. These additional details are included in this analysis, including the ISFSI decommissioning estimate (Appendix E).

Decommissioning Scenarios

Two basic decommissioning scenarios are evaluated for the two nuclear units. The scenarios selected are representative of alternatives available to the owner and are defined as follows:

> DECON: Units 1 and 2 are currently expected to cease operations in November 2024 and August 2025, respectively. Spent fuel remaining in the spent fuel storage pools after a minimum cooling period of 10 years is transferred to the ISFSI for interim storage. This scenario assumes that decommissioning activities at the two units begin soon after unit shutdown and are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Any residual spent fuel is transferred to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handing buildings. Decommissioning of the station and subsequent demolition of the structures is completed by 2039. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2061. The ISFSI is then decommissioned and dismantled.
>
> SAFSTOR: Units 1 and 2 are currently expected to cease operations in November 2024 and August 2025, respectively. The units are placed into safe-storage in this scenario. The start of field decommissioning is deferred to the end of the fuel storage period. Spent fuel remaining in the spent fuel storage pools after a minimum cooling period of 10 years is transferred to the ISFSI for interim storage. As with the DECON scenario, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2061.

Methodology

The methodology used to develop the estimates follows the basic approach originally presented in the cost estimating guidelines [12] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit cost factor method for estimating decommissioning activity costs. The unit cost factors used in this

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[12] T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

analysis incorporate site-specific costs and the latest available information about worker productivity in decommissioning.

An activity duration critical path is used to determine the total decommissioning program schedule. This is required for calculating the carrying costs, which include program management, administration, field engineering, equipment rental, quality assurance, and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting costs.

The estimates also reflect lessons learned from previously completed decommissioning projects, including TLG's involvement in the Shippingport Station decommissioning, completed in 1989, and the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and experience associated with the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Connecticut Yankee, San Onofre, Vermont Yankee, and Zion nuclear units have provided additional insight into the process, the regulatory aspects, and technical challenges of decommissioning commercial nuclear units.

Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[13] The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, is based on a preliminary technical position [14] to reflect the California Public Utilities Commission's desire for owners to conservatively establish an appropriate contingency factor for inclusion in the decommissioning revenue requirements.

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[13] Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239.

[14] "Technical Position Paper for Establishing an Appropriate Contingency Factor for Inclusion in the Decommissioning Revenue Requirements", Study Number: DECON-POS-H002, Revision A, Status: Preliminary (provided by PG&E).

Contingency funds are expected to be fully expended throughout the program. As such, inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is generally classified as low-level radioactive waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Disposal Act" in 1980,[15] and its Amendments of 1985,[16] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to PG&E. The majority of the low-level radioactive waste designated for direct disposal (Class A[17]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon PG&E's current-contract rates with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The WCS facility is able to receive the Class B and C waste. As such, for this analysis, Class B and C waste was assumed to be shipped to the WCS facility and disposal costs for the waste using this facility were based upon PG&E current-contract rates.

The dismantling of the components residing closest to the reactor core generates radioactive waste that may be considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (Greater Than Class C, or GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. However, to date,

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[15] "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980

[16] "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

[17] Waste is classified in accordance with U.S. Code of Federal Regulations, Title 10, Part 61.55

the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis only, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act"[18] (NWPA) in 1982, assigning the federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. It was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan."[19]

Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[20]

On January 26, 2012, the Blue Ribbon Commission issued its "Report to the Secretary of Energy" containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

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[18] "Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

[19] Charter of the Blue Ribbon Commission on America's Nuclear Future, "Objectives and Scope of Activities," http://www.brc.gov/index.php?q=page/charter

[20] Ibid.

- "[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities"[21]
- "[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste."[22]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."[23]

"With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048."[24]

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)[25]

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[21] "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 32, January 2012

[22] Ibid., p.27

[23] "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

[24] Ibid., p.2

[25] U.S. Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, Aug. 2013,http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

ordering NRC to comply with federal law and resume its review of DOE's Yucca Mountain repository license application to the extent allowed by previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE's environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made.

A federal appeals court has ruled that DOE's obligation to take possession of spent nuclear fuel is unconditional and cannot be excused either by the absence of a repository or by a claim of unavoidable delay.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[26] PG&E's current spent fuel management plan for the Diablo Canyon spent fuel is based in general upon: 1) a 2028 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Diablo Canyon fuel. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Assuming a maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, the spent fuel is completely removed from the site by the end of 2061 for a 2025 station shutdown. Different DOE acceptance schedules may result in different completion dates.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE.[27] Interim storage of the fuel, until the DOE has completed the transfer, will be in the fuel handling building's storage pool as well as at an on-site

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[26] In 2008, the DOE issued a report to Congress in which it concluded that it did not have authority, under present law, to accept spent nuclear fuel for interim storage from decommissioned commercial nuclear power reactor sites. However, the Blue Ribbon Commission, in its final report, noted that: "[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first." For planning purposes only, this estimate does not assume that Diablo Canyon, as a permanently shutdown plant, will receive priority; the fuel removal schedule assumed in this estimate is based upon DOE acceptance of fuel according to the "Oldest Fuel First" priority ranking.

[27] U.S. Code of Federal Regulations, Title 10, Part 50 – Domestic Licensing of Production and Utilization Facilities, Subpart 54 (bb), "Conditions of Licenses"

ISFSI. For purposes of this analysis, it is assumed that DOE will accept already-canistered fuel.

An ISFSI, which is independently licensed and operated, will remain operational after the cessation of plant operations. For the DECON and SAFSTOR scenarios, the facility is projected to have the capacity to accommodate the inventory of spent fuel residing in the plant's storage pools at the conclusion of the required cooling period. Once emptied, the spent fuel pool facilities can be either decontaminated and dismantled or prepared for long-term storage.

For cost estimating purposes, the spent fuel scenario developed for Diablo Canyon assumed that the DOE would initiate spent fuel receipt in the year 2028. DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. The information available on the projected rate of transfer and the backlogged national queue indicates that Diablo Canyon fuel would not be eligible for pickup until 2035. Supplemental dry cask spent nuclear fuel storage in the form of an ISFSI is assumed to be expanded following cessation of plant operations to accommodate the assemblies in the plant's wet storage pools. By relocating the fuel to the ISFSI, the wet storage pools may be secured and decommissioning of the nuclear units may proceed. Costs are included within the estimates to expand the ISFSI to accommodate the residual spent fuel inventories after pool operations cease and for the long-term caretaking of spent fuel at the site through the year 2061.

The PG&E position is that the DOE has a contractual obligation to accept Diablo Canyon's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation.

Site Restoration

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities can substantially damage power block structures, potentially weakening the footings and structural supports. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process is deferred. Consequently, this study assumes that site structures included within this analysis are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized. The debris and scrap metal produced during site restoration activities is designated as "decommissioned material" and transported to an out-of-state facility.

Summary

The estimates to decommission Diablo Canyon assume the removal of all contaminated and activated plant components and structural materials such that the owner may then have unrestricted use of the site with no further requirements for an operating license. Low-level radioactive waste, other than GTCC waste, is sent to a licensed radioactive waste disposal facility. Decommissioned materials are sent to an out-of-state disposal facility.

Decommissioning is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility is complete. Once emptied, the storage facility can also be decommissioned.

Both the DECON and SAFSTOR scenarios are described in Section 2. The bases of the estimates and assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements delineated in Appendices C and D. The major cost components for all scenarios are also identified in the cost summary provided at the end of this section.

The cost elements in the estimates for all the decommissioning alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory "NRC License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the unit's operating license, recognizing that there may be some additional cost impact from spent fuel management.

The "Spent Fuel Management" subcategory contains costs associated with the containerization and transfer of spent fuel from the wet storage pool to a DOE transport cask or to the ISFSI for interim storage, as well as the transfer of the spent fuel in storage at the ISFSI to the DOE. Costs are included for the operation of the storage pool and the management of the ISFSI until such time that the transfer is complete. It does not include any spent fuel management expenses incurred prior to the cessation of plant operations, nor does it include any costs related to the final disposal of the spent fuel.

"Site Restoration" is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are removed to a depth of three feet and backfilled to conform to local grade.

It should be noted that the costs assigned to these subcategories are allocations. Delegation of cost elements is for the purposes of comparison (e.g., with NRC financial guidelines) or to permit specific financial treatment (e.g., Asset Retirement Obligation determinations). In reality, there can be considerable interaction between the activities in the three subcategories. For example, an owner may decide to remove non-contaminated structures early in the project to improve access to highly contaminated facilities or plant components. In these instances, the non-contaminated removal costs could be reassigned from Site Restoration to an NRC License Termination support activity. However, in general, the allocations represent a reasonable accounting of those costs that can be expected to be incurred for the specific subcomponents of the total estimated program cost, if executed as described.

As noted within this document, the estimates were developed and costs are presented in 2014 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the plant or during the decommissioning period.

DECON COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	18,214	21,549	39,763
Removal	141,218	319,210	460,428
Packaging	33,435	32,500	65,934
Transportation	31,679	294,378	326,057
Waste Disposal	199,331	178,340	377,671
Program Management [1]	473,419	491,299	964,718
Security	338,910	348,555	687,465
Spent Fuel Pool Isolation	26,314	17,577	43,890
Spent Fuel Management [2]	213,527	193,784	407,311
Insurance and Regulatory Fees	36,956	32,862	69,817
Energy	32,071	31,910	63,981
Characterization and Licensing Surveys	33,875	37,509	71,384
Property Taxes	7,658	7,503	15,161
Severance	84,005	84,169	168,174
Miscellaneous Equipment	8,421	9,026	17,447
Total [3]	1,679,030	2,100,172	3,779,202

Cost Element			
License Termination	1,190,754	1,172,913	2,363,667
Spent Fuel Management	389,775	395,217	784,992
Site Restoration	98,501	532,042	630,543
Total [3]	1,679,030	2,100,172	3,779,202

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

SAFSTOR COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	14,403	21,401	35,804
Removal	143,288	319,891	463,179
Packaging	23,554	22,581	46,135
Transportation	29,063	292,279	321,341
Waste Disposal	182,273	160,224	342,497
Program Management [1]	604,377	439,612	1,043,988
Security	377,878	386,029	763,907
Spent Fuel Pool Isolation	26,459	17,615	44,074
Spent Fuel Management [2]	214,610	194,121	408,730
Insurance and Regulatory Fees	53,180	50,493	103,673
Energy	37,842	37,721	75,562
Characterization and Licensing Surveys	34,831	42,625	77,455
Property Taxes	9,548	9,373	18,921
Severance	84,470	84,353	168,823
Miscellaneous Equipment	15,685	16,419	32,104
Total 3]	1,851,460	2,094,736	3,946,195

Cost Element			
License Termination	1,128,923	1,048,860	2,177,783
Spent Fuel Management	623,759	512,851	1,136,610
Site Restoration	98,778	533,025	631,802
Total [3]	1,851,460	2,094,736	3,946,195

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

1. INTRODUCTION

This report presents estimates of the cost to decommission the Diablo Canyon Power Plant (Diablo Canyon) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The estimates are designed to provide Pacific Gas and Electric Company (PG&E) with the information to assess its current decommissioning liability, as it relates to Diablo Canyon.

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2012[1]* updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a detailed engineering evaluation, but estimates prepared in advance of the detailed engineering required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Diablo Canyon; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the costs to decommission Diablo Canyon based on the DECON and SAFSTOR scenarios, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. For the purposes of this study, the shutdown dates are based on the expiration of the current operating licenses, or 2 November 2024 for Unit 1, and 26 August 2025 for Unit 2.

1.2 SITE DESCRIPTION

Diablo Canyon is located on the central California coast in San Luis Obispo County, approximately 12 miles west southwest of the City of San Luis Obispo. The plant, comprised of two nuclear units, is located on a 750-acre site adjacent to the Pacific Ocean, roughly equidistant from San Francisco and Los Angeles.

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* References provided in Section 7 of the document

The Nuclear Steam Supply System (NSSS) consists of a pressurized water reactor and a four-loop Reactor Coolant System. The systems were supplied by the Westinghouse Electric Corporation. Units 1 and 2 each have a license rating of 3411 MWt, with corresponding net electrical outputs 1131 and 1156 megawatts (electric), respectively, with the reactors at rated power.

The Reactor Coolant System is comprised of the reactor vessel and four heat transfer loops, each containing a vertical U-tube type steam generator, and a single-stage centrifugal reactor coolant pump. In addition, the system includes an electrically heated pressurizer, a pressurizer relief tank, and interconnected piping. The system is housed within a "containment structure," a seismic Category I reinforced-concrete dry structure. It consists of an upright cylinder topped with a hemispherical dome, supported on a reinforced concrete foundation mat, which is keyed into the bedrock. A welded steel liner plate anchored to the inside face of the containment serves as a leak-tight membrane. The liner on top of the foundation mat is protected by a two-foot thick concrete fill mat, which supports the containment internals and forms the floor of the containment. The lower portion of the containment cylindrical wall has additional embedded wide flange steel beams between elevations 88 ft. 2 in. and 108 ft. 2 in. (mean sea level).

Heat produced in the reactor is converted to electrical energy by the Steam and Power Conversion Systems. A turbine-generator system converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The plant's turbine-generators are each tandem compound, four element units. They consist of one high-pressure double-flow and three low-pressure double-flow elements driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle that condenses the steam; the heated feedwater is returned to the steam generators. Heat rejected in the main condensers is removed by the Circulating Water System (CWS).

The circulating water system provides the heat sink required for removal of waste heat in the power plant's thermal cycle. The system has the principal function of removing heat by absorbing this energy in the main condenser. Condenser circulating water is water from the Pacific Ocean. Each unit is served by two circulating water pumps at the intake structure. From this structure seawater is pumped through two circulating water conduits to the condenser inlet water boxes. The water is returned to the ocean at Diablo Cove through an outfall at the water's edge.

1.3 REGULATORY GUIDANCE

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.[2] This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,"[3] which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations, while the SAFSTOR and ENTOMB alternatives defer the process.

The rule also placed limits on the time allowed to complete the decommissioning process. For all alternatives, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. At the conclusion of a 60-year dormancy period (or longer if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with rulemaking permitting the controlled release of a site,[4] the NRC did re-evaluated the alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. The staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative.

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[5] However, the NRC's staff has subsequently recommended that rulemaking be deferred, based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities), at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants.[6] When the decommissioning regulations were adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process. The amendments allow for greater public participation and better define the transition process from operations to decommissioning.

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after the decision to cease operations. Certification will also be required once the fuel is permanently removed from the reactor vessel. Submittal of these notices, along with related changes to Technical Specifications, entitle the licensee to a fee reduction and eliminate the obligation to follow certain requirements needed only during operation of the reactor. Within two years of submitting notice of permanent cessation of operations, the licensee is required to submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC. The PSDAR describes the planned decommissioning activities, the associated sequence and schedule, and an estimate of expected costs. Prior to completing decommissioning, the licensee is required to submit an application to the NRC to terminate the license, which will include a license termination plan (LTP).

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.[7] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. The additional details, including a decommissioning estimate for the Independent Spent Fuel Storage Installation (ISFSI), are included in this study.

1.3.1 Nuclear Waste Policy Act

Congress passed the "Nuclear Waste Policy Act"[8] (NWPA) in 1982, assigning the federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. It was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle ... and make recommendations for a new plan."

Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[9]

On January 26, 2012, the Blue Ribbon Commission issued its "Report to the Secretary of Energy" containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- "[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities"
- "[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste."[10]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..." [11]

"With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048."

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)[12] ordering NRC to comply with federal law and resume its review of DOE's Yucca Mountain repository license application to the extent allowed by previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE's environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program assumes that spent fuel allocations will be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[13] PG&E's current spent fuel management plan for the Diablo Canyon spent fuel is based in general upon: 1) a 2028 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Diablo Canyon fuel. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. The information available on the projected rate of transfer and the backlogged national queue indicates that the oldest Diablo Canyon fuel would not be eligible for pickup until 2035. Assuming a maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, the spent fuel is completely removed from the site by year end 2061 for a 2025 station shutdown.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE.[14] Interim storage of the fuel, until the DOE has completed the transfer, will be in the fuel handling buildings' storage pool as well as at an on-site ISFSI. The ISFSI will remain operational until the DOE is able to complete the transfer of the fuel to a federal facility (e.g., a monitored retrievable storage facility). DOE has breached its obligations to remove fuel from reactor sites, and has also failed to provide the plant owner with information about how it will ultimately perform. In the absence of information about how DOE will perform, and for purposes of this analysis only, it is assumed that DOE will accept already-canistered fuel. (It is recognized that the canisters may not be licensed or licensable for transportation when DOE performs.) If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers.

The ISFSI is assumed to be expanded following cessation of plant operations to accommodate the assemblies in the plant's wet storage pools. By relocating the fuel to the ISFSI, the wet storage pools may be secured and decommissioning of the nuclear units may proceed. Costs are included within the estimates to expand the ISFSI to accommodate the residual spent fuel inventories after pool operations cease and for the long-term caretaking of spent fuel at the site through the year 2061.

The PG&E position is that the DOE has a contractual obligation to accept Diablo Canyon's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

1.3.2 Low-Level Radioactive Waste Acts

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980,[15] and its Amendments of 1985,[16] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to PG&E. The majority of the low-level radioactive waste designated for direct disposal (Class A[17]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon PG&E's current Diablo Canyon contract-based costs associated with the Energy*Solutions* facility. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The WCS facility is able to receive the Class B and C waste. As such, for this analysis, Class B and C waste was assumed to be shipped to the WCS facility. Disposal costs for this waste were also based upon PG&E's current contract-based costs associated with the WCS facility.

The dismantling of the components residing closest to the reactor core generates radioactive waste that may be considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.

However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis only, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination," [18] amending 10 CFR Part 20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the Diablo Canyon site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[19] An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water. [20]

On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU)[21] provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site;

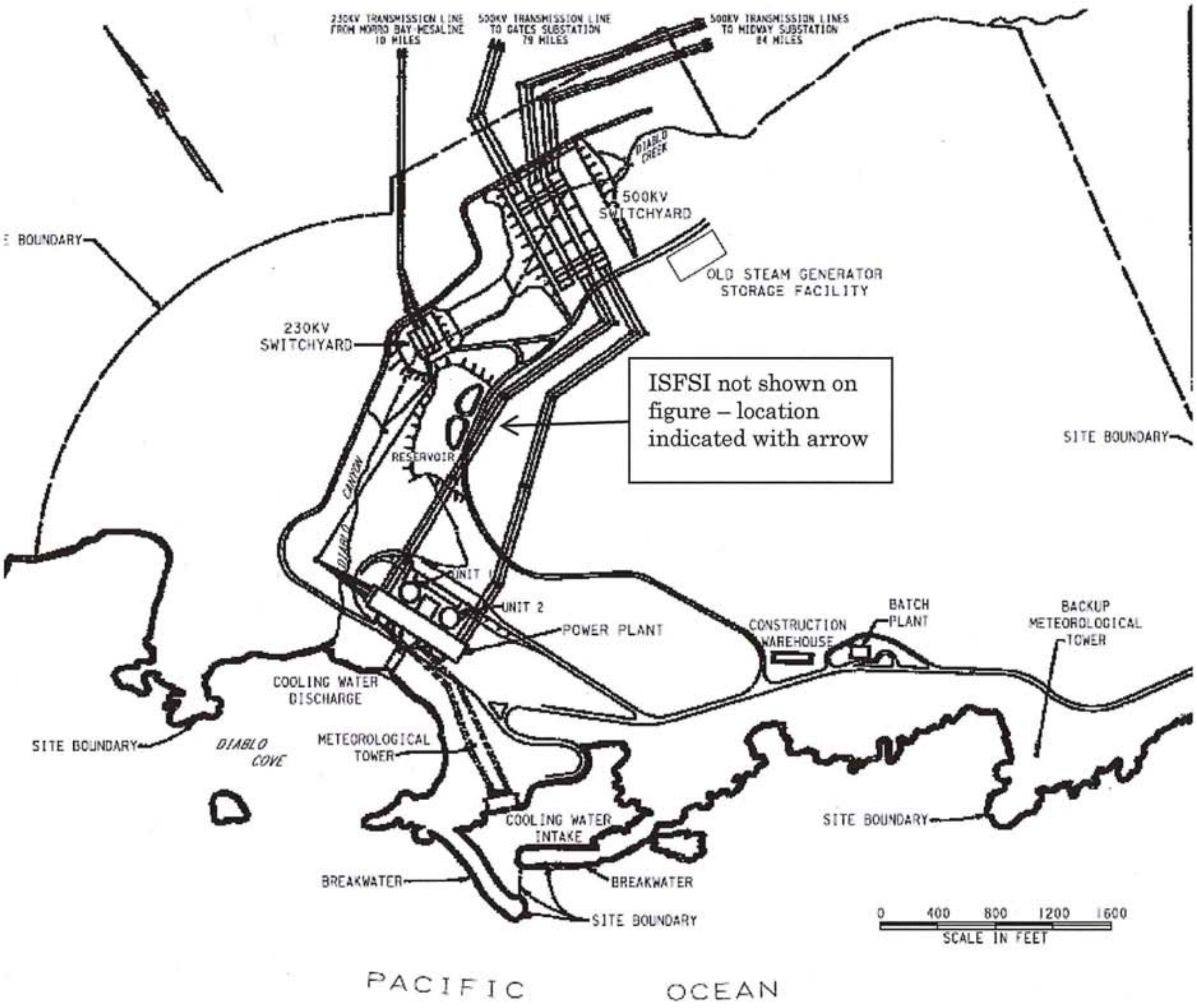
and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

1.3.4 California Governor Moratorium on Disposing of Decommissioned Materials

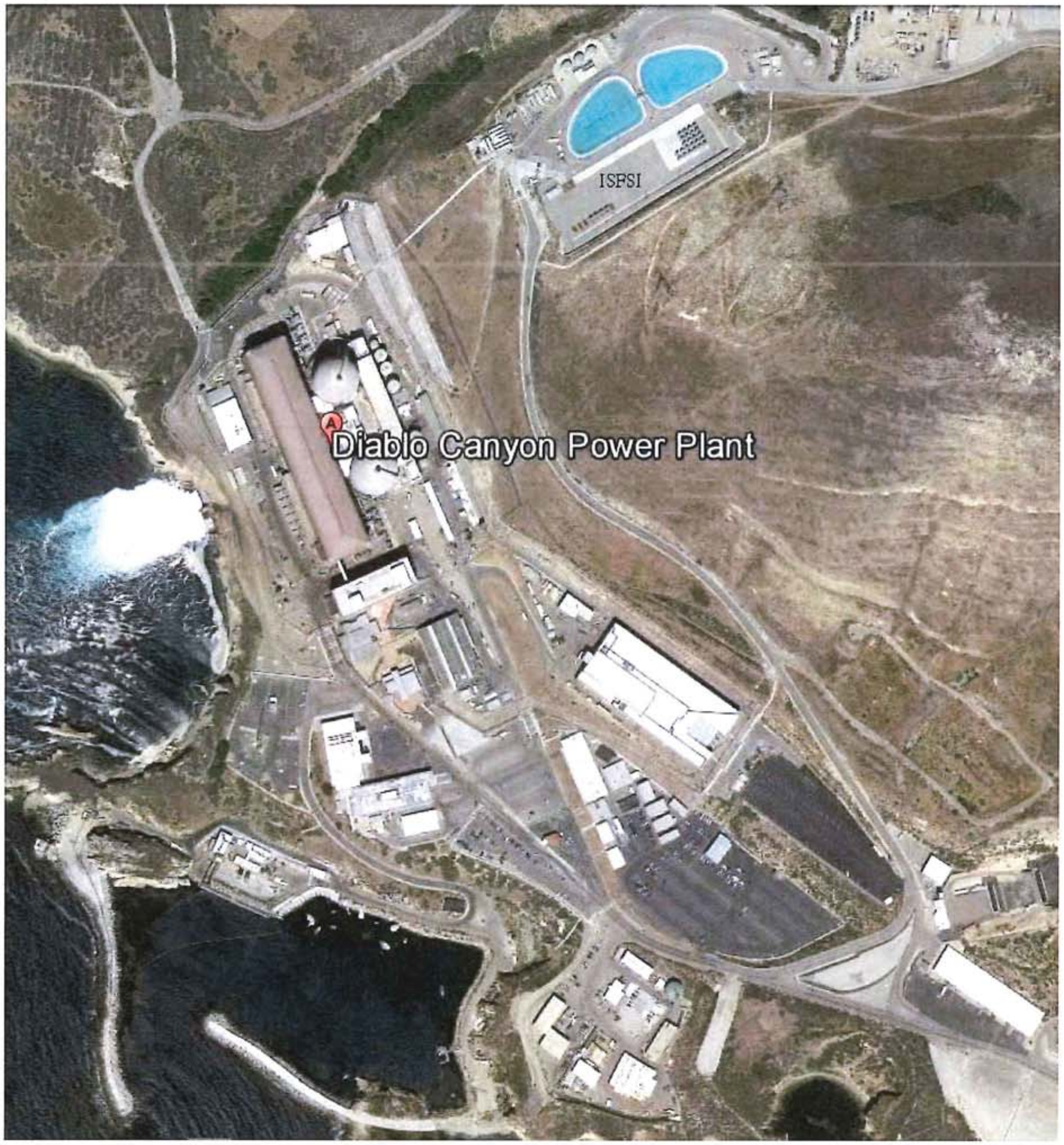
The Governor of the State of California, Executive Order D-62-02, orders a moratorium "... on the disposal of decommissioned materials into Class III landfills and unclassified waste management units, as described in title 27, sections 20260 and 20230, of the California Code of Regulations". The order defines "decommissioned materials," as materials with low residual levels of radioactivity (below Federal Nuclear Regulatory Commission release levels) that, upon decommissioning of a licensed site, may presently be released with no restrictions upon their use. The order concludes that without regulations these decommissioned materials may not be released with no restrictions upon their use. As such, in the absence of California regulations on decommissioned materials, it is PG&E's position that the decommissioning plan for decommissioned materials should be based on transport and disposal to an out-of-state licensed facility.

FIGURE 1.1
DIABLO CANYON POWER PLANT GENERAL PLAN



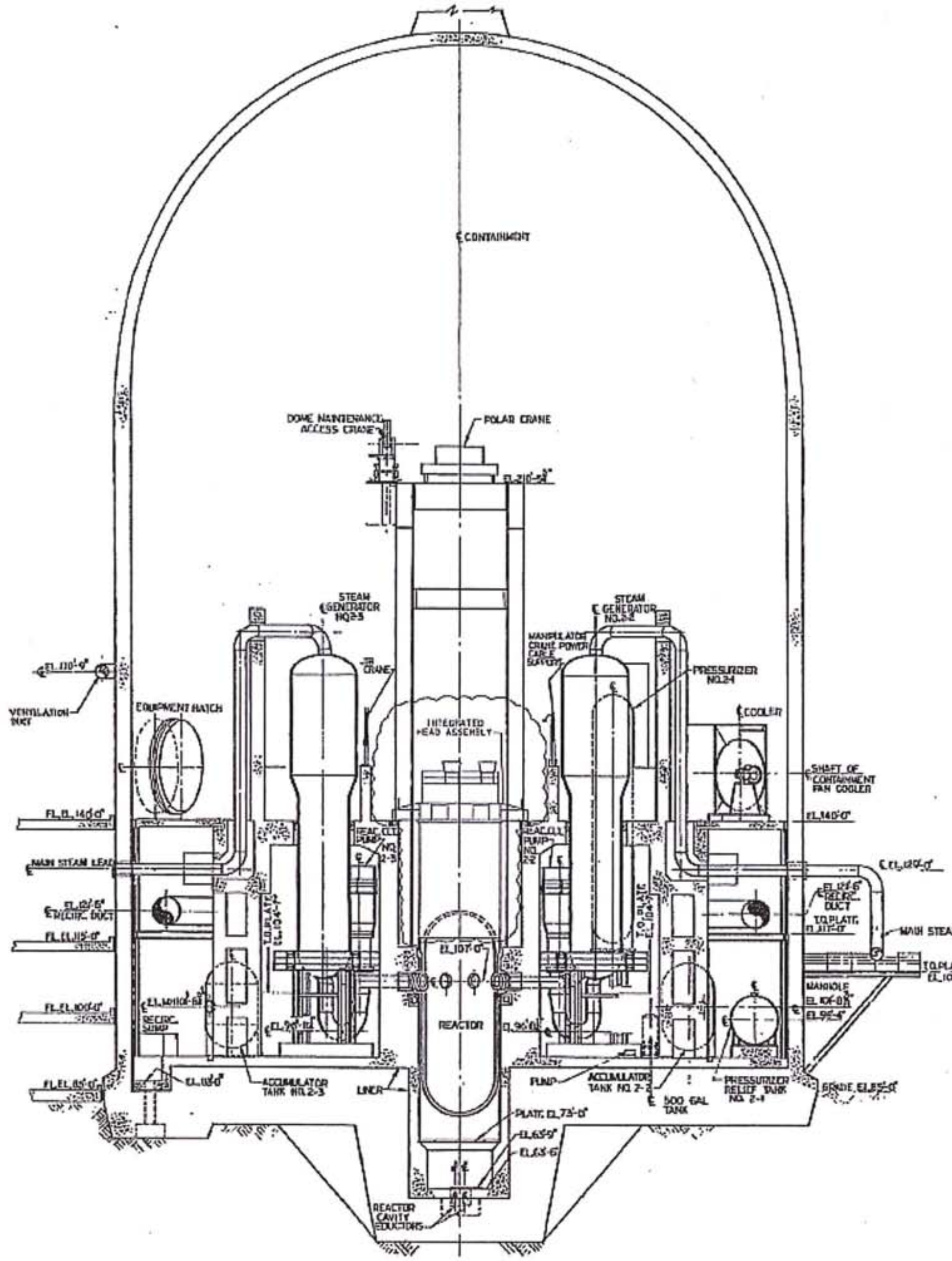
ISFSI not shown on figure – location indicated with arrow

FIGURE 1.2
DIABLO CANYON POWER PLANT
AERIAL VIEW



(Imagery date August 2013, from Google Earth)

FIGURE 1.3
DIABLO CANYON POWER PLANT
REACTOR BUILDING SECTION



2. DECOMMISSIONING ALTERNATIVES

Detailed cost estimates were developed to decommission Diablo Canyon based upon the approved DECON and SAFSTOR decommissioning alternatives. Although the alternatives differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use. This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility.

The scenarios selected are representative of alternatives available to the owner and are defined as follows:

DECON: Units 1 and 2 are currently expected to cease operations in November 2024 and August 2025, respectively. Spent fuel remaining in the spent fuel storage pools after a minimum cooling period of 10 years is transferred to the ISFSI for interim storage. This scenario assumes that decommissioning activities at the two units begin soon after unit shutdown and are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Any residual spent fuel is transferred to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handing buildings. Decommissioning of the station and subsequent demolition of the structures is completed by 2039. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2061. The ISFSI is then decommissioned and dismantled.

SAFSTOR: Units 1 and 2 are currently expected to cease operations in November 2024 and August 2025, respectively. The units are placed into safe-storage in this scenario. The start of field decommissioning is deferred to the end of the fuel storage period. Spent fuel remaining in the spent fuel storage pools after a minimum cooling period of 10 years is transferred to the ISFSI for interim storage. As with the DECON scenario, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2061.

The following sections describe the basic activities associated with each base case alternative (DECON and SAFSTOR). Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating but also for the expected scope of work, i.e., engineering and planning at the time of decommissioning.

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant and licensee from reactor operations (i.e., power production) to facility de-activation and closure.

During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee is then prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Diablo Canyon are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.

2.1 DECON

The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility.

2.1.1 Period 1 - Preparations

In anticipation of the cessation of plant operations, detailed preparations are undertaken to provide a smooth transition from plant operations to site decommissioning. Through implementation of a staffing transition plan, the organization required to manage the intended decommissioning activities is assembled from available plant staff and outside resources. Preparations include the planning for permanent defueling of the reactor, revision of technical specifications applicable to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

Engineering and Planning

The PSDAR, required prior to or within two years of permanent cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local hearing to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure, i.e., without specific NRC approval. Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor coolant system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

- foreclose release of the site for possible unrestricted use,
- significantly increase decommissioning costs,
- cause any significant environmental impact, or
- violate the terms of the licensee's existing license

Existing operational technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with permanent cessation of operations. The environmental impact associated with the planned decommissioning activities is also considered. Typically, a licensee will not be allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee would have to submit a license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR will be designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR §20) for protection of personnel from exposure to radiation hazards. It will also address the continued protection of the health and safety of the public and the environment during the dismantling activity. Consequently, with the development of the PSDAR, activity specifications, cost-benefit and safety analyses, work packages, and procedures, would be assembled to support the proposed decontamination and dismantling activities.

Site Preparations

Following final plant shutdown, and in preparation for actual decommissioning activities, the following activities are initiated:

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and biological shield cores.
- Isolation of the spent fuel storage pool and fuel handling systems. This allows decommissioning operations to be performed in plant areas to the greatest extent, with minimum impact to the project schedule. The fuel will be transferred from the spent fuel pools once it decays to the point that it meets the heat load criteria of the spent fuel casks. It is therefore assumed that the fuel pools will remain operational for a minimum of ten years following the cessation of plant operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful release of the site from the 10 CFR §50 operating license, exclusive of the ISFSI. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. For example, this will include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.

- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This will include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications will be required to the containment structure to facilitate access of large/heavy equipment. Modifications will also be required to the refueling area of the reactor building to support the segmentation of the reactor vessel internals and component extraction.
- Transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from reactor vessel head. Segmentation of the vessel closure head.
- Removal and segmentation of the upper internals assemblies. Segmentation will maximize the loading of the shielded transport casks, i.e., by weight and activity. The operations are conducted under water using remotely operated tooling and contamination controls.
- Disassembly and segmentation of the remaining reactor internals, including the core former and lower core support assembly. Some material is expected to exceed Class C disposal requirements. As such, the segments will be packaged in modified fuel storage canisters for geologic disposal.
- Segmentation of the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in-air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water, for example, in an isolated area of the refueling canal.
- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam

generator and pressurizer removal scenarios, those portions of the associated cubicles necessary for access and component extraction are removed.

- Removal of the steam generators and pressurizer for controlled disposal. The generators will be moved to an on-site processing center, the steam domes removed and segmented for transportation and disposal. The lower shell and tube bundle will be packaged as a one-piece container for direct disposal. These components can serve as their own disposal containers provided that all penetrations are properly sealed and steel shielding added, as necessary, to those external areas of the package to meet transportation limits and regulations.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pools to the DOE and ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer to the DOE is expected to begin in 2035 and to be completed by the end of the year 2061.

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local hearing. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of activated/ contaminated concrete (all concrete inside the containment liner).
- Surveys of the decontaminated areas of the containment structure.

- Remediation and removal of the contaminated equipment and material from the auxiliary building, fuel handling buildings, and any other contaminated facility. Radiation and contamination controls will be utilized until residual levels indicate that the structures and equipment can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity facilitates surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Routing of material removed in the decontamination and dismantling to a central processing area. Contaminated material is characterized and segregated for packaging and disposal at a low-level radioactive waste disposal facility. Material that meets the US NRC release criteria, but may contain residual radioactivity is classified as decommissioned material and will be transported and disposed of at an out-of-state waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."[22] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on the requested change to the operating licenses (that would release the property, exclusive of the ISFSI, for unrestricted use).

The NRC terminates the operating licenses if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release.

2.1.3 Period 3 - Site Restoration

Following completion of decommissioning operations, site restoration activities can begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits will result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor and auxiliary buildings. Under certain circumstances, verifying that subsurface radionuclide concentrations meet NRC site release requirements will require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity will be necessary for those facilities and plant areas where historical records indicate the potential for radionuclides having been present in the soil, where system failures have been recorded, or where it is required to confirm that subsurface process and drain lines were not breached over the operating life of the station.

It is not currently anticipated that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized on site is more efficient than if the process is deferred.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity. Foundations and exterior walls are removed to a nominal depth of three feet below grade. The three-foot depth allows for the placement of gravel for drainage, as well as topsoil, so that vegetation can be established for erosion control. Non-contaminated concrete rubble produced by demolition activities is processed on-site to remove reinforcing steel and miscellaneous embedments. The processed rubble is then transported and disposed of at an out-of-state waste disposal facility. The removed rebar, plus non-contaminated steel, copper, and other metals are transported to an out-of-state scrap dealer. Below grade voids are backfilled with clean imported fill to provide a reasonably uniform site contour (i.e., no large localized on site depressions). Site areas affected by the dismantling activities are restored and the plant area graded as required to prevent ponding and inhibit the refloating of subsurface materials.

2.1.4 ISFSI Operations and Decommissioning

For purposes only of this estimate, transfer of spent fuel to a DOE repository or interim facility is assumed to be exclusively from the ISFSI once the fuel pools have been emptied and the fuel handling buildings released for decommissioning. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers and to dispose of existing containers.

The ISFSI will continue to operate under a separate and independent license (10 CFR §72) following the termination of the §50 operating licenses. Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a manner timely enough to complete license termination activities within 60 years of unit shut down. This analysis assumes that the last of the spent fuel will be removed from the site within approximately 36 years of the station shutdown or year 2061.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the §72 license when it determines that the remediation of the ISFSI has been performed in accordance with an ISFSI license termination plan and that the final radiation survey and associated documentation demonstrate that the facility is suitable for release. Once the requirements are satisfied, the NRC can terminate the license for the ISFSI.

The ISFSI is based upon the currently licensed facility that uses multi-purpose canisters and concrete overpacks for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters containing the spent fuel assemblies have been removed, any required decontamination performed on the storage overpack (some minor neutron activation is assumed), and the license for the facility terminated, the concrete overpacks can be dismantled using conventional techniques for the demolition of reinforced concrete. Demolished concrete (decommissioned material) is packaged and transported to an out-of-state waste disposal facility. The concrete storage pad is then removed and the area regraded.

2.2 SAFSTOR

The NRC defines SAFSTOR as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems that are not required to support the spent fuel pool or site surveillance and security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of remaining contamination are performed. Access to contaminated areas is secured to provide controlled access for inspection and maintenance.

The engineering and planning requirements for physical dismantling activities are similar to those for the DECON alternative. Site preparations for physical dismantling are also similar to those for the DECON alternative, with the exception of certain activities, such as spent fuel pool operations and maintenance, and chemical decontamination of primary systems.

Decommissioning operations are assumed to begin once the transfer of the spent fuel to the DOE is completed (in year 2062).

2.2.1 Period 1 - Preparations

Preparations for long-term storage include the planning for permanent defueling of the reactor, revision of technical specifications appropriate to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

The process of placing the plant in safe-storage includes, but is not limited to, the following activities:

- Isolation of the spent fuel storage services and fuel handling systems so that safe-storage operations may commence on the balance of the plant. This activity may be carried out by plant personnel in accordance with existing operating technical specifications. Activities are scheduled around the fuel handling systems to the greatest extent possible.
- Transferring the spent fuel from the storage pools to the ISFSI for interim storage, following the minimum required cooling period in the spent fuel pools.
- Draining and de-energizing of the non-contaminated systems not required to support continued site operations or maintenance.
- Disposing of contaminated filter elements and resin beds not required for processing wastes from layup activities for future operations.

- Draining of the reactor vessel, with the internals left in place and the vessel head secured.
- Draining and de-energizing non-essential, contaminated systems with decontamination as required for future maintenance and inspection.
- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.
- Cleaning of the loose surface contamination from building access pathways.
- Performing an interim radiation survey of plant, posting warning signs where appropriate.
- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.
- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

2.2.2 Period 2 - Dormancy

The second phase identified by the NRC in its rule addresses licensed activities during a storage period and is applicable to the dormancy phases of the deferred decommissioning alternatives. Dormancy activities include a 24-hour security force, preventive and corrective maintenance on security systems, area lighting, general building maintenance, heating and ventilation of buildings, routine radiological inspections of contaminated structures, maintenance of structural integrity, and a site environmental and radiation monitoring program. Resident maintenance personnel perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services.

An environmental surveillance program is carried out during the dormancy period to ensure that releases of radioactive material to the environment are prevented or detected and controlled. Appropriate emergency procedures are established and initiated for potential releases that exceed prescribed limits. The environmental surveillance program constitutes an abbreviated version of the program in effect during normal plant operations.

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of its own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained.

Consistent with the DECON scenario, the spent fuel storage pools are emptied within approximately 10 years of the cessation of operations. The transfer of the spent fuel to the DOE takes place during the dormancy period until completed in 2061. Once emptied, the ISFSI is decommissioned along with the power block structures in Period 4.

2.2.3 Periods 3 and 4 - Delayed Decommissioning

Prior to the commencement of decommissioning operations, preparations are undertaken to reactivate site services and prepare for decommissioning. Preparations include engineering and planning, a detailed site characterization, and the assembly of a decommissioning management organization. Final planning for activities and the writing of activity specifications and detailed procedures are also initiated at this time.

Much of the work in developing a termination plan is relevant to the development of the detailed engineering plans and procedures. The activities associated with this phase and the follow-on decontamination and dismantling processes are detailed in Sections 2.1.1 and 2.1.2. The primary difference between the sequences anticipated for the DECON and this deferred scenario is the absence, in the latter, of any constraint on the availability of the fuel storage facilities for decommissioning.

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from forty years of plant operation, no plant process system identified as being contaminated upon final shutdown will become releasable due to the decay period alone, i.e., there is no significant reduction in the waste generated from the decommissioning activities.

The delay in decommissioning also yields lower working area radiation levels. As such, the estimate for this delayed scenario incorporates reduced ALARA controls for the SAFSTOR's lower occupational exposure potential.

Although the initial radiation levels due to ^{60}Co will decrease during the dormancy period, the internal components of the reactor vessel will still exhibit sufficiently high radiation dose rates to require remote sectioning under water due to the presence of long-lived radionuclides such as ^{94}Nb, ^{59}Ni, and ^{63}Ni. Therefore, the dismantling procedures described for the DECON alternative would still be employed during this scenario. Portions of the biological shield will still be radioactive due to the presence of activated trace elements with longer half-lives (^{152}Eu and ^{154}Eu). Decontamination will require controlled removal and disposal. It is assumed that radioactive corrosion products on inner surfaces of piping and components will not have decayed to levels that will permit unrestricted use or allow conventional removal. These systems and components will be surveyed as they are removed and disposed of in accordance with the existing radioactive release criteria.

2.2.4 Period 5 - Site Restoration

Following completion of decommissioning operations, site-restoration activities begin. Dismantling, as a continuation of the decommissioning process is a cost-effective option, as described in Section 2.1.3. The basis for the dismantling cost is consistent with that described for DECON, presuming the removal of structures and site facilities to a nominal depth of three feet below grade and the limited restoration of the site.

PACIFIC GAS AND ELECTRIC COMPANY

CHAPTER 1

ATTACHMENT C

2018 HUMBOLDT BAY POWER PLANT UNIT 3

NRC ASSURANCE OF FUNDING LETTER

3. COST ESTIMATES

The cost estimates prepared for decommissioning Diablo Canyon consider the unique features of the site, including the nuclear steam supply system, electric power generating systems, structures, and supporting facilities. The basis of the estimates, including the sources of information relied upon, the estimating methodology employed, site-specific considerations, and other pertinent assumptions, is described in this section.

3.1 BASIS OF ESTIMATES

The estimates were developed using site-specific, technical information extracted from the 2012 and previous estimates. This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes. The following are the significant changes associated with the plant configuration or radiological status that have been incorporated into the current estimate.

- Removing and disposing of materials associated with recently installed security measures, particularly physical barriers, were incorporated into the estimate.

The following are the significant changes associated with other aspects of the current estimate.

- Consistent with PG&E's interpretation of the California governor's executive order on the moratorium on disposing of decommissioned materials in the State of California[23], costs to account for transporting and disposing of decommissioned materials to an out-of-state disposal facility have been added.
- PG&E's experience segmenting the Humboldt Bay Unit 3 reactor and industry experience segmenting the Zion Nuclear Station reactor vessels have been incorporated into the estimate.
- Permitting costs associated with constructing a Greater-Than-Class-C storage pad, as well as other expected permitting expenses and environmental fees have been incorporated into the estimate.

- Maintaining security staff levels near operating staff levels while spent fuel is stored in the spent fuel pools was re-affirmed. The cost associated with maintaining these staff levels has been incorporated into the estimate.
- Cost impact of a delay in DOE's start of spent fuel pickup from commercial generators from 2024 to 2028.
- Complying with expected re-licensing requirements after the ISFSI license is renewed.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[24] and the DOE "Decommissioning Handbook."[25] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) are developed using local labor rates. The activity-dependent costs are estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures rely upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means. [26]

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, ensures that essential elements have not been omitted. Appendix A presents the detailed development of a typical unit factor. Appendix B provides the values contained within one set of factors developed for this analysis.

This analysis reflects lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and experience associated with the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Connecticut Yankee, San Onofre, Vermont Yankee, and Zion nuclear units have provided additional insight into the process, the regulatory aspects, and technical challenges of decommissioning commercial nuclear units.

Work Difficulty Factors

TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in a power plant environment. WDFs are assigned to each unique set of unit factors, commensurate with the inefficiencies associated with working in confined, hazardous environments. The ranges used for the WDFs are as follows:

Access Factor	10% to 20%
Respiratory Protection Factor	10% to 50%
Radiation/ALARA Factor	10% to 37%
Protective Clothing Factor	10% to 30%
Work Break Factor	8.33%

The factors and their associated range of values were developed in conjunction with the AIF/NESP-036 study. The application of the factors is discussed in more detail in that publication.

Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiological controlled areas. The resulting labor-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities is based upon productivity information available from the "Building Construction Cost Data" publication. In the DECON alternative, dismantling of the fuel handing systems and decontamination of the spent fuel pool is also dependent upon the timetable for the transfer of the spent fuel assemblies from the pool to the ISFSI.

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting costs.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS

In estimating the near simultaneous decommissioning of two co-located reactor units there can be opportunities to achieve economies of scale, by sharing costs between units, and coordinating the sequence of work activities. There will also be schedule constraints, particularly where there are requirements for specialty equipment and staff, or practical limitations on when final status surveys can take place. For purposes of the estimate, Units 1 and 2 are assumed to be essentially identical. Common facilities have been assigned to Unit 2. A summary of the principal impacts are listed below.

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimate generally does not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously. The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).
- Segmenting the reactor vessel and internals will require the use of special equipment. Thermal cutting equipment and equipment spare parts will be shared between the two reactors. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented in sequence with the activities at Unit 1.
- Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions. The designation as lead is based on the unit undertaking the most complex tasks (for instance vessel segmentation) or performing tasks for the first time.
- The final radiological survey schedule is also affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process. As such, the transfer of the spent fuel from the storage pools and subsequent decontamination of the spent fuel pool areas is coordinated so as to synchronize the final status survey for the station.
- The final demolition of buildings at Units 1 and 2 are considered to take place concurrently.

- Unit 1, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
- Shared systems and common structures are generally assigned to Unit 2.
- Station costs such as ISFSI operating costs, emergency response fees, regulatory agency fees, and insurance are generally allocated on an equal basis between the two units.

3.4 FINANCIAL COMPONENTS OF THE COST MODEL

TLG's proprietary decommissioning cost model, DECCER, produces a number of distinct cost elements. These direct expenditures, however, do not comprise the total cost to accomplish the project goal, i.e., license termination, spent fuel management and site restoration.

3.4.1 Contingency

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook"[27] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, contingency is included. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, includes a contingency target based on a preliminary technical position [28] to reflect the California Public Utilities Commission's desire for owners to conservatively establish an appropriate contingency factor for inclusion in the decommissioning revenue requirements.

Contingency Based on AIF Guidelines

As stated in the AIF study contingency funds are an integral part of the total cost to complete the decommissioning process. Exclusion of this component puts at risk a successful completion of the intended tasks and, potentially, subsequent related activities. For this study, TLG examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. Individual activity contingencies ranged from 10% to 50%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

Decontamination	50%
Contaminated Component Removal	25%
Contaminated Component Packaging	10%
Contaminated Component Transport	15%
Low-Level Radioactive Waste Disposal	25%
Reactor Segmentation*	35%
NSSS Component Removal	25%
Reactor Waste Packaging	25%
Reactor Waste Transport	25%
Reactor Vessel Component Disposal	50%
GTCC Disposal	15%
Non-Radioactive Component Removal	15%
Heavy Equipment and Tooling	15%
Supplies	25%
Engineering	15%
Energy	15%
Characterization and Termination Surveys	30%
Construction	15%
Taxes and NRC Fees	10%
Insurance	10%
Staffing	15%
Breakwater Removal	25%
ISFSI Decommissioning (license termination)	25%
Spent Fuel Storage (Dry) Systems	15%
Spent Fuel Transfer Costs	15%
GTCC Pad Permitting	15%
Environmental Permits and Fees	15%
Decommissioned Materials (Transport and Disposal)	15%

* Reactor Segmentation Contingency has been reduced from AIF Guidelines level (75%) to 35% since substantial industry experience (and corresponding increased cost) has been incorporated into the current estimate.

The contingency values are applied to the appropriate components of the estimates on a line item basis. The composite contingency value (excluding additional contingency described in the Preliminary Technical Position) for the DECON alternative is approximately 17.4%. The value for the SAFSTOR alternative is approximately 17.0%. Appendix E, the ISFSI decommissioning calculation, uses a flat 25% contingency added at the end of the calculation.

Contingency Based on Preliminary Technical Position

In addition to the contingency based on the AIF guidelines, additional contingency was added to reflect the California Public Utilities Commission desire for owners to conservatively establish an appropriate contingency factor for inclusion in the decommissioning revenue requirements. Based on the previously referenced technical position, additional contingency was added to reflect an overall project contingency of 25% (both scenarios). This contingency was incorporated on a line item basis, with each line item receiving a pro-rated share of the increase. The nominal increase in contingency to achieve an overall contingency rate of 25% is 40%.

3.4.2 Financial Risk

In addition to the routine uncertainties addressed by contingency, another cost element that is sometimes necessary to consider when bounding decommissioning costs relates to uncertainty, or risk. Examples can include changes in work scope, pricing, job performance, and other variations that could conceivably, but not necessarily, occur. Consideration is sometimes necessary to generate a level of confidence in the estimate, within a range of probabilities. TLG considers these types of costs under the broad term "financial risk." Included within the category of financial risk are:

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.

- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes, for example, affecting worker health and safety, site release criteria, waste transportation, and disposal.
- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition, or in the timetable for such, or the start and rate of acceptance of spent fuel by the DOE.
- Pricing changes for basic inputs such as labor, energy, materials, and waste disposal.

This cost study does not add any additional costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are revisited periodically and addressed through repeated revisions or updates of the base estimates.

3.5 SITE-SPECIFIC CONSIDERATIONS

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impact of the considerations identified below is included in this cost study.

3.5.1 Spent Fuel Management

The cost to dispose the spent fuel generated from plant operations is not reflected within the estimates to decommission Diablo Canyon site. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act. As such, the disposal cost is financed by a surcharge paid into the DOE's waste fund during operations. On November 19, 2013, the U.S. Court of Appeals for the D.C. Circuit ordered the Secretary of the Department of Energy to suspend collecting annual fees for nuclear waste disposal from nuclear power plant operators until the DOE has conducted a legally adequate fee assessment. Prior to this suspension, the disposal cost was financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations.

The total inventory of assemblies that will require handling during decommissioning is based upon the following assumptions. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. For purposes of this analysis, acceptance of Diablo Canyon spent fuel by the DOE is expected to be complete by 2061 to permit license termination within approximately 36 years of station shut down. The first assemblies removed from the Diablo Canyon site are projected to be in year 2035.

The estimates incorporate a minimum cooling period of approximately 10 years for the spent fuel that resides in the storage pools when operations cease. The current Part 72 ISFSI license does not allow dry cask storage of spent fuel with burnups above 62 GWD/metric ton. It is assumed that PG&E can amend the Part 72 license to store the higher burnup fuel, but that as a condition of the amendment it will require longer decay times (10 years) before storing the spent fuel in the casks.

In both scenarios, any residual fuel remaining in the pool after the 10-year period is relocated to the ISFSI to await transfer to a DOE facility. Operation and maintenance costs for the spent fuel pool and the ISFSI are included within the estimates and address the cost for staffing the facility, as well as security, insurance, and licensing fees. The estimates include the costs to purchase, load, and transfer the multi-purpose spent fuel storage canisters (MPCs) from the pool to the ISFSI. Costs are also provided for transfer of the MPCs to the DOE from the ISFSI (although it is acknowledged that this may not occur and that the fuel in the MPCs may have to be repackaged at DOE expense).

Canister Design

A multi-purpose storage canister (HOLTEC HI-STORM 100SA system), with a 32-fuel assemblies capacity, is assumed for future canister and overpack acquisitions. The overpack in use at Diablo Canyon is uniquely configured with additional support steel for seismic considerations. A unit cost of $1,230,000 is used for pricing the internal multi-purpose canister (MPC) and concrete overpack.

Canister Loading and Transfer

An average cost of $1,053,600 per canister is used for the labor and consumables to load/transport the spent fuel from the pools to the ISFSI pad, based upon Diablo Canyon operating experience. The same cost, $1.053 million per canister, is used to estimate the cost to transfer the fuel from the spent fuel pools to the DOE. For estimating purposes, 50% of the pool to DOE cost is used to estimate the cost to transfer the fuel from the ISFSI to the DOE.

Operations and Maintenance

Annual costs (excluding labor) of $1.58 million and $1.09 million are used for operation and maintenance of the spent fuel pools and the ISFSI, respectively. The ISFSI cost reflects additional costs associated with inspection and aging mitigation likely to be required as a result of the ISFSI license renewal.

ISFSI and GTCC Pad and Decommissioning

At the time of decommissioning it is expected that there will be 138 emptied concrete / steel HI-STORM 100 SA overpacks, and 8 similar GTCC emptied concrete / steel overpacks located on the ISFSI and GTCC pads, respectively. The nominal weight of each overpack is 135 tons, comprised of 45 tons of steel and 90 tons of concrete. From a perspective of complying with the US NRC release criteria, the estimate is based on seven overpacks per unit (quantity necessary to manage the final core offload) having some level of steel liner neutron-induced activation as a result of the long-term storage of the fuel, i.e., to levels exceeding free-release limits. The steel liners in these activated overpacks are assumed to be removed and disposed of as radioactive material. The remaining material, including the concrete pads and embedments up to a depth of three feet below grade are designated as decommissioned material. The cost to demolish this material, as well as package and transport it to an out-of-state waste disposal is included in the estimates.

In accordance with the specific requirements of 10 CFR §72.30 for the ISFSI work scope, the cost estimate for decommissioning the ISFSI reflects: 1) the cost of an independent contractor performing the decommissioning activities; 2) an adequate contingency factor; and 3) the cost of meeting the criteria for unrestricted use. The decommissioning cost for the ISFSI is identified as a separate line item in the Unit 1 and 2 cost tables in Appendices C and D, and as stand-alone table in Appendix E.

GTCC

The dismantling of the reactor internals generates radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. Although there are strong arguments that GTCC waste is covered by the spent fuel contact with DOE and the fees being paid pursuant to that contract, DOE has taken the position that GTCC waste is not covered by that contract or its fees and that utilities, including PG&E, will have to pay an additional fee for the disposal of their GTCC waste. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the GTCC radioactive waste has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

For purposes of this study, GTCC is packaged in a canister similar to those used to store spent fuel. The cost of the canister is estimated to be approximately 50% of the spent fuel canister due to design differences. Disposal costs are based upon a cost equivalent to that envisioned for the spent fuel. It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage with the spent fuel in the ISFSI at the Diablo Canyon site (for the DECON alternative). In the SAFSTOR scenario, the GTCC material is shipped directly to a DOE facility as it is generated since the fuel will have been removed from the site prior to the start of decommissioning and the ISFSI deactivated.

The cost to dispose of GTCC material is based on the equivalent cost to dispose of spent fuel (weight basis). The details for estimating this value is provided in Section 5 of this analysis.

3.5.2 Reactor Vessel and Internal Components

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the refueling canal, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor cavity. Transportation cask specifications and transportation regulations dictate the segmentation and packaging methodology.

Intact disposal of reactor vessel shells has been successfully demonstrated at several of the sites that have been decommissioned. Access to navigable waterways has allowed these large packages to be transported to the Barnwell disposal site with minimal overland travel. Intact disposal of the reactor vessel and internal components as a single package can provide savings in cost and worker exposure by eliminating the complex segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package (including the internals). However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when the Diablo Canyon plant ceases operation. Future viability of this option will depend upon the ultimate location of the disposal site, as well as the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Consequently, the study assumes that the reactor vessel will require segmentation, as a bounding condition.

3.5.3 Primary System Components

In the DECON scenario, the reactor coolant system components are assumed to be decontaminated using chemical agents prior to the start of dismantling operations. This type of decontamination can be expected to have a significant ALARA impact, since in this scenario the removal work is done within the first few years of shutdown. A decontamination factor (average reduction) of 10 is assumed for the process. Disposal of the decontamination solution effluent is included within the estimate as a "process liquid waste" charge. In the SAFSTOR scenarios, radionuclide decay is expected to provide the same benefit and, therefore, a chemical decontamination is not included.

The following discussion deals with the removal and disposition of the steam generators, but the techniques involved are also applicable to other large components, such as heat exchangers, component coolers, and the pressurizer. The steam generators' size and weight, as well as their location within the reactor building, will ultimately determine the removal strategy.

A trolley crane is set up for the removal of the generators. It can also be used to move portions of the steam generator cubicle walls and floor slabs from the reactor building to a location where they can be decontaminated and transported to the material handling area. Interferences within the work area, such as grating, piping, and other components are removed to create sufficient laydown space for processing these large components.

The generators are rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they are lowered onto a dolly. Each generator is rotated into the horizontal position for extraction from the containment and placed onto a multi-wheeled vehicle for transport to an on-site processing and storage area.

The generators are disassembled on-site with the outer shell and lightly contaminated subassemblies designated for segmentation and direct disposal. The more highly contaminated tube sheet and tube bundle contained within the steam generator lower shell are packaged as a one-piece container for direct disposal.

Disposal costs are based upon the displaced volume and weight of the units.

Reactor coolant piping is cut from the reactor vessel once the water level in the vessel (used for personnel shielding during dismantling and cutting operations in and around the vessel) is dropped below the nozzle zone. The piping is boxed and transported by shielded van. The reactor coolant pumps and motors are lifted out intact, packaged, and transported for processing and/or disposal.

3.5.4 Main Turbine and Condenser

The main turbine is dismantled using conventional maintenance procedures. The turbine rotors and shafts are removed to a laydown area. The lower turbine casings are removed from their anchors by controlled demolition. The main condensers are also disassembled and moved to a laydown area. Material is then surveyed and prepared for transportation to an off-site scrap facility.

3.5.5 Retired Components

Both Diablo Canyon units have replaced their original sets of steam generators and reactor closure heads; these retired components are stored on site within a concrete protective structure. The cost for transportation and disposal of these items has been included in this analysis.

3.5.6 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49. [29] The contaminated material will be packaged in Industrial Packages (IP-1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with 10 CFR Part 71, in Type B containers. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., ^{137}Cs, ^{90}Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major reactor components to be shipped under current transportation regulations and disposal requirements.

Transport of the highly activated metal, produced in the segmentation of the reactor vessel and internal components, will be by shielded truck cask. Cask shipments may exceed 95,000 pounds, including vessel segment(s), supplementary shielding, cask tie-downs, and tractor-trailer. The maximum level of activity per shipment assumed permissible was based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments is designed to meet these limits.

The transport of large intact components (e.g., large heat exchangers and other oversized components) will be by a combination of truck, rail, and/or multi-wheeled transporter.

Transportation costs for Class A radioactive material requiring controlled disposal are based upon the mileage to the Energy*Solutions* facility in Clive, Utah. Transportation costs for the higher activity Class B and C radioactive material are based upon the mileage to the WCS facility in Andrews County, Texas. The transportation cost for the GTCC material is assumed to be contained within the disposal cost. Truck transport costs were developed from published tariffs from Tri-State Motor Transit. [30]

3.5.7 Low-Level Radioactive Waste Disposal

The mass of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in the detailed Appendices C and D, and summarized in Section 5. The quantified waste summaries shown in these tables are consistent with 10 CFR Part 61 classifications. Commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The volumes are calculated based on the exterior package dimensions for containerized material or a specific calculation for components serving as their own waste containers.

The more highly activated reactor components will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the disposal fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Class A waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

Class A Waste

For the purpose of this analysis, the Energy*Solutions'* facility is used as the disposal site for the majority of the radioactive waste (Class A). The disposal costs for Class A low-level radioactive waste are based on current Diablo Canyon contracted rates between PG&E and Energy*Solutions* in year 2014 dollars. A complete explanation of the basis for Class A waste disposal is provided in Section 5 of this analysis.

Class B and C Waste

For purposes of this analysis, the Waste Control Specialists (WCS) Andrews County, TX facility is used as the disposal site for the higher radioactivity waste (Class B and C). The disposal costs for Class B and C low-level radioactive waste are based on current Diablo Canyon contracted rates between PG&E and WCS in year 2014 dollars. A complete explanation of the basis for class B and C waste disposal is provided in Section 5 of this analysis.

3.5.8 Site Restoration Following License Termination

The NRC will amend or terminate the site license if it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the next step in the decommissioning process, as well as owner's own future plans for the site.

Only existing site structures are considered in the dismantling cost. It is assumed that the electrical switchyards remain after Diablo Canyon is decommissioned. Structures are removed to a nominal depth of three feet below grade. The voids are backfilled with clean fill and capped with soil. The site is then re-graded to conform to the adjacent landscape. Vegetation is established to inhibit erosion. These "non-radiological costs" are included in the total cost of decommissioning.

Concrete rubble and scrap metal (considered decommissioned material) generated from demolition activities is processed and transported via a combination of local truck and long-distance railway transport to an off-site out-of-state waste facility or out-of-state scrap dealer. Concrete rubble also incurs a disposal charge. Clean fill is brought on site to backfill below grade voids as needed. The excavations will be regraded such that the power block area will have a final contour consistent with adjacent surroundings.

The estimates do not assume the remediation of any significant volume of contaminated soil.

3.6 ASSUMPTIONS

The following are the major assumptions made in the development of the estimates for decommissioning the site.

3.6.1 Estimating Basis

Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in 2014 dollars. Costs are not inflated, escalated, or discounted over the periods of performance.

The estimates were developed using site-specific and technical information extracted from the 2012 estimates. This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

The study follows the principles of ALARA through the use of work duration adjustment factors. These factors address the impact of activities such as radiological protection instruction, mock-up training, and the use of respiratory protection and protective clothing. The factors lengthen a task's duration, increasing costs and lengthening the overall schedule. ALARA planning is considered in the costs for engineering and planning, and in the development of activity specifications and detailed procedures. Changes to worker exposure limits may impact the decommissioning cost and project schedule.

3.6.2 Labor Costs

The craft labor required to decontaminate and dismantle the nuclear units will be acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis. Costs for site administration, operations, construction, and maintenance personnel are based upon average salary information provided by PG&E.

PG&E will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. The owner will provide site security, radiological health and safety, quality assurance and overall site administration during the decommissioning and demolition phases. Contract personnel will provide engineering services (e.g., for preparing the activity specifications, work procedures, activation, and structural analyses) under the direction of PG&E.

Personnel costs are based upon average salary information provided by PG&E. Overhead costs are included for site and corporate support, reduced commensurate with the staffing of the project.

Security is maintained close to operational levels while fuel is stored in the spent fuel pool. Security is reduced substantially once all spent fuel has been relocated to the ISFSI.

Staffing levels are assigned for each unit by sub-period and functional area. This estimate was updated to reflect PG&E's experience at Humboldt Bay Unit 3 and industry experience at Zion. This experience has resulted in an increase in the Utility and DOC staff needed to support the reactor and large component decommissioning activities (Sub-Period 2a in the estimate).

Economies of a multi-unit decommissioning are recognized by establishing a primary and a secondary staff level. The unit assigned the primary staff will include common supervisory positions and positions that may be shared across both units. The types of positions and staffing levels are adjusted based upon the type of activity occurring in each sub-period.

3.6.3 Design Conditions

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., ^{137}Cs, ^{90}Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.[31] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Diablo Canyon components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from NUREG/CR-0130[32] and NUREG/CR-0672,[33] and benchmarked to the long-lived values from NUREG/CR-3474.

It is anticipated that there may be control element assemblies (CEAs) in the spent fuel pool at the cessation of operations, including those CEAs from the final core. This analysis assumes that the CEAs can be disposed of along with the spent fuel at no additional cost.

Neutron activation of the containment building structure is assumed to be confined to the biological shield.

3.6.4 General

Transition Activities

Existing warehouses are cleared of non-essential material and remain for use by PG&E and its subcontractors. The plant's operating staff performs the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.
- Process operating waste inventories. Disposal of operating wastes (e.g., filtration media, resins) during this initial period is not considered a decommissioning expense; however, the estimates do include the disposition of a small volume of material currently being stored in the spent fuel pool (as described in Section 5).

Decommissioned Materials

Consistent with PG&E's interpretation of the California governor's executive order on the moratorium on disposing of decommissioned materials in the State of California (Executive Order D-62-02), costs to account for transporting and disposing of decommissioned materials to an out-of-state disposal facility have been included in this estimate. Decommissioned materials, as used in the context of this analysis are defined as materials that meet the US NRC release criteria but contain low residual levels of radioactivity that currently may not be placed into California Class III landfills or unclassified waste management units. Demolished concrete and scrap steel are categorized as decommissioned materials in this analysis.

Cost for disposing of decommissioned materials include local handling and packaging costs, cost for truck transport via public highway to a railhead in San Luis Obispo, and rail transport to an out-of-state location (Utah for concrete, Nevada for scrap steel). This cost is included in the Appendices C and D cost tables line items labeled:

- Backfill Structures & Concrete Removal (out of state disposal)
- Breakwater Demolition and Removal (out of state disposal)
- Disposition of Mobile Barriers (out of state disposal)
- Miscellaneous Construction Debris (out of state disposal)
- Scrap Metal Transportation (out of state); and
- Demolition and Site Restoration ISFSI

GTCC Pad

The existing ISFSI pad is expected to be at capacity at the time of station shutdown with all spent fuel offloaded to the ISFSI. Due to the physical layout of the ISFSI pad it is impractical to expand the pad to support the addition of GTCC storage casks. In order to store GTCC material generated during decommissioning, costs for permitting and constructing a GTCC Storage Pad have been included. The cost for design, permitting and reviews is estimated at $18.8 million. The cost for construction is estimated at $5 million.

Environmental Permits and Fees

The estimate reflects PG&E's determination that there will be substantive Environmental Permits and Fees required and costs incurred between the time of station shutdown and Part 50 licenses termination. The annual amount budgeted between shutdown and license termination is $1.9 million / year (DECON scenario). A similar amount was included in the SAFSTOR scenario. The projected costs are consistent with costs identified in the SONGS 2 and 3 Site-Specific Decommissioning Estimate [34] submitted to the NRC in 2014.

Scrap and Salvage

The existing plant equipment is considered obsolete and suitable for scrap as deadweight quantities only. PG&E will make economically reasonable efforts to salvage equipment following final plant shutdown. However, dismantling techniques assumed by TLG for equipment in this analysis are not consistent with removal techniques required for salvage (resale) of equipment. Experience has indicated that some buyers wanted equipment stripped down to very specific requirements before they would consider purchase. This required expensive rework after the equipment had been removed from its installed location. Since placing a salvage value on this machinery and equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, this analysis does not attempt to quantify the value that an owner may realize based upon those efforts.

It is assumed, for purposes of this analysis, that metallic scrap generated in the dismantling process would be considered decommissioned material that requires out-of-state transport. The dismantling techniques assumed in the decommissioning estimates do not include the additional cost for size reduction and preparation to meet "furnace ready" conditions. For example, the recovery of copper from electrical cabling may require the removal and disposition of any contaminated insulation, an added expense. With a volatile market, the potential profit margin in scrap recovery is highly speculative, regardless of the ability to free release this material. This assumption is an implicit recognition of scrap value in the disposal of clean metallic waste at no additional cost to the project.

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property is removed at no cost or credit to the decommissioning project. Disposition may include relocation to other facilities. Spare parts are also made available for alternative use.

Energy

For estimating purposes, the plant is assumed to be substantially de-energized, with the exception of those facilities necessary to support dismantling activities and spent fuel storage. Replacement power costs are used to calculate the cost of energy consumed during decommissioning for tooling, lighting, ventilation, and essential services. The purchase price of electricity is based on the average PG&E's 2014 price for utility bundled retail sales to industrial customers. The average price in 2014 was 14.22 cents / kWh.

Emergency Planning

FEMA fees associated with emergency planning are assumed to continue for approximately 18 months following the cessation of operations. At this time, the fees are discontinued, based upon the anticipated condition of the spent fuel. Annual state fees are assumed to be reduced by 50% at time of shutdown and remain at those levels until spent fuel has been transferred to dry storage. After spent fuel is in dry storage state fees are estimated to be reduced to 25% of operating levels until spent fuel has been removed from the station.

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance and the limits for coverage defined in the NRC's proposed rulemaking "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors."[35] The NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Reactor Pressure Vessel (RPV) and Internals Segmentation

This estimate was updated to reflect PG&E's experience with reactor and internals segmentation at Humboldt Bay Unit 3 and industry experience at Zion. This experience has resulted in an increase in the time to segment and package the reactor and internals (Sub-Period 2a in the estimate), an increase in the Utility and DOC staff needed during this sub-period (included in Utility and DOC Staff cost elements), an increase in the level of PG&E and DOC staff necessary to directly support the work (identified as "PG&E RPV Staff Support Team" and "DOC RPV Staff Support Team"), and an increase in the estimated amount of equipment and spares necessary to perform the segmentation (included in the cost table line items labeled "reactor vessel" and "reactor vessel internals". A reduction in reactor vessel segmentation (Removal) contingency from 75% to 35% was incorporated to reflect the addition of this industry experience, and cost of the equipment and spares necessary to perform the segmentation. The estimate was also revised to reflect difference in mass between the Unit 1 and Unit 2 reactor internals. Unit 1 has a somewhat massive thermal shield along the core elevation, whereas Unit 2 has a less massive series of neutron pad assemblies along the core elevation. The thermal shield has a greater mass (76,500 pounds) than the neutron pad assemblies (23,000 pounds).

Taxes

Property taxes (land) are included for all decommissioning periods.

Site Modifications

The perimeter fence and in-plant security barriers will be moved, as appropriate, to conform to the Site Security Plan in force during the various stages of the project.

3.7 COST ESTIMATE SUMMARY

Schedules of expenditures for the DECON and SAFSTOR scenarios are provided in Tables 3.1 through 3.4. The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

Additional tables in Appendices C and D provide detailed costs elements. The cost elements are also assigned to one of three subcategories: "License Termination," "Spent Fuel Management," and "Site Restoration." The subcategory "License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the plant's operating license, recognizing that spent fuel management represents an additional cost liability that will interact with the license termination effort.

The "Spent Fuel Management" subcategory contains costs associated with the containerization and transfer of spent fuel from the pools to the DOE and the transfer of casks from the ISFSI to the DOE. Costs are also included for the operations of the pools and management of the ISFSI until such time that the transfer of all fuel from this facility to an off-site location (e.g., geologic repository) is complete.

"Site Restoration" is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are removed to a depth of three feet and backfilled to conform to local grade.

As discussed in Section 3.4.1, it is not anticipated that the DOE will accept the GTCC waste prior to completing the transfer of spent fuel. Therefore, the cost of GTCC disposal is shown in the final year of ISFSI operation (for the DECON alternative). While designated for disposal at the geologic repository along with the spent fuel, GTCC waste is still classified as low-level radioactive waste and, as such, included as a "License Termination" expense.

Decommissioning costs are reported in 2014 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure (or projected lifetime of the plant). The schedules are based upon the detailed activity costs reported in Appendices C and D, along with the timeline presented in Section 4.

The ISFSI decommissioning cost estimate is provided in a table format in Appendix E. This appendix is provided to support required US NRC filings.

TABLE 3.1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 1

(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2024	21,002	1,457	6,586	636	1,681	31,362
2025	119,598	10,517	40,814	5,910	10,985	187,824
2026	72,400	17,296	42,746	26,395	14,434	173,271
2027	69,575	16,495	41,811	31,414	14,230	173,525
2028	69,766	16,541	41,925	31,500	14,269	174,000
2029	68,119	18,396	47,764	49,277	16,960	200,516
2030	38,931	13,597	23,432	33,664	21,319	130,943
2031	26,569	8,460	2,732	14	19,520	57,295
2032	26,641	8,484	2,739	14	19,573	57,452
2033	26,569	8,460	2,732	14	19,520	57,295
2034	27,971	8,603	6,589	2,951	17,914	64,028
2035	14,456	2,851	7,752	5,293	6,308	36,660
2036	12,322	2,274	23,668	13	6,215	44,491
2037	8,689	8,162	13,394	0	8,956	39,201
2038	8,689	8,162	13,394	0	8,956	39,201
2039	5,853	2,818	4,624	0	5,307	18,601
2040	4,370	0	0	0	3,392	7,762
2041	4,358	0	0	0	3,383	7,740
2042	4,358	0	0	0	3,383	7,740
2043	4,358	0	0	0	3,383	7,740
2044	4,370	0	0	0	3,392	7,762
2045	4,358	0	0	0	3,383	7,740
2046	4,358	0	0	0	3,383	7,740
2047	4,358	0	0	0	3,383	7,740
2048	4,370	0	0	0	3,392	7,762
2049	4,358	0	0	0	3,383	7,740
2050	4,358	0	0	0	3,383	7,740
2051	4,358	0	0	0	3,383	7,740
2052	4,370	0	0	0	3,392	7,762
2053	4,358	0	0	0	3,383	7,740

TABLE 3.1 (continued)
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 1
(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2054	4,358	0	0	0	3,383	7,740
2055	4,358	0	0	0	3,383	7,740
2056	4,370	0	0	0	3,392	7,762
2057	4,358	0	0	0	3,383	7,740
2058	4,358	0	0	0	3,383	7,740
2059	4,358	0	0	0	3,383	7,740
2060	4,370	0	0	0	3,392	7,762
2061	4,358	2,861	0	0	14,848	22,066
2062	567	653	1,639	666	5,096	8,621
Total	713,655	156,089	324,340	187,761	297,185	1,679,030

TABLE 3.2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 2

(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2025	42,905	2,330	9,426	1,361	3,452	59,475
2026	101,899	9,790	27,036	8,243	11,518	158,485
2027	68,437	17,998	40,977	27,142	14,477	169,030
2028	69,374	18,453	43,415	29,060	14,493	174,794
2029	69,184	18,403	43,296	28,981	14,453	174,317
2030	66,579	19,330	53,125	54,562	17,630	211,226
2031	42,012	8,972	10,491	9,522	17,501	88,497
2032	37,800	7,066	2,254	16	17,359	64,493
2033	37,696	7,046	2,248	15	17,311	64,317
2034	37,696	7,046	2,248	15	17,311	64,317
2035	41,465	7,980	11,924	5,451	14,784	81,604
2036	17,044	13,124	49,794	1,713	6,884	88,558
2037	8,710	75,661	119,926	0	10,588	214,884
2038	8,710	75,661	119,926	0	10,588	214,884
2039	5,830	25,497	40,413	0	5,815	77,555
2040	4,378	0	0	0	3,398	7,776
2041	4,366	0	0	0	3,389	7,755
2042	4,366	0	0	0	3,389	7,755
2043	4,366	0	0	0	3,389	7,755
2044	4,378	0	0	0	3,398	7,776
2045	4,366	0	0	0	3,389	7,755
2046	4,366	0	0	0	3,389	7,755
2047	4,366	0	0	0	3,389	7,755
2048	4,378	0	0	0	3,398	7,776
2049	4,366	0	0	0	3,389	7,755
2050	4,366	0	0	0	3,389	7,755
2051	4,366	0	0	0	3,389	7,755
2052	4,378	0	0	0	3,398	7,776
2053	4,366	0	0	0	3,389	7,755
2054	4,366	0	0	0	3,389	7,755

TABLE 3.2 (continued)
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 2
(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2055	4,366	0	0	0	3,389	7,755
2056	4,378	0	0	0	3,398	7,776
2057	4,366	0	0	0	3,389	7,755
2058	4,366	0	0	0	3,389	7,755
2059	4,366	0	0	0	3,389	7,755
2060	4,378	0	0	0	3,398	7,776
2061	4,366	2,869	0	0	14,876	22,111
2062	568	655	1,643	668	5,108	8,641
Total	752,034	317,881	578,140	166,748	285,369	2,100,172

TABLE 3.3
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 1
(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2024	20,458	1,388	4,497	642	1,689	28,673
2025	116,037	9,383	24,985	3,733	10,712	164,851
2026	67,890	5,852	3,519	1,141	12,146	90,548
2027	36,157	4,856	1,455	9	12,556	55,033
2028	36,256	4,870	1,459	9	12,591	55,184
2029	36,157	4,856	1,455	9	12,556	55,033
2030	36,157	4,856	1,455	9	12,556	55,033
2031	36,157	4,856	1,455	9	12,556	55,033
2032	36,256	4,870	1,459	9	12,591	55,184
2033	36,157	4,856	1,455	9	12,556	55,033
2034	31,592	4,113	1,216	8	11,164	48,092
2035	8,386	332	0	4	4,088	12,811
2036	8,409	333	0	4	4,099	12,846
2037	8,386	332	0	4	4,088	12,811
2038	8,386	332	0	4	4,088	12,811
2039	8,386	332	0	4	4,088	12,811
2040	8,409	333	0	4	4,099	12,846
2041	8,386	332	0	4	4,088	12,811
2042	8,386	332	0	4	4,088	12,811
2043	8,386	332	0	4	4,088	12,811
2044	8,409	333	0	4	4,099	12,846
2045	8,386	332	0	4	4,088	12,811
2046	8,386	332	0	4	4,088	12,811
2047	8,386	332	0	4	4,088	12,811
2048	8,409	333	0	4	4,099	12,846
2049	8,386	332	0	4	4,088	12,811
2050	8,386	332	0	4	4,088	12,811
2051	8,386	332	0	4	4,088	12,811
2052	8,409	333	0	4	4,099	12,846
2053	8,386	332	0	4	4,088	12,811

TABLE 3.3 (continued)
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 1
(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2054	8,386	332	0	4	4,088	12,811
2055	8,386	332	0	4	4,088	12,811
2056	8,409	333	0	4	4,099	12,846
2057	8,386	332	0	4	4,088	12,811
2058	8,386	332	0	4	4,088	12,811
2059	8,386	332	0	4	4,088	12,811
2060	8,409	333	0	4	4,099	12,846
2061	8,386	332	0	4	4,088	12,811
2062	29,475	4,842	24,283	19	4,487	63,106
2063	33,803	12,283	34,589	17,982	9,584	108,242
2064	38,260	18,198	37,588	36,140	14,667	144,853
2065	38,155	18,148	37,485	36,041	14,627	144,458
2066	24,111	15,212	39,236	50,426	14,844	143,830
2067	10,329	6,429	17,651	24,321	6,893	65,623
2068	6,659	916	15,819	11	1,076	24,481
2069	5,508	6,913	17,271	3	6,031	35,726
2070	4,289	8,361	13,999	0	7,243	33,893
2071	2,961	5,772	9,665	0	5,001	23,400
Total	909,418	160,812	292,002	170,639	318,588	1,851,460

TABLE 3.4
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 2
(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2025	41,550	2,169	5,902	1,365	3,459	54,446
2026	106,578	9,402	17,134	3,681	11,884	148,680
2027	45,846	4,247	1,823	531	8,035	60,482
2028	29,765	4,038	1,198	7	5,512	40,520
2029	29,683	4,027	1,194	7	5,497	40,410
2030	29,683	4,027	1,194	7	5,497	40,410
2031	29,683	4,027	1,194	7	5,497	40,410
2032	29,765	4,038	1,198	7	5,512	40,520
2033	29,683	4,027	1,194	7	5,497	40,410
2034	29,683	4,027	1,194	7	5,497	40,410
2035	21,225	2,727	777	6	5,626	30,361
2036	5,579	320	4	4	5,881	11,787
2037	5,564	319	4	4	5,865	11,755
2038	5,564	319	4	4	5,865	11,755
2039	5,564	319	4	4	5,865	11,755
2040	5,579	320	4	4	5,881	11,787
2041	5,564	319	4	4	5,865	11,755
2042	5,564	319	4	4	5,865	11,755
2043	5,564	319	4	4	5,865	11,755
2044	5,579	320	4	4	5,881	11,787
2045	5,564	319	4	4	5,865	11,755
2046	5,564	319	4	4	5,865	11,755
2047	5,564	319	4	4	5,865	11,755
2048	5,579	320	4	4	5,881	11,787
2049	5,564	319	4	4	5,865	11,755
2050	5,564	319	4	4	5,865	11,755
2051	5,564	319	4	4	5,865	11,755
2052	5,579	320	4	4	5,881	11,787
2053	5,564	319	4	4	5,865	11,755
2054	5,564	319	4	4	5,865	11,755

TABLE 3.4 (continued)
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES, UNIT 2

(thousands, 2014 dollars)

Year	PG&E Labor	Equipment & Materials	Contractor Labor	LLRW Disposal	Other	Total
2055	5,564	319	4	4	5,865	11,755
2056	5,579	320	4	4	5,881	11,787
2057	5,564	319	4	4	5,865	11,755
2058	5,564	319	4	4	5,865	11,755
2059	5,564	319	4	4	5,865	11,755
2060	5,579	320	4	4	5,881	11,787
2061	5,564	319	4	4	5,865	11,755
2062	2,006	319	4	4	1,323	3,655
2063	22,352	4,799	16,381	18	4,428	47,978
2064	31,504	13,382	29,759	16,245	9,724	100,614
2065	40,483	20,301	39,540	32,382	14,885	147,591
2066	40,040	20,085	39,650	32,725	14,823	147,324
2067	28,047	14,248	42,615	42,032	13,152	140,094
2068	18,373	7,665	41,126	19,470	6,810	93,444
2069	5,501	60,188	103,406	3	7,246	176,344
2070	4,283	76,008	120,736	0	8,853	209,880
2071	2,957	52,477	83,358	0	6,112	144,904
Total	763,457	324,526	550,674	148,606	307,474	2,094,736

4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequences presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plan described in Section 3.5.1.

A schedule or sequence of activities for the DECON alternative from shutdown to ISFSI site restoration is presented in Figure 4.1. The scheduling sequence is based on the fuel being removed from the spent fuel pools within ten years. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project Professional" computer software.[36]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

The schedule reflects the results of a precedence network developed for the site decommissioning activities, i.e., a PERT (Program Evaluation and Review Technique) Software Package. The work activity durations used in the precedence network reflect the actual man-hour estimates from the cost table, adjusted by stretching certain activities over their slack range and shifting the start and end dates of others. The following assumptions were made in the development of the decommissioning schedule:

- The spent fuel pools are isolated until such time that all spent fuel has been discharged from the spent fuel pools to the DOE. Decontamination and dismantling of the storage pools is initiated once the transfer of spent fuel is complete (DECON option).
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

4.2 PROJECT SCHEDULE

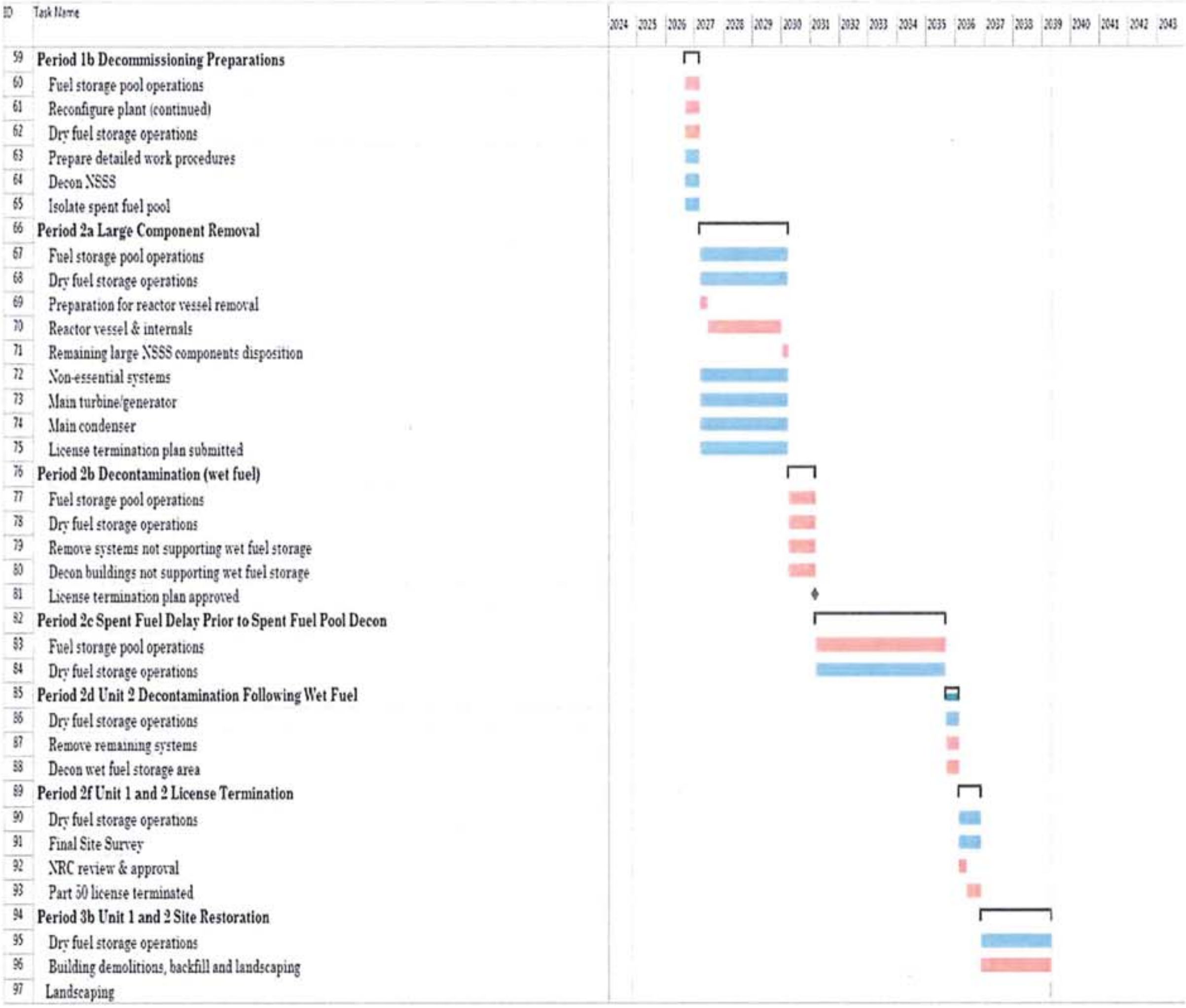
The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedules for decommissioning. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is used as the basis for determining the period-dependent costs. A second critical path is shown for the spent fuel storage period, which determines the release of the fuel handling area of the auxiliary building for final decontamination.

Project timelines are for the DECON and SAFSTOR scenarios are provided in Figures 4.2 and 4.3 with milestone dates based on the 2024 and 2025 shutdown dates for Units 1 and 2, respectively. The fuel pools are emptied approximately ten years after shutdown, while ISFSI operations continue until the DOE can complete the transfer of assemblies to its geologic repository. Deferred decommissioning in the SAFSTOR scenarios is assumed to commence so that the physical dismantling takes place immediately after all spent fuel has been removed from the site.

FIGURE 4.1
ACTIVITY SCHEDULE – DECON

ID	Task Name
1	Diablo Canyon Unit 1 Shutdown Date
2	**Period 1a Shutdown Through Transition**
3	Certificate of permanent cessation of operations submitted
4	Fuel storage pool operations
5	Dry fuel storage operations
6	Reconfigure plant
7	Prepare activity specifications
8	Perform site characterization
9	PSDAR submitted
10	Written certificate of permanent removal of fuel submitted
11	Site specific decommissioning cost estimate submitted
12	DOC staff mobilized
13	**Period 1b Decommissioning Preparations**
14	Fuel storage pool operations
15	Reconfigure plant (continued)
16	Dry fuel storage operations
17	Prepare detailed work procedures
18	Decon NSSS
19	Isolate spent fuel pool
20	**Period 2a Large Component Removal**
21	Fuel storage pool operations
22	Dry fuel storage operations
23	Preparation for reactor vessel removal
24	Reactor vessel & internals
25	Remaining large NSSS components disposition
26	Non-essential systems
27	Main turbine/generator
28	Main condenser
29	License termination plan submitted
30	**Period 2b Decontamination (wet fuel)**
31	Fuel storage pool operations
32	Dry fuel storage operations
33	Remove systems not supporting wet fuel storage
34	Decon buildings not supporting wet fuel storage
35	License termination plan approved
36	**Period 2c Spent Fuel Delay Prior to Spent Fuel Pool Decon**
37	Fuel storage pool operations
38	Dry fuel storage operations
39	**Period 2d Decontamination following wet fuel**
40	Dry fuel storage operations
41	Remove remaining systems
42	Decon wet fuel storage area
43	**Period 2e Delay before license termination**
44	Delay before license termination
45	
46	
47	Diablo Canyon Unit 2 Shutdown Date August 26, 2025
48	**Period 1a Shutdown Through Transition**
49	Certificate of permanent cessation of operations submitted
50	Fuel storage pool operations
51	Dry fuel storage operations
52	Reconfigure plant
53	Prepare activity specifications
54	Perform site characterization
55	PSDAR submitted
56	Certificate of permanent removal of fuel submitted
57	Site specific decommissioning cost estimate submitted
58	DOC staff mobilized

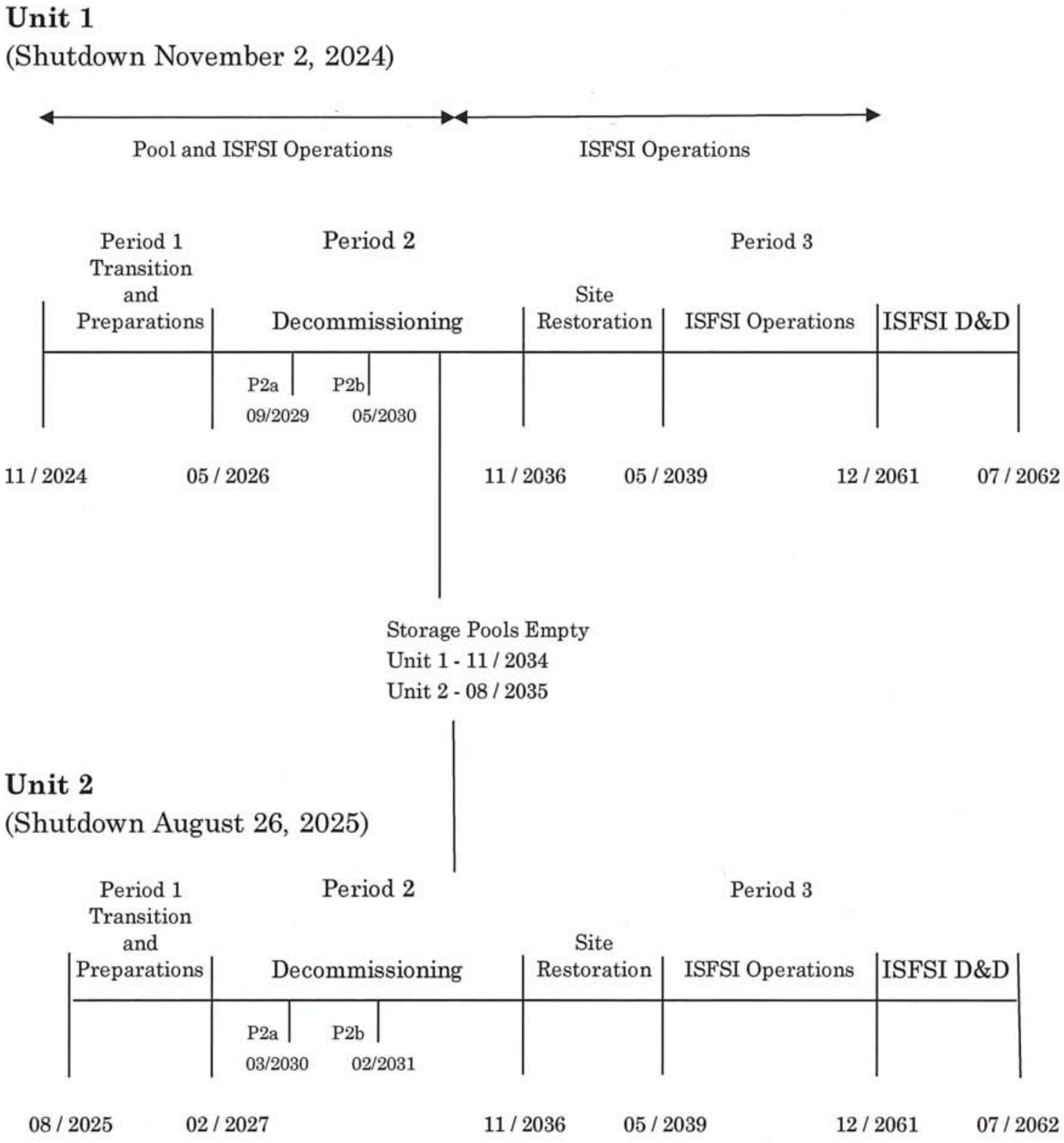
FIGURE 4.1 (continued)
ACTIVITY SCHEDULE – DECON



ID	Task Name
59	**Period 1b Decommissioning Preparations**
60	Fuel storage pool operations
61	Reconfigure plant (continued)
62	Dry fuel storage operations
63	Prepare detailed work procedures
64	Decon NSSS
65	Isolate spent fuel pool
66	**Period 2a Large Component Removal**
67	Fuel storage pool operations
68	Dry fuel storage operations
69	Preparation for reactor vessel removal
70	Reactor vessel & internals
71	Remaining large NSSS components disposition
72	Non-essential systems
73	Main turbine/generator
74	Main condenser
75	License termination plan submitted
76	**Period 2b Decontamination (wet fuel)**
77	Fuel storage pool operations
78	Dry fuel storage operations
79	Remove systems not supporting wet fuel storage
80	Decon buildings not supporting wet fuel storage
81	License termination plan approved
82	**Period 2c Spent Fuel Delay Prior to Spent Fuel Pool Decon**
83	Fuel storage pool operations
84	Dry fuel storage operations
85	**Period 2d Unit 2 Decontamination Following Wet Fuel**
86	Dry fuel storage operations
87	Remove remaining systems
88	Decon wet fuel storage area
89	**Period 2f Unit 1 and 2 License Termination**
90	Dry fuel storage operations
91	Final Site Survey
92	NRC review & approval
93	Part 50 license terminated
94	**Period 3b Unit 1 and 2 Site Restoration**
95	Dry fuel storage operations
96	Building demolitions, backfill and landscaping
97	Landscaping

FIGURE 4.2
DECON ALTERNATIVE
DECOMMISSIONING TIMELINE

(not to scale)



P2a represents the sub-period during which the reactor, reactor internals, and other large NSSS components are removed.

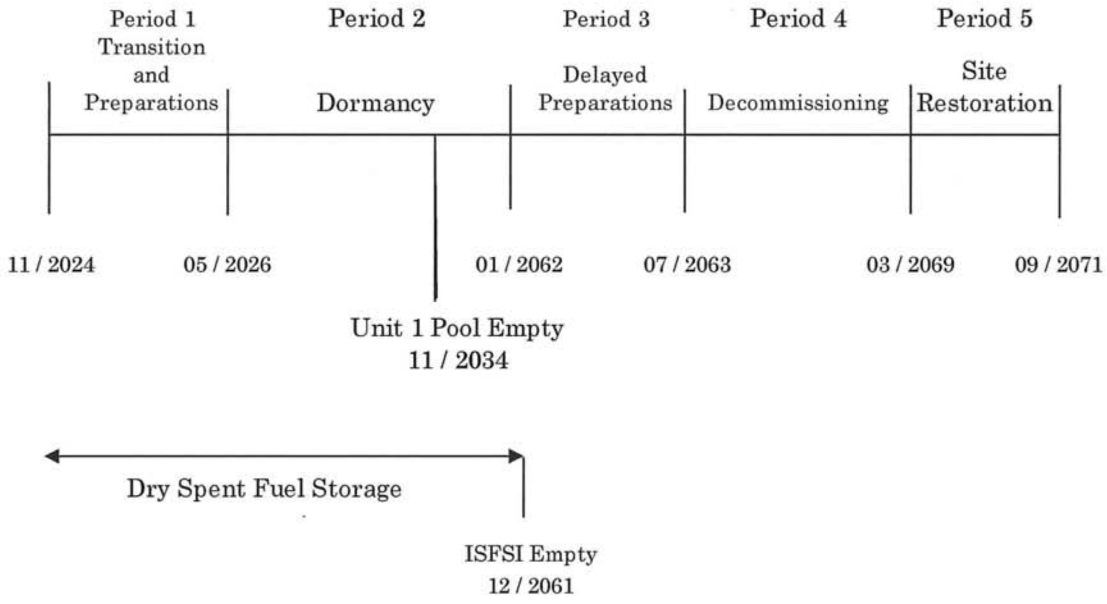
P2b represents the sub-period during which the remaining radioactive materials are removed (excluding wet spent fuel storage facilities).

FIGURE 4.3
SAFSTOR ALTERNATIVE DECOMMISSIONING TIMELINE

(not to scale)

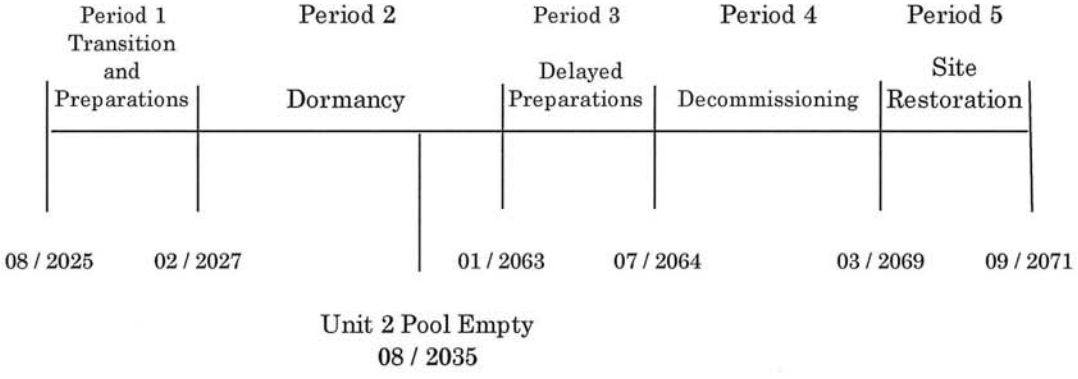
Unit 1

(Shutdown November 2, 2024)



Unit 2

(Shutdown August 26, 2025)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license. This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act, [37] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, Part 71 defines radioactive material as it pertains to transportation and Part 61 specifies its disposition.

Most of the materials being transported for controlled Disposal are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR Parts 173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in 10 CFR §173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and limited quantities of concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. Material that is expected to meet requirements for transport in bulk, such as the majority of contaminated concrete, is disposed of without its' packaging.

The waste material produced in the decontamination and dismantling of the nuclear plants is primarily generated during Period 2 of DECON and Period 4 of SAFSTOR. The volumes of radioactive waste generated during the various decommissioning activities at the site are shown on a line-item basis in Appendices C and D, and summarized in Tables 5.1 through 5.4. The quantified waste volume summaries shown in these tables are consistent with Part 61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

The reactor vessel and internals are categorized as large quantity shipments and, accordingly, will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the disposal fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging efficiencies can be lower for the highly activated materials (greater than Type A quantity waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone (i.e., systems radioactive at shutdown will still be radioactive over the time period during which the decommissioning is accomplished, due to the presence of long-lived radionuclides). While the dose rates decrease with time, radionuclides such as ^{137}Cs will still control the disposition requirements.

Disposal costs are based on the following:

Class A Waste

For the purpose of this analysis, the EnergySolutions' facility is used as the disposal site for radioactive waste (Class A). The disposal costs for Class A low-level radioactive waste are based on current Diablo Canyon contracted rates between PG&E and EnergySolutions in year 2014 dollars. The resulting 2014 rates, using this approach, results in disposal costs of:

- $304 per cubic foot for Large Component waste (components disposed of essentially intact)
- $277 per cubic for Containerized waste (components that are segmented and placed into steel shipping containers)
- $62 per cubic foot for "Bulk" waste (high density was such as contaminated concrete)
- $39 per cubic foot for medium density "Bulk waste
- $27 per cubic foot for low density waste (paper and plastics)
- $62,188 per cask ($518 per cubic foot for a 120 cubic foot cask) for higher activity Class A waste requiring cask shipments (some resins and filters and some segments of the reactor and internals).

Class B and C Waste

For purposes of this analysis, the WCS Andrews County, TX facility is used as the disposal site for the higher activity radioactive waste (Class B and C). The disposal costs for Class B and C low-level radioactive waste are based on current Diablo Canyon contracted rates between PG&E and WCS in year 2014 dollars. The resulting 2014 rates, using this approach, results in a disposal costs of:

- Class B non-irradiated hardware waste (including High Activity Fee) - The Class B non-irradiated hardware base rate is $2,885 per cubic foot. The high activity fee reflects a surcharge for waste with higher curie contents); after application of this surcharge the rate is $6,520 per cubic foot.

- Class B irradiated hardware waste - $10,500 per cubic foot (the curie content of this waste is not considered large enough to warrant High Activity or Carbon-14 fees).

- Class C irradiated hardware waste - $10,500 per cubic foot (base rate). The high activity and Carbon-14 fees are a substantial contributor to cost increases above the base rate. The average rate for irradiated hardware with high activity and Carbon-14 fees included ranges from a low average of $19,335 per cubic foot (Unit 2 - SAFSTOR) to a high average of $23,561 per cubic foot (Unit 1 – DECON scenario). The average changes depending on the mass of the reactor internals (there are differences between Units 1 and 2), and the amount of radioactive decay (SAFSTOR scenario is based on a greater amount of radioactive decay).

GTCC Waste

The volume and cost to dispose of GTCC material is developed using the following method:

- A projection of the amount of electricity delivered from the station through the end of currently licensed life is calculated. Using a rate of 1 mill per kWhr (DOE standard contract rate) this is converted to a total spent fuel disposal cost for the station.
- An estimate of the total weight of spent fuel generated through the end of currently licensed life is calculated.
- An average disposal cost for the spent fuel (per pound) is calculated by dividing the total spent fuel disposal cost by the total spent fuel mass. This calculation results in the cost per pound used for disposal ($111 per pound).
- This average disposal cost is applied against the total mass of GTCC material to estimate the GTCC disposal cost.
- The reported disposal volume is calculated by assuming that GTCC waste is placed in a canister equivalent in size to a spent fuel canister (nominal 360 cubic feet, each) and loading these canisters with up to 23,100 pounds of waste. The reported disposal mass is the mass of the GTCC material plus the mass of the spent fuel canister.

TABLE 5.1
DECON ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY, UNIT 1

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Large Component	A	101,249	8,511,621
	Energy*Solutions* Containerized	A	150,150	8,670,091
	Energy*Solutions* Bulk	A	322,760	32,275,569
	Energy*Solutions* Medium Density	A	8,960	397,906
	Energy*Solutions* DAW	A	13,117	262,341
	Energy*Solutions* Class A Cask	A	6,953	630,618
	WCS (other than irradiated hardware)	B	887	94,531
	WCS (irradiated hardware)	B	963	109,091
	WCS (irradiated hardware)	C	785	112,154
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC*	1,649	330,307
Total [2]			607,474	51,394,230

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

[2] Columns may not add due to rounding.

* GTCC unpackaged mass is 85,510 lbs.

TABLE 5.2
DECON ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY, UNIT 2

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Large Component	A	101,249	8,492,999
	Energy*Solutions* Containerized	A	139,621	8,017,074
	Energy*Solutions* Bulk	A	329,078	32,907,367
	Energy*Solutions* Medium Density	A	11,761	517,442
	Energy*Solutions* DAW	A	14,857	297,133
	Energy*Solutions* Class A Cask	A	7,031	635,327
	WCS (other than irradiated hardware)	B	887	94,531
	WCS (irradiated hardware)	B	963	109,091
	WCS (irradiated hardware)	C	393	52,080
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC*	1,649	330,307
Total [2]			607,490	51,453,351

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

[2] Columns may not add due to rounding.

* GTCC unpackaged mass is 85,510 lbs.

TABLE 5.3
SAFSTOR ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY, UNIT 1

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Large Component	A	106,396	8,987,727
	Energy*Solutions* Containerized	A	148,691	8,514,573
	Energy*Solutions* Bulk	A	322,095	32,209,011
	Energy*Solutions* Medium Density	A	8,960	397,906
	Energy*Solutions* DAW	A	15,511	310,219
	Energy*Solutions* Class A Cask	A	3,142	214,949
	WCS (other than irradiated hardware)	B	-	-
	WCS (irradiated hardware)	B	501	44,300
	WCS (irradiated hardware)	C	798	111,490
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,649	330,307
Total [2]			607,742	51,120,484

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

[2] Columns may not add due to rounding.

* GTCC unpackaged mass is 85,510 lbs.

TABLE 5.4
SAFSTOR ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY, UNIT 2

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Large Component	A	106,396	8,987,727
	Energy*Solutions* Containerized	A	138,340	7,880,533
	Energy*Solutions* Bulk	A	326,832	32,682,782
	Energy*Solutions* Medium Density	A	11,761	517,442
	Energy*Solutions* DAW	A	15,913	318,268
	Energy*Solutions* Class A Cask	A	3,244	221,109
	WCS (other than irradiated hardware)	B	-	-
	WCS (irradiated hardware)	B	501	44,300
	WCS (irradiated hardware)	C	406	51,416
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC*	1,649	330,307
Total [2]			605,044	51,033,885

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

[2] Columns may not add due to rounding.

* GTCC unpackaged mass is 85,510 lbs.

6. RESULTS

The analysis to estimate the costs to decommission Diablo Canyon relied upon the site-specific, technical information extracted from the 2012 and previous estimates. This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes. While not an engineering study, the estimates provide PG&E with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the station's spent fuel pools for a minimum of ten years following the cessation of operations for continued cooling of the assemblies.

The cost projected to promptly decommission (DECON) Diablo Canyon is estimated to be $3,779.2 million. The majority of this cost (approximately 62.5%) is associated with the physical decontamination and dismantling of the nuclear plant so that the operating license can be terminated. Another 20.8% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 16.7% is for the demolition of the designated structures and limited restoration of the site.

The cost projected for deferred decommissioning (SAFSTOR) is estimated to be $3,946.2 million. The majority of this cost (approximately 55.2%) is associated with placing the plant in storage, ongoing caretaking of the plant during dormancy, and the eventual physical decontamination and dismantling of the nuclear plant so that the operating license can be terminated. Another 28.8% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 16.0% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.4, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating licenses are terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pools will remain operational for a minimum of ten years following the cessation of operations. The pools will be isolated and independent spent fuel islands created. This will allow decommissioning operations to proceed in and around the pool areas. Over the ten-year period, the spent fuel will be packaged into multi-purpose canisters for transfer to the ISFSI. Spent fuel stored in the ISFSI is assumed to be transferred to the DOE in order to support license termination within 60 years of shut down.

The cost for waste disposal includes those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposition of the majority of the low-level radioactive material requiring controlled disposal is at the Energy*Solutions'* facility. Highly activated components, requiring additional isolation from the environment (GTCC), are packaged for geologic disposal. The cost of geologic disposal is based upon a cost equivalent for spent fuel.

Decontamination and removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Non-radiological demolition is a natural extension of the decommissioning process. With a work force mobilized to support decommissioning operations, non-radiological demolition can be an integrated activity and a logical expansion of the work being performed in the process of terminating the operating license. Prompt demolition reduces future liabilities and can be more cost effective than deferral, due to the deterioration of the facilities (and therefore the working conditions) with time.

The reported cost for transport includes the tariffs and surcharges associated with moving large components and/or overweight shielded casks overland, as well as the general expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this analysis, low-level radioactive waste is primarily moved via public highway by truck. Bulk shipments of decommissioned materials are moved by a combination of truck and railway.

Decontamination is used to reduce the plant's radiation fields and minimize worker exposure.

License termination survey costs are associated with the labor intensive and complex activity of verifying that contamination has been removed from the site to the levels specified by the NRC. This process involves a systematic survey of all remaining plant surface areas and surrounding environs, sampling, isotopic analysis, and documentation of the findings. The status of any plant components and materials not removed in the decommissioning process will also require confirmation and will add to the expense of surveying the facilities alone.

The remaining costs include allocations for heavy equipment and temporary services, as well as for other expenses such as regulatory fees and the premiums for nuclear insurance. While site operating costs are greatly reduced following the final cessation of plant operations, certain administrative functions do need to be maintained either at a basic functional or regulatory level.

TABLE 6.1
DECON ALTERNATIVE
DECOMMISSIONING COST ELEMENTS, UNIT 1

(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	18,214	1.1
Removal	141,218	8.4
Packaging	33,435	2.0
Transportation	31,679	1.9
Waste Disposal	199,331	11.9
Program Management [1]	473,419	28.2
Security	338,910	20.2
Spent Fuel Pool Isolation	26,314	1.6
Spent Fuel Management [2]	213,527	12.7
Insurance and Regulatory Fees	36,956	2.2
Energy	32,071	1.9
Characterization and Licensing Surveys	33,875	2.0
Property Taxes	7,658	0.5
Severance	84,005	5.0
Miscellaneous Equipment	8,421	0.5
Total [3]	1,679,030	100.0

Cost Element	Total	Percentage
License Termination	1,190,754	70.9
Spent Fuel Management	389,775	23.2
Site Restoration	98,501	5.9
Total [3]	1,679,030	100.0

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer costs/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

TABLE 6.2
DECON ALTERNATIVE
DECOMMISSIONING COST ELEMENTS, UNIT 2

(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	21,549	1.0
Removal	319,210	15.2
Packaging	32,500	1.5
Transportation	294,378	14.0
Waste Disposal	178,340	8.5
Program Management [1]	491,299	23.4
Security	348,555	16.6
Spent Fuel Pool Isolation	17,577	0.8
Spent Fuel Management [2]	193,784	9.2
Insurance and Regulatory Fees	32,862	1.6
Energy	31,910	1.5
Characterization and Licensing Surveys	37,509	1.8
Property Taxes	7,503	0.4
Severance	84,169	4.0
Miscellaneous Equipment	9,026	0.4
Total [3]	2,100,172	100.0

Cost Element	Total	Percentage
License Termination	1,172,913	55.8
Spent Fuel Management	395,217	18.8
Site Restoration	532,042	25.3
Total [3]	2,100,172	100.0

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer costs/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

TABLE 6.3
SAFSTOR ALTERNATIVE
DECOMMISSIONING COST ELEMENTS, UNIT 1

(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	14,403	0.8
Removal	143,288	7.7
Packaging	23,554	1.3
Transportation	29,063	1.6
Waste Disposal	182,273	9.8
Program Management [1]	604,377	32.6
Security	377,878	20.4
Spent Fuel Pool Isolation	26,459	1.4
Spent Fuel Management [2]	214,610	11.6
Insurance and Regulatory Fees	53,180	2.9
Energy	37,842	2.0
Characterization and Licensing Surveys	34,831	1.9
Property Taxes	9,548	0.5
Severance	84,470	4.6
Miscellaneous Equipment	15,685	0.8
Total [3]	1,851,460	100.0

Cost Element	Total	Percentage
License Termination	1,128,923	61.0
Spent Fuel Management	623,759	33.7
Site Restoration	98,778	5.3
Total [3]	1,851,460	100.0

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer costs/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

TABLE 6.4
SAFSTOR ALTERNATIVE
DECOMMISSIONING COST ELEMENTS, UNIT 2
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	21,401	1.0
Removal	319,891	15.3
Packaging	22,581	1.1
Transportation	292,279	14.0
Waste Disposal	160,224	7.6
Program Management [1]	439,612	21.0
Security	386,029	18.4
Spent Fuel Pool Isolation	17,615	0.8
Spent Fuel Management [2]	194,121	9.3
Insurance and Regulatory Fees	50,493	2.4
Energy	37,721	1.8
Characterization and Licensing Surveys	42,625	2.0
Property Taxes	9,373	0.4
Severance	84,353	4.0
Miscellaneous Equipment	16,419	0.8
Total [3]	2,094,736	100.0

Cost Element	Total	Percentage
License Termination	1,048,860	50.1
Spent Fuel Management	512,851	24.5
Site Restoration	533,025	25.4
Total [3]	2,094,736	100.0

[1] Includes engineering costs

[2] Excludes program management costs (staffing) but includes costs for spent fuel loading/transfer costs/spent fuel pool O&M and EP fees

[3] Columns may not add due to rounding

7. REFERENCES

1. "Decommissioning Cost Analysis for the Diablo Canyon Power Plant," Document P01-1648-001, TLG Services, Inc., December 2012.
2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg. 24018, June 27, 1988.
3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011.
4. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination."
5. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, "Entombment Options for Power Reactors," Advanced Notice of Proposed Rulemaking, 66 Fed. Reg. 52551, October 16, 2001.
6. U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, 61 Fed. Reg. 39278, July 29, 1996.
7. U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011.
8. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. http://pbadupws.nrc.gov/docs/ML1327/ML13274A489.pdf#page=419
9. Charter of the Blue Ribbon Commission on America's Nuclear Future, "Objectives and Scope of Activities" http://www.brc.gov/index.php?q=page/charter
10. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 27, 32, January 2012.
11. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013.
12. U.S. Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, Aug. 2013, http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

7. REFERENCES
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13. In 2008, the DOE issued a report to Congress in which it concluded that it did not have authority, under present law, to accept spent nuclear fuel for interim storage from decommissioned commercial nuclear power reactor sites. However, the Blue Ribbon Commission, in its final report, noted that: "[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first." For planning purposes only, this estimate does not assume that Vogtle, as a permanently shutdown plant, will receive priority; the fuel removal schedule assumed in this estimate is based upon DOE acceptance of fuel according to the "Oldest Fuel First" priority ranking. The plant owner will seek the most expeditious means of removing fuel from the site when DOE commences performance.

14. U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses."

15. "Low Level Radioactive Waste Policy Act," Public Law 96-573, 1980.

16. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986.

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31. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, August 1984.

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35. "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors," 10 CFR Parts 50 and 140, Proposed Rule, 62 Fed. Reg. 58690, October 30, 1997.

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APPENDIX A

UNIT COST FACTOR DEVELOPMENT

APPENDIX A
UNIT COST FACTOR DEVELOPMENT

Example: Unit Factor for Removal of Contaminated Heat Exchanger < 3,000 lbs.

1. SCOPE

Heat exchangers weighing < 3,000 lbs. will be removed in one piece using a crane or small hoist. They will be disconnected from the inlet and outlet piping. The heat exchanger will be sent to the waste processing area.

2. CALCULATIONS

Act ID	Activity Description	Activity Duration (minutes)	Critical Duration (minutes)*
a	Remove insulation	60	(b)
b	Mount pipe cutters	60	60
c	Install contamination controls	20	(b)
d	Disconnect inlet and outlet lines	60	60
e	Cap openings	20	(d)
f	Rig for removal	30	30
g	Unbolt from mounts	30	30
h	Remove contamination controls	15	15
i	Remove, wrap, send to waste processing area	60	60
	Totals (Activity/Critical)	355	255

Duration adjustment(s):	
+ Respiratory protection adjustment (50% of critical duration)	128
+ Radiation/ALARA adjustment (37.1% of critical duration)	95
Adjusted work duration	478
+ Protective clothing adjustment (30% of adjusted duration)	143
Productive work duration	621
+ Work break adjustment (8.33 % of productive duration)	52
Total work duration (minutes)	673

***** Total duration = 11.217 hr *****

* alpha designators indicate activities that can be performed in parallel

APPENDIX A

(continued)

3. LABOR REQUIRED

Crew	Number	Duration (hours)	Rate ($/hr)	Cost
Laborers	3.00	11.217	$58.50	$1,968.58
Craftsmen	2.00	11.217	$73.82	$1,656.08
Foreman	1.00	11.217	$77.97	$874.59
General Foreman	0.25	11.217	$82.70	$231.91
Fire Watch	0.05	11.217	$58.50	$32.81
Health Physics Technician	1.00	11.217	$80.71	$905.32
Total Labor Cost				$5,669.29

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Universal Sorbent 50 @ $0.63 sq. ft. {1}	$31.50
-Tarpaulins (7.5 mils, oil resistant, fire retardant) 50 @ $0.28/sq. ft. {2}	$14.00
-Gas torch consumables 1 @ $19.89/hr. x 1 hr. {3}	$19.89
Subtotal cost of equipment and materials	$65.39
Overhead & profit on equipment and materials @ 17.25 %	$11.28
Total costs, equipment & material	$76.67

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds: $5,745.96

Total labor cost:	$5,669.29
Total equipment/material costs:	$76.67
Total craft labor man-hours required per unit:	81.88

5. NOTES AND REFERENCES

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum's (now NEI) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog, McMaster Carr Spill Control (7193T88)
    2. R.S. Means (2011) Division 01 56, Section 13.60-0600, page 20
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- Material and consumable costs were adjusted using the regional indices for San Luis Obispo, California.

APPENDIX B

UNIT COST FACTOR LISTING
(DECON: Power Block Structures Only)

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean instrument and sampling tubing, $/linear foot	0.64
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	6.83
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	9.71
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	18.80
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	36.38
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	47.32
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	69.62
Removal of clean pipe >36 inches diameter, $/linear foot	82.71
Removal of clean valve >2 to 4 inches	125.09
Removal of clean valve >4 to 8 inches	187.99
Removal of clean valve >8 to 14 inches	363.81
Removal of clean valve >14 to 20 inches	473.25
Removal of clean valve >20 to 36 inches	696.24
Removal of clean valve >36 inches	827.12
Removal of clean pipe hanger for small bore piping	43.11
Removal of clean pipe hanger for large bore piping	153.78
Removal of clean pump, <300 pound	317.69
Removal of clean pump, 300-1000 pound	876.55
Removal of clean pump, 1000-10,000 pound	3,467.44
Removal of clean pump, >10,000 pound	6,708.09
Removal of clean pump motor, 300-1000 pound	366.40
Removal of clean pump motor, 1000-10,000 pound	1,440.67
Removal of clean pump motor, >10,000 pound	3,241.51
Removal of clean heat exchanger <3000 pound	1,863.57
Removal of clean heat exchanger >3000 pound	4,694.16
Removal of clean feedwater heater/deaerator	13,221.06
Removal of clean moisture separator/reheater	27,164.50
Removal of clean tank, <300 gallons	408.58
Removal of clean tank, 300-3000 gallon	1,287.26
Removal of clean tank, >3000 gallons, $/square foot surface area	10.76

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean electrical equipment, <300 pound	172.18
Removal of clean electrical equipment, 300-1000 pound	596.53
Removal of clean electrical equipment, 1000-10,000 pound	1,193.05
Removal of clean electrical equipment, >10,000 pound	2,833.62
Removal of clean electrical transformer < 30 tons	1,967.92
Removal of clean electrical transformer > 30 tons	5,667.24
Removal of clean standby diesel generator, <100 kW	2,010.05
Removal of clean standby diesel generator, 100 kW to 1 MW	4,486.57
Removal of clean standby diesel generator, >1 MW	9,288.11
Removal of clean electrical cable tray, $/linear foot	16.19
Removal of clean electrical conduit, $/linear foot	7.07
Removal of clean mechanical equipment, <300 pound	172.18
Removal of clean mechanical equipment, 300-1000 pound	596.53
Removal of clean mechanical equipment, 1000-10,000 pound	1,193.05
Removal of clean mechanical equipment, >10,000 pound	2,833.62
Removal of clean HVAC equipment, <300 pound	208.20
Removal of clean HVAC equipment, 300-1000 pound	716.77
Removal of clean HVAC equipment, 1000-10,000 pound	1,428.53
Removal of clean HVAC equipment, >10,000 pound	2,833.62
Removal of clean HVAC ductwork, $/pound	0.67
Removal of contaminated instrument and sampling tubing, $/linear foot	2.12
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	27.60
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	48.06
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	76.99
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	151.04
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	182.02
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	252.93
Removal of contaminated pipe >36 inches diameter, $/linear foot	299.41
Removal of contaminated valve >2 to 4 inches	596.47
Removal of contaminated valve >4 to 8 inches	713.66

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated valve >8 to 14 inches	1,457.10
Removal of contaminated valve >14 to 20 inches	1,855.89
Removal of contaminated valve >20 to 36 inches	2,475.96
Removal of contaminated valve >36 inches	2,940.80
Removal of contaminated pipe hanger for small bore piping	196.57
Removal of contaminated pipe hanger for large bore piping	627.04
Removal of contaminated pump, <300 pound	1,271.73
Removal of contaminated pump, 300-1000 pound	2,912.20
Removal of contaminated pump, 1000-10,000 pound	9,419.98
Removal of contaminated pump, >10,000 pound	22,949.80
Removal of contaminated pump motor, 300-1000 pound	1,224.80
Removal of contaminated pump motor, 1000-10,000 pound	3,820.36
Removal of contaminated pump motor, >10,000 pound	8,577.08
Removal of contaminated heat exchanger <3000 pound	5,745.96
Removal of contaminated heat exchanger >3000 pound	16,620.69
Removal of contaminated tank, <300 gallons	2,109.59
Removal of contaminated tank, >300 gallons, $/square foot	41.10
Removal of contaminated electrical equipment, <300 pound	992.28
Removal of contaminated electrical equipment, 300-1000 pound	2,374.42
Removal of contaminated electrical equipment, 1000-10,000 pound	4,571.64
Removal of contaminated electrical equipment, >10,000 pound	8,896.21
Removal of contaminated electrical cable tray, $/linear foot	47.99
Removal of contaminated electrical conduit, $/linear foot	22.33
Removal of contaminated mechanical equipment, <300 pound	1,104.56
Removal of contaminated mechanical equipment, 300-1000 pound	2,624.64
Removal of contaminated mechanical equipment, 1000-10,000 pound	5,045.24
Removal of contaminated mechanical equipment, >10,000 pound	8,896.21
Removal of contaminated HVAC equipment, <300 pound	1,104.56
Removal of contaminated HVAC equipment, 300-1000 pound	2,624.64
Removal of contaminated HVAC equipment, 1000-10,000 pound	5,045.24

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	**Cost/Unit($)**
Removal of contaminated HVAC equipment, >10,000 pound	8,896.21
Removal of contaminated HVAC ductwork, $/pound	2.88
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	5.18
Additional decontamination of surface by washing, $/square foot	10.82
Additional decontamination of surfaces by hydrolasing, $/square foot	46.25
Decontamination rig hook up and flush, $/ 250 foot length	9,363.44
Chemical flush of components/systems, $/gallon	20.36
Removal of clean standard reinforced concrete, $/cubic yard	176.00
Removal of grade slab concrete, $/cubic yard	236.02
Removal of clean concrete floors, $/cubic yard	458.27
Removal of sections of clean concrete floors, $/cubic yard	1,369.56
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	294.72
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	2,746.44
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	372.62
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	3,635.61
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	567.86
Removal of below-grade suspended floors, $/cubic yard	458.27
Removal of clean monolithic concrete structures, $/cubic yard	1,148.84
Removal of contaminated monolithic concrete structures, $/cubic yard	2,741.24
Removal of clean foundation concrete, $/cubic yard	902.94
Removal of contaminated foundation concrete, $/cubic yard	2,553.97
Explosive demolition of bulk concrete, $/cubic yard	39.04
Removal of clean hollow masonry block wall, $/cubic yard	127.04
Removal of contaminated hollow masonry block wall, $/cubic yard	450.03
Removal of clean solid masonry block wall, $/cubic yard	127.04
Removal of contaminated solid masonry block wall, $/cubic yard	450.03
Backfill of below-grade voids, $/cubic yard	36.27
Removal of subterranean tunnels/voids, $/linear foot	146.14
Placement of concrete for below-grade voids, $/cubic yard	139.00
Excavation of clean material, $/cubic yard	3.78

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	**Cost/Unit($)**
Excavation of contaminated material, $/cubic yard	52.86
Removal of clean concrete rubble (tipping fee included), $/cubic yard	28.80
Removal of contaminated concrete rubble, $/cubic yard	33.74
Removal of building by volume, $/cubic foot	0.38
Removal of clean building metal siding, $/square foot	1.69
Removal of contaminated building metal siding, $/square foot	6.08
Removal of standard asphalt roofing, $/square foot	2.99
Removal of transite panels, $/square foot	2.70
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	16.23
Scabbling contaminated concrete floors, $/square foot	10.18
Scabbling contaminated concrete walls, $/square foot	27.24
Scabbling contaminated ceilings, $/square foot	93.82
Scabbling structural steel, $/square foot	8.28
Removal of clean overhead crane/monorail < 10 ton capacity	830.25
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,454.05
Removal of clean overhead crane/monorail >10-50 ton capacity	1,992.60
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,888.73
Removal of polar crane > 50 ton capacity	8,320.63
Removal of gantry crane > 50 ton capacity	35,420.29
Removal of structural steel, $/pound	0.26
Removal of clean steel floor grating, $/square foot	5.97
Removal of contaminated steel floor grating, $/square foot	17.93
Removal of clean free standing steel liner, $/square foot	16.14
Removal of contaminated free standing steel liner, $/square foot	48.13
Removal of clean concrete-anchored steel liner, $/square foot	8.07
Removal of contaminated concrete-anchored steel liner, $/square foot	56.11
Placement of scaffolding in clean areas, $/square foot	17.60
Placement of scaffolding in contaminated areas, $/square foot	31.95
Landscaping with topsoil, $/acre	26,800.29
Cost of CPC B-88 LSA box & preparation for use	2,212.44

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Cost of CPC B-25 LSA box & preparation for use	2,025.85
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,655.88
Cost of CPC B-144 LSA box & preparation for use	11,184.40
Cost of LSA drum & preparation for use	230.65
Cost of cask liner for CNSI 8 120A cask (resins)	13,296.62
Cost of cask liner for CNSI 8 120A cask (filters)	9,629.75
Decontamination of surfaces with vacuuming, $/square foot	1.02

APPENDIX C

DETAILED COST ANALYSIS

DECON

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	202	43	245	245	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	310	67	377	377	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	713	153	866	866	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	202	43	245	245	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	1,163	250	1,412	1,412	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	481	103	584	584	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	775	166	942	942	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	635	136	771	771	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	763	164	927	834	-	93	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	646	139	785	706	-	78	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	78	17	94	94	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	1,101	236	1,337	1,337	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	1,008	216	1,224	1,224	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	78	17	94	94	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	484	104	588	588	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	248	53	301	151	-	151	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	62	13	75	-	-	75	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	62	13	75	-	-	75	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	484	104	588	294	-	294	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	713	153	866	866	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	140	30	169	85	-	85	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,865	1,259	7,124	6,273	-	851	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	372	80	452	452	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	644	3,644	3,644	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	217	47	264	264	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	494	2,794	2,794	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	191	41	232	232	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	16,735	3,592	20,328	19,477	-	851	-	-	-	-	-	-	-	73,753
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	21,664	4,650	26,314	26,314	-	-	-	-	-	-	-	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	219	103	-	2,835	-	1,068	4,225	4,225	-	-	-	10,245	-	-	-	624,945	317	-
1a.2	Subtotal Period 1a Additional Costs	-	-	219	103	-	2,835	21,664	5,718	30,538	30,538	-	-	-	10,245	-	-	-	624,945	317	-
Period 1a Collateral Costs																					
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	949	204	1,153	1,153	-	-	-	-	-	-	-	-	-	-
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	3,290	706	3,996	3,996	-	-	-	-	-	-	-	-	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	510	109	619	619	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	4,749	1,019	5,769	5,769	-	-	-	-	-	-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

															Burial Volumes						
Activity Index	**Activity Description**	**Decon Cost**	**Removal Cost**	**Packaging Costs**	**Transport Costs**	**Off-Site Processing Costs**	**LLRW Disposal Costs**	**Other Costs**	**Total Contingency**	**Total Costs**	**NRC Lic. Term. Costs**	**Spent Fuel Management Costs**	**Site Restoration Costs**	**Processed Volume Cu. Feet**	**Class A Cu. Feet**	**Class B Cu. Feet**	**Class C Cu. Feet**	**GTCC Cu. Feet**	**Burial / Processed Wt., Lbs.**	**Craft Manhours**	**Utility and Contractor Manhours**
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,132	162	1,294	1,294	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	177	25	203	203	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	526	-	-	-	-	-	188	714	714	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	507	-	-	-	-	-	122	689	689	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	4	-	16	-	9	43	43	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	587	3,324	3,324	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	169	1,350	1,350	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,001	143	1,145	-	1,145	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	792	170	963	-	963	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	547	117	664	-	664	-	-	-	-	-	-	-	-	-
1a.4.11	Severance Related Costs	-	-	-	-	-	-	41,741	8,960	50,701	50,701	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	22,783	4,890	27,673	27,673	-	-	-	-	-	-	-	-	-	302,908
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	37,370	8,022	45,392	45,392	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,093	14	4	-	16	109,462	23,565	134,153	131,382	2.771	-	-	610	-	-	-	12.190	20	726,308
1a.0	TOTAL PERIOD 1a COST	-	1,093	233	107	-	2,851	152,610	33,895	190,788	187,166	2,771	851	-	10,855	-	-	-	637,135	337	800,061
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	734	158	891	802	-	89	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	388	83	471	471	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	209	45	254	64	-	191	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	155	33	188	188	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	563	121	684	684	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	186	40	226	113	-	113	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	70	15	85	85	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	186	40	226	226	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	713	153	866	866	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	155	33	188	94	-	94	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	242	52	294	-	-	294	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	242	52	294	-	-	294	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	423	91	514	463	-	51	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	423	91	514	463	-	51	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	5,154	1.106	6,261	5,083	-	1,177	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	797	-	-	-	-	-	-	570	1,367	1,367	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	797	-	-	-	-	-	5.154	1,677	7,628	6,451	-	1,177	-	-	-	-	-	-	1,067	33,243
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	5,234	2,247	7,481	7,481	-	-	-	-	-	-	-	-	25,000	9.412
1b.2.2	Hazardous Waste Management	-	-	-	-	-	-	217	47	264	264	-	-	-	-	-	-	-	-	-	-
1b.2.3	Mixed Waste Management	-	-	-	-	-	-	287	62	349	349	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	5,738	2,355	8.093	8,093	-	-	-	-	-	-	-	-	25,000	9,412
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	942	-	-	-	-	-	-	202	1,144	1,144	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,465	315	1,780	1,780	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	46	-	32	54	-	151	-	103	386	386	-	-	-	291	-	-	-	17,471	57	-
1b.3.4	Process decommissioning chemical flush waste	2	-	94	251	-	5,783	-	2,138	8,269	8,269	-	-	-	-	887	-	-	94,531	166	-
1b.3.5	Small tool allowance	-	3	-	-	-	-	-	1	3	3	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	236	1,336	1,336	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,600	-	-	-	-	-	-	343	1,943	1,943	-	-	-	-	-	-	-	-	-	-
1b.3.8	Environmental Permits and Fees	-	-	-	-	-	-	471	101	572	572	-	-	-	-	-	-	-	-	-	-
1b.3.9	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	221	47	269	269	-	-	-	-	-	-	-	-	-	-
1b.3.10	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	513	110	623	623	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,590	1,103	127	305	-	5,934	2,670	3,597	16,326	16,326	-	-	-	291	887	-	-	112,002	223	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	29	-	-	-	-	-	-	10	39	39	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	561	80	642	642	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	292	-	-	-	-	-	104	396	396	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	281	-	-	-	-	-	60	341	341	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	2	-	10	-	5	25	25	-	-	-	354	-	-	-	7,084	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	2,714	583	3,297	3,297	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	342	49	391	391	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	497	71	568	-	568	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	393	84	477	-	477	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	271	58	329	-	329	-	-	-	-	-	-	-	-	-
1b.4.12	Severance Related Costs	-	-	-	-	-	-	2,454	527	2,981	2,981	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	10,570	2,269	12,839	12,839	-	-	-	-	-	-	-	-	-	142,214
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	7,046	1,512	8,558	8,558	-	-	-	-	-	-	-	-	-	63,091
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	18,638	4,001	22,638	22,638	-	-	-	-	-	-	-	-	-	210,994
1b.4	Subtotal Period 1b Period-Dependent Costs	29	573	8	2	-	10	43,674	9,427	53,622	52,248	1,374	-	-	354	-	-	-	7,084	12	416,300
1b.0	TOTAL PERIOD 1b COST	3,416	1,676	135	307	-	5,944	57,137	17,055	85,670	83,118	1,374	1,177	-	645	887	-	-	119,086	26,301	458,955
PERIOD 1 TOTALS		3,416	2,768	367	414	-	8,795	209,747	50,950	276,458	270,284	4,146	2,028	-	11,500	887	-	-	756,221	26,638	1,259,016
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	390	361	48	38	-	1,181	-	846	2,865	2,865	-	-	-	2,276	-	-	-	260,153	10,138	-
2a.1.1.2	Pressurizer Quench Tank	41	37	7	6	-	166	-	104	362	362	-	-	-	329	-	-	-	36,557	1,073	-
2a.1.1.3	Reactor Coolant Pumps & Motors	153	131	159	213	-	1,431	-	737	2,823	2,823	-	-	-	4,701	-	-	-	774,960	4,568	100
2a.1.1.4	Pressurizer	53	74	530	131	-	744	-	434	1,966	1,966	-	-	-	2,443	-	-	-	305,214	2,366	938
2a.1.1.5	Steam Generators	503	3,330	3,239	2,034	-	12,696	-	6,993	28,795	28,795	-	-	-	41,712	-	-	-	3,350,761	23,233	1,750
2a.1.1.6	Retired Steam Generator Units	-	-	2,298	1,982	-	12,696	-	5,296	22,272	22,272	-	-	-	41,031	-	-	-	3,125,629	10,800	1,125
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	207	380	246	35	-	661	-	563	2,092	2,092	-	-	-	3,881	-	-	-	145,494	7,976	-
2a.1.1.8	Reactor Vessel Internals	215	10,286	10,095	2,004	-	29,545	357	30,850	83,352	83,352	-	-	-	1,878	963	785	-	404,413	33,167	1,459
2a.1.1.9	Reactor Vessel	161	7,786	2,834	858	-	3,469	357	7,894	23,358	23,358	-	-	-	9,420	-	-	-	963,382	33,167	1,459
2a.1.1	Totals	1,724	22,385	19,456	7,300	-	62,587	714	53,719	167,885	167,885	-	-	-	107,671	963	785	-	9,366,562	126,487	6,830
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	212	-	-	-	-	-	45	257	-	-	257	-	-	-	-	-	-	3,033	-
2a.1.3	Main Condensers	-	696	-	-	-	-	-	149	846	-	-	846	-	-	-	-	-	-	9,875	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	*Reactor	-	1,262	-	-	-	-	-	271	1,533	1,533	-	-	-	-	-	-	-	-	11,895	-
2a.1.4.2	Containment Penetration Area	-	78	-	-	-	-	-	17	95	95	-	-	-	-	-	-	-	-	704	-
2a.1.4.3	Fuel Handling	-	205	-	-	-	-	-	44	249	249	-	-	-	-	-	-	-	-	1,746	-
2a.1.4	Totals	-	1,545	-	-	-	-	-	332	1,877	1,877	-	-	-	-	-	-	-	-	14,345	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Steam	-	154	-	-	-	-	-	33	187	-	-	187	-	-	-	-	-	-	2,310	-
2a.1.5.2	Auxiliary Steam (RCA)	-	278	41	16	-	508	-	290	1,133	1,133	-	-	-	1,835	-	-	-	111,862	3,714	-
2a.1.5.3	Condensate System	-	708	-	-	-	-	-	152	860	-	-	860	-	-	-	-	-	-	10,671	-
2a.1.5.4	Condensate System (Insulated)	-	293	-	-	-	-	-	63	356	-	-	356	-	-	-	-	-	-	4,367	-
2a.1.5.5	Containment Spray	-	252	121	47	-	1,506	-	656	2,583	2,583	-	-	-	5,441	-	-	-	331,619	3,631	-
2a.1.5.6	Extraction Steam & Heater Drip	-	274	-	-	-	-	-	59	332	-	-	332	-	-	-	-	-	-	4,152	-
2a.1.5.7	Feedwater System	-	48	-	-	-	-	-	10	58	-	-	58	-	-	-	-	-	-	706	-
2a.1.5.8	Feedwater System (Insulated)	-	176	-	-	-	-	-	38	213	-	-	213	-	-	-	-	-	-	2,655	-
2a.1.5.9	Feedwater System (RCA Insulated)	-	128	34	13	-	420	-	204	798	798	-	-	-	1,517	-	-	-	92,470	1,793	-
2a.1.5.10	Feedwater System (RCA)	-	6	2	1	-	22	-	11	41	41	-	-	-	80	-	-	-	4,867	86	-
2a.1.5.11	Lube Oil Distribution & Purification	-	120	-	-	-	-	-	26	146	-	-	146	-	-	-	-	-	-	1,817	-
2a.1.5.12	Nitrogen & Hydrogen	-	20	-	-	-	-	-	4	25	-	-	25	-	-	-	-	-	-	315	-
2a.1.5.13	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
2a.1.5.14	Nitrogen & Hydrogen (RCA Insulated)	-	6	0	0	-	4	-	4	14	14	-	-	-	15	-	-	-	937	77	-
2a.1.5.15	Nitrogen & Hydrogen (RCA)	-	111	6	3	-	81	-	70	271	271	-	-	-	292	-	-	-	17,803	1,463	-
2a.1.5.16	Oily Water Separator & TB Sump	-	38	10	4	-	132	-	63	247	247	-	-	-	478	-	-	-	29,138	477	-
2a.1.5.17	Saltwater System	-	198	-	-	-	-	-	43	241	-	-	241	-	-	-	-	-	-	2,926	-
2a.1.5.18	Turbine Steam Supply	-	790	-	-	-	-	-	170	960	-	-	960	-	-	-	-	-	-	11,955	-
2a.1.5.19	Turbine Steam Supply (RCA)	-	871	254	99	-	3,162	-	1,501	5,888	5,888	-	-	-	11,428	-	-	-	696,509	12,203	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

															Burial Volumes						
Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
2a.1.5.20	Turbine and Generator	-	84	-	-	-	-	-	18	102	-	-	102	-	-	-	-	-	-	1,244	-
2a.1.5.21	Turbine and Generator (Insulated)	-	28	-	-	-	-	-	6	34	-	-	34	-	-	-	-	-	-	422	-
2a.1.5	Totals	-	4,585	469	183	-	5,835	-	3,420	14,491	10,976	-	3,515	-	21,087	-	-	-	1,285,205	67,001	-
2a.1.6	Scaffolding in support of decommissioning	-	2,256	15	4	-	25	-	819	3,119	3,119	-	-	-	652	-	-	-	29,323	16,818	-
2a.1	Subtotal Period 2a Activity Costs	1,724	31,679	19,939	7,488	-	68,447	714	56,485	188,476	183,858	-	4,618	-	129,410	963	785	-	10,681,000	237,559	6,830
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	5,877	2,523	8,400	8,400	-	-	-	-	-	-	-	-	71,015	-
2a.2.2	Retired Reactor Head	-	-	263	81	-	1,515	-	597	2,456	2,456	-	-	-	5,072	-	-	-	322,442	2,098	40
2a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	6,098	1,309	7,407	7,407	-	-	-	-	-	-	-	-	-	59,803
2a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	5,875	1,261	7,136	7,136	-	-	-	-	-	-	-	-	-	91,694
2a.2	Subtotal Period 2a Additional Costs	-	-	263	81	-	1,515	17,850	5,690	25,399	25,399	-	-	-	5,072	-	-	-	322,442	73,114	151,537
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	69	-	50	84	-	235	-	159	597	597	-	-	-	453	-	-	-	27,170	88	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	298	-	-	-	-	-	64	302	326	-	36	-	-	-	-	-	-	-	-
2a.3.4	Environmental Permits and Fees	-	-	-	-	-	-	3,243	696	3,940	3,940	-	-	-	-	-	-	-	-	-	-
2a.3.5	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	2,305	495	2,800	2,800	-	-	-	-	-	-	-	-	-	-
2a.3.6	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	2,579	554	3,133	3,133	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	69	298	50	84	-	235	8,128	1,967	10,831	10,795	-	36	-	453	-	-	-	27,170	88	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	196	-	-	-	-	-	-	70	267	267	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,739	249	1,988	1,988	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	606	87	693	624	-	69	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	3,530	-	-	-	-	-	1,263	4,792	4,792	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	7,443	-	-	-	-	-	1,598	9,041	9,041	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	125	35	-	150	-	79	390	390	-	-	-	5,580	-	-	-	111,598	182	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	8,882	1,907	10,789	10,789	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	2,139	306	2,445	2,445	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,443	350	2,792	-	2,792	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,707	581	3,288	-	3,288	-	-	-	-	-	-	-	-	-
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	1,868	401	2,269	-	2,269	-	-	-	-	-	-	-	-	-
2a.4.12	Severance Related Costs	-	-	-	-	-	-	9,130	1,960	11,089	11,089	-	-	-	-	-	-	-	-	-	-
2a.4.13	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	1,863	400	2,263	-	2,263	-	-	-	-	-	-	-	-	-
2a.4.14	Security Staff Cost	-	-	-	-	-	-	66,601	14,296	80,898	80,898	-	-	-	-	-	-	-	-	-	909,241
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	77,702	16,679	94,381	94,381	-	-	-	-	-	-	-	-	-	712,571
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	115,873	24,872	140,745	140,745	-	-	-	-	-	-	-	-	-	1,308,922
2a.4	Subtotal Period 2a Period-Dependent Costs	196	10,973	125	35	-	150	291,554	65,097	368,131	357,449	10,613	69	-	5,580	-	-	-	111,598	182	2,930,735
2a.0	TOTAL PERIOD 2a COST	1,990	42,950	20,378	7,688	-	70,347	318,246	131,239	592,838	577,501	10,613	4,724	-	140,515	963	785	-	11,142,300	310,943	3,089,102
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Capital Additions 85-2002 (clean)	-	190	-	-	-	-	-	41	230	-	-	230	-	-	-	-	-	-	2,830	-
2b.1.1.2	Capital Additions 85-2002 (contaminated)	-	490	38	16	-	491	-	361	1,398	1,398	-	-	-	1,785	-	-	-	108,808	6,756	-
2b.1.1.3	Chemical & Volume Control	918	1,258	148	61	-	1,927	-	1,831	6,143	6,143	-	-	-	6,965	-	-	-	424,520	27,684	-
2b.1.1.4	Chemical & Volume Control (Insulated)	338	469	26	11	-	342	-	538	1,723	1,723	-	-	-	1,235	-	-	-	75,243	10,765	-
2b.1.1.5	Component Cooling Water	-	204	-	-	-	-	-	44	248	-	-	248	-	-	-	-	-	-	3,078	-
2b.1.1.6	Component Cooling Water (RCA)	-	622	149	58	-	1,852	-	919	3,599	3,599	-	-	-	6,692	-	-	-	407,837	8,514	-
2b.1.1.7	Compressed Air	-	181	-	-	-	-	-	39	220	-	-	220	-	-	-	-	-	-	2,744	-
2b.1.1.8	Compressed Air (Insulated)	-	6	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	98	-
2b.1.1.9	Compressed Air (RCA Insulated)	-	29	2	1	-	22	-	19	73	73	-	-	-	80	-	-	-	4,883	393	-
2b.1.1.10	Compressed Air (RCA)	-	538	34	13	-	421	-	351	1,358	1,358	-	-	-	1,522	-	-	-	92,770	7,199	-
2b.1.1.11	Diesel Engine-Generator	-	187	-	-	-	-	-	40	227	-	-	227	-	-	-	-	-	-	2,760	-
2b.1.1.12	Diesel Engine-Generator (Insulated)	-	12	-	-	-	-	-	3	14	-	-	14	-	-	-	-	-	-	178	-
2b.1.1.13	Electrical (Clean)	-	2,227	-	-	-	-	-	478	2,705	-	-	2,705	-	-	-	-	-	-	32,770	-
2b.1.1.14	Electrical (Contaminated)	-	636	86	35	-	1,124	-	649	2,531	2,531	-	-	-	4,061	-	-	-	247,499	8,650	-
2b.1.1.15	Electrical (Decontaminated)	-	3,481	-	-	-	-	-	747	4,228	-	-	4,228	-	-	-	-	-	-	49,541	-
2b.1.1.16	Fire Protection	-	396	123	50	-	1,607	-	745	2,922	2,922	-	-	-	5,808	-	-	-	353,970	5,466	-
2b.1.1.17	Gaseous Radwaste	-	89	6	2	-	72	-	59	228	228	-	-	-	262	-	-	-	16,953	1,166	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.18	HVAC (Clean Insulated)	-	29	-	-	-	-	-	6	35	-	-	35	-	-	-	-	-	-	475	-
2b.1.1.19	HVAC (Clean)	-	381	-	-	-	-	-	82	463	-	-	463	-	-	-	-	-	-	6,016	-
2b.1.1.20	HVAC (Contaminated Insulated)	-	321	49	20	-	643	-	356	1,389	1,389	-	-	-	2,324	-	-	-	141,631	4,102	-
2b.1.1.21	HVAC (Contaminated)	-	1,425	247	101	-	3,214	-	1,716	6,703	6,703	-	-	-	11,615	-	-	-	707,889	18,472	-
2b.1.1.22	Liquid Radwaste	610	801	82	34	-	1,072	-	1,126	3,725	3,725	-	-	-	3,874	-	-	-	236,137	18,782	-
2b.1.1.23	Liquid Radwaste (Insulated)	72	87	5	2	-	67	-	107	340	340	-	-	-	241	-	-	-	14,718	2,106	-
2b.1.1.24	Make-up Water	-	376	-	-	-	-	-	81	457	-	-	457	-	-	-	-	-	-	5,614	-
2b.1.1.25	Make-up Water (Insulated)	-	34	-	-	-	-	-	7	41	-	-	41	-	-	-	-	-	-	521	-
2b.1.1.26	Make-up Water (RCA Insulated)	-	45	5	2	-	59	-	38	148	148	-	-	-	212	-	-	-	12,896	594	-
2b.1.1.27	Make-up Water (RCA)	-	237	27	10	-	332	-	210	815	815	-	-	-	1,199	-	-	-	73,076	3.139	-
2b.1.1.28	Miscellaneous Reactor Coolant	22	141	9	3	-	111	-	108	393	393	-	-	-	402	-	-	-	24,489	2,158	-
2b.1.1.29	Nuclear Steam Supply Sampling	-	188	9	4	-	121	-	113	436	436	-	-	-	438	-	-	-	26,671	2,709	-
2b.1.1.30	Nuclear Steam Supply Sampling (Insulated	-	57	1	0	-	15	-	26	100	100	-	-	-	55	-	-	-	3,352	824	-
2b.1.1.31	Residual Heat Removal	338	344	123	50	-	1,603	-	966	3,424	3,424	-	-	-	5,793	-	-	-	353,070	6,035	-
2b.1.1.32	Safety Injection	-	132	16	7	-	210	-	126	491	491	-	-	-	759	-	-	-	46.248	1,852	-
2b.1.1.33	Safety Injection (Insulated)	-	6	1	0	-	8	-	5	21	21	-	-	-	30	-	-	-	1,841	89	-
2b.1.1.34	Safety Injection (RCA Insulated)	-	42	6	2	-	75	-	43	169	169	-	-	-	272	-	-	-	16,571	558	-
2b.1.1.35	Safety Injection (RCA)	-	352	54	21	-	677	-	380	1.485	1.485	-	-	-	2,447	-	-	-	149,139	4,655	-
2b.1.1.36	Service Cooling Water	-	123	-	-	-	-	-	26	149	-	-	149	-	-	-	-	-	-	1,856	-
2b.1.1.37	Service Cooling Water (RCA)	-	30	4	2	-	55	-	32	123	123	-	-	-	200	-	-	-	12,159	406	-
2b.1.1	Totals	2,297	16,165	1,251	507	-	16,123	-	12,420	48,763	39,737	-	9,026	-	58,270	-	-	-	3,551,368	251,548	-
2b.1.2	Scaffolding in support of decommissioning	-	2,820	18	5	-	32	-	1,024	3,899	3,899	-	-	-	815	-	-	-	36,653	21,023	-
Decontamination of Site Buildings																					
2b.1.3.1	*Reactor	983	2,637	1,132	5,306	-	25,386	-	12,030	47,475	47,475	-	-	-	349,938	-	-	-	33,233,450	43,339	-
2b.1.3.2	Capital Additions 85-2004	34	30	7	3	-	85	-	67	224	224	-	-	-	320	-	-	-	18,671	847	-
2b.1.3.3	Containment Penetration Area	335	225	25	27	-	328	-	447	1,386	1,386	-	-	-	2,129	-	-	-	172,793	7,352	-
2b.1.3	Totals	1,352	2,892	1,163	5,336	-	25,799	-	12,544	49,085	49,085	-	-	-	352,387	-	-	-	33,424,910	51,537	-
2b.1	Subtotal Period 2b Activity Costs	3,649	21,877	2,433	5,848	-	41,954	-	25,987	101,748	92,722	-	9,026	-	411,472	-	-	-	37.012,930	324,108	-
Period 2b Additional Costs																					
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,009	433	1,441	1,441	-	-	-	-	-	-	-	-	12,187	-
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	1,009	433	1,441	1,441	-	-	-	-	-	-	-	-	12,187	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	133	-	98	164	-	457	-	308	1,160	1,160	-	-	-	882	-	-	-	52,900	172	-
2b.3.2	Process decommissioning chemical flush waste	3	-	155	413	-	1,344	-	594	2,509	2,500	-	-	-	1,450	-	-	-	155,522	273	-
2b.3.3	Small tool allowance	-	400	-	-	-	-	-	86	486	486	-	-	-	-	-	-	-	-	-	-
2b.3.4	Environmental Permits and Fees	-	-	-	-	-	-	557	119	676	676	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	137	400	253	577	-	1,801	557	1,107	4,831	4,831	-	-	-	2,341	-	-	-	208,421	445	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	702	-	-	-	-	-	-	251	953	953	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	299	43	341	341	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	104	15	119	119	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	1,919	-	-	-	-	-	686	2.605	2.605	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	1,265	-	-	-	-	-	271	1.536	1.536	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	70	20	-	83	-	44	217	217	-	-	-	3,102	-	-	-	62,046	101	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,203	258	1,462	1,462	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	367	53	420	420	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	419	60	479	-	479	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	465	100	564	-	564	-	-	-	-	-	-	-	-	-
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	110	24	134	134	-	-	-	-	-	-	-	-	-	-
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	321	69	389	-	389	-	-	-	-	-	-	-	-	-
2b.4.13	Severance Related Costs	-	-	-	-	-	-	8,978	1,927	10,905	10,905	-	-	-	-	-	-	-	-	-	-
2b.4.14	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	637	137	774	-	774	-	-	-	-	-	-	-	-	-
2b.4.15	Security Staff Cost	-	-	-	-	-	-	11,096	2,382	13,478	13,478	-	-	-	-	-	-	-	-	-	152,246
2b.4.16	DOC Staff Cost	-	-	-	-	-	-	6,909	1,483	8,392	8,392	-	-	-	-	-	-	-	-	-	66,034
2b.4.17	Utility Staff Cost	-	-	-	-	-	-	10,751	2,308	13,058	13,058	-	-	-	-	-	-	-	-	-	122,897
2b.4	Subtotal Period 2b Period-Dependent Costs	702	3,183	70	20	-	83	41,657	10,110	55,825	53,619	2,207	-	-	3,102	-	-	-	62,046	101	341,177
2b.0	TOTAL PERIOD 2b COST	4,488	25,460	2,755	6,444	-	43,838	43,223	37,637	163,846	152,613	2,207	9,026	-	416,915	-	-	-	37,283,400	336,842	341,177

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2c - Spent fuel delay prior to SFP decon																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	40,531	8,700	49,231	-	49,231	-	-	-	-	-	-	-	-	-
2c.3.2	Environmental Permits and Fees	-	-	-	-	-	-	4,279	918	5,197	5,197	-	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	44,809	9,618	54,428	5,197	49,231	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	2,295	328	2,623	2,623	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	800	114	914	914	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	859	-	-	-	-	-	307	1,166	1,166	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	39	11	-	47	-	25	121	121	-	-	-	1,732	-	-	-	34,637	56	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	9,250	1,986	11,236	11,236	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	2,460	352	2,812	2,812	-	-	-	-	-	-	-	-	-	-
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,222	461	3,684	-	3,684	-	-	-	-	-	-	-	-	-
2c.4.8	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	846	182	1,027	1,027	-	-	-	-	-	-	-	-	-	-
2c.4.9	ISFSI Operating Costs	-	-	-	-	-	-	2,464	529	2,993	-	2,993	-	-	-	-	-	-	-	-	-
2c.4.10	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	47,317	10,157	57,473	-	57,473	-	-	-	-	-	-	-	-	-
2c.4.11	Security Staff Cost	-	-	-	-	-	-	85,022	18,250	103,273	51,636	51,636	-	-	-	-	-	-	-	-	1,170,300
2c.4.12	Utility Staff Cost	-	-	-	-	-	-	13,558	2,910	16,468	8,234	8,234	-	-	-	-	-	-	-	-	150,400
2c.4	Subtotal Period 2c Period-Dependent Costs	-	859	39	11	-	47	167,234	35,601	203,791	79,770	124,021	-	-	1,732	-	-	-	34,637	56	1,320,700
2c.0	TOTAL PERIOD 2c COST	-	859	39	11	-	47	212,044	45,220	258,219	84,967	173,251	-	-	1,732	-	-	-	34,637	56	1,320,700
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	602	59	163	33	-	1,066	-	863	2,786	2,786	-	-	-	3,852	-	-	-	234,773	965	-
Disposal of Plant Systems																					
2d.1.2.1	Electrical (Contaminated) - FHB	-	185	13	5	-	171	-	130	505	505	-	-	-	619	-	-	-	37,721	2,492	-
2d.1.2.2	Electrical (Decontaminated) - FHB	-	1,149	126	49	-	1,569	-	1,001	3,895	3,895	-	-	-	5,670	-	-	-	345,553	15,063	-
2d.1.2.3	Fire Protection (RCA)	-	250	28	11	-	342	-	218	849	849	-	-	-	1,237	-	-	-	75,373	3,308	-
2d.1.2.4	HVAC (Contaminated) - FHB	-	339	56	23	-	734	-	397	1,550	1,550	-	-	-	2,654	-	-	-	161,763	4,375	-
2d.1.2.5	Spent Fuel Pit Cooling	-	96	46	19	-	602	-	260	1,022	1,022	-	-	-	2,174	-	-	-	132,511	1,401	-
2d.1.2.6	Spent Fuel Pit Cooling - FHB	-	133	60	20	-	645	-	290	1,138	1,138	-	-	-	2,332	-	-	-	142,103	1,923	-
2d.1.2	Totals	-	2,152	319	128	-	4,063	-	2,297	8,959	8,959	-	-	-	14,685	-	-	-	806,024	28,562	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling	845	899	60	38	-	466	-	1,110	3,418	3,418	-	-	-	3,325	-	-	-	248,142	23,547	-
2d.1.3	Totals	845	899	60	38	-	466	-	1,110	3,418	3,418	-	-	-	3,325	-	-	-	248,142	23,547	-
2d.1.4	Scaffolding in support of decommissioning	-	564	4	1	-	6	-	205	780	780	-	-	-	163	-	-	-	7,331	4,205	-
2d.1	Subtotal Period 2d Activity Costs	1,447	3,674	545	201	-	5,602	-	4,475	15,943	15,943	-	-	-	22,025	-	-	-	1,385,269	57,278	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	845	363	1,208	1,208	-	-	-	-	-	-	-	-	-	6,240
2d.2.2	Remedial Action Surveys	-	-	-	-	-	-	792	340	1,132	1,132	-	-	-	-	-	-	-	-	9,567	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,637	703	2,340	2,340	-	-	-	-	-	-	-	-	9,567	6,240
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	45	-	35	59	-	165	-	109	414	414	-	-	-	319	-	-	-	19,142	62	-
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	82	-	-	-	-	-	18	100	100	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	150	52	-	258	-	125	585	585	-	-	-	6,667	-	-	-	300,000	88	-
2d.3.5	Environmental Permits and Fees	-	-	-	-	-	-	437	94	531	531	-	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	45	82	185	112	-	423	437	345	1,629	1,629	-	-	-	6,986	-	-	-	319,142	150	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	212	-	-	-	-	-	-	76	287	287	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	234	34	268	268	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	82	12	93	93	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	526	-	-	-	-	-	188	714	714	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	993	-	-	-	-	-	213	1,206	1,206	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	30	8	-	35	-	19	92	92	-	-	-	1,321	-	-	-	26,412	43	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2d Period-Dependent Costs (continued)																					
2d.4.7	Plant energy budget	-	-	-	-	-	-	504	108	612	612	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	245	35	280	280	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	165	24	188	-	188	-	-	-	-	-	-	-	-	-
2d.4.10	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	395	85	480	-	480	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	173	37	210	210	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	252	54	306	-	306	-	-	-	-	-	-	-	-	-
2d.4.13	Severance Related Costs	-	-	-	-	-	-	6,857	1,472	8,329	8,329	-	-	-	-	-	-	-	-	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1.364	293	1,657	1,657	-	-	-	-	-	-	-	-	-	16,800
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	3,639	781	4.420	4.420	-	-	-	-	-	-	-	-	-	35,040
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	5,079	1.090	6.170	6.170	-	-	-	-	-	-	-	-	-	58,080
2d.4	Subtotal Period 2d Period-Dependent Costs	212	1.518	30	8	-	35	18,989	4.520	25.312	24.338	974	-	-	1,321	-	-	-	26,412	43	109,920
2d.0	TOTAL PERIOD 2d COST	1,703	5,274	760	321	-	6,061	21.063	10,043	45,225	44,251	974	-	-	30,332	-	-	-	1.730.822	67,039	116,160
PERIOD 2e - Delay before License Termination																					
Period 2e Direct Decommissioning Activities																					
Period 2e Collateral Costs																					
2e.3.1	Environmental Permits and Fees	-	-	-	-	-	-	780	167	948	948	-	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	780	167	948	948	-	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	374	53	427	427	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	146	21	167	167	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	78	-	-	-	-	-	28	105	105	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	2	1	-	2	-	1	6	6	-	-	-	82	-	-	-	1,639	3	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	209	30	238	238	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	294	42	336	-	336	-	-	-	-	-	-	-	-	-
2e.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,098	236	1,333	-	1,333	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	449	96	546	-	546	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	2,850	612	3,462	3,462	-	-	-	-	-	-	-	-	-	36,103
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	1,061	228	1,289	1,289	-	-	-	-	-	-	-	-	-	12,000
2e.4	Subtotal Period 2e Period-Dependent Costs	-	78	2	1	-	2	6,480	1,347	7,909	5,694	2,215	-	-	82	-	-	-	1,639	3	48,103
2e.0	TOTAL PERIOD 2e COST	-	78	2	1	-	2	7,260	1,514	8,857	6,642	2,215	-	-	82	-	-	-	1,639	3	48,103
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	183	79	262	262	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	183	79	262	262	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	9,761	4,190	13,951	13,951	-	-	-	-	-	-	-	-	126,393	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	9,761	4.190	13.951	13.951	-	-	-	-	-	-	-	-	126,393	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,465	315	1,780	1,780	-	-	-	-	-	-	-	-	-	-
2f.3.2	Environmental Permits and Fees	-	-	-	-	-	-	715	154	869	869	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	2,181	468	2,649	2,649	-	-	-	-	-	-	-	-	-	-

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	342	49	391	391	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	134	19	153	153	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	684	-	-	-	-	-	245	929	929	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	2	-	9	-	5	24	24	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	412	89	501	501	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	455	65	521	521	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	269	39	308	-	308	-	-	-	-	-	-	-	-	-
2f.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,004	215	1,219	-	1,219	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	412	88	500	-	500	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	2,899	622	3,521	3,521	-	-	-	-	-	-	-	-	-	37,321
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	5,073	1,089	6,162	6,162	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5,744	1,233	6,977	6,977	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	684	8	2	-	9	16,745	3,758	21,206	19,178	2,027	-	-	337	-	-	-	6,734	11	144,179
2f.0	TOTAL PERIOD 2f COST	-	684	8	2	-	9	28,869	8,495	38,067	36,039	2,027	-	-	337	-	-	-	6,734	126,404	147,299
PERIOD 2 TOTALS		8,181	75,306	23,942	14,406	-	120,303	630,704	234,148	1,107,050	902,013	191,287	13,750	-	589,912	963	785	-	50,199,530	841,286	5,062,541
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	*Reactor	-	7,188	-	-	-	-	-	1,543	8,731	-	-	8,731	-	-	-	-	-	-	67,914	-
3b.1.1.2	Capital Additions 85-2004	-	320	-	-	-	-	-	69	388	-	-	388	-	-	-	-	-	-	3,572	-
3b.1.1.3	Containment Penetration Area	-	730	-	-	-	-	-	157	887	-	-	887	-	-	-	-	-	-	6,563	-
3b.1.1.4	Miscellaneous	-	31	-	-	-	-	-	7	37	-	-	37	-	-	-	-	-	-	249	-
3b.1.1.5	Turbine	-	3,897	-	-	-	-	-	837	4,734	-	-	4,734	-	-	-	-	-	-	38,603	-
3b.1.1.6	Turbine Pedestal	-	1,404	-	-	-	-	-	301	1,705	-	-	1,705	-	-	-	-	-	-	11,300	-
3b.1.1.7	Fuel Handling	-	1,979	-	-	-	-	-	425	2,403	-	-	2,403	-	-	-	-	-	-	16,750	-
3b.1.1	Totals	-	15,549	-	-	-	-	-	3,338	18,886	-	-	18,886	-	-	-	-	-	-	144,951	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	2,337	-	-	-	-	-	502	2,839	-	-	2,839	-	-	-	-	-	-	4,587	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	242	52	294	294	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	17,886	-	-	-	-	242	3,891	22,019	294	-	21,725	-	-	-	-	-	-	149,538	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	457	-	-	-	-	2	98	557	-	-	557	-	-	-	-	-	-	1,071	-
3b.2.2	Cofferdam Construction and Teardown	-	478	-	-	-	-	-	103	581	-	-	581	-	-	-	-	-	-	4,004	-
3b.2.3	Soil / Sediment Control Plant Area	-	1,334	-	-	-	-	-	286	1,620	-	-	1,620	-	-	-	-	-	-	10,271	-
3b.2.4	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	5,870	1,260	7,131	-	-	7,131	-	-	-	-	-	-	-	-
3b.2.5	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	4,976	1,068	6,044	-	-	6,044	-	-	-	-	-	-	-	-
3b.2.6	FSS Manager	-	-	-	-	-	-	622	134	756	756	-	-	-	-	-	-	-	-	-	5,148
3b.2	Subtotal Period 3b Additional Costs	-	2,268	-	-	-	-	11,471	2,949	16,688	756	-	15,932	-	-	-	-	-	-	16,247	5,148
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	208	-	-	-	-	-	45	253	-	-	253	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	208	-	-	-	-	-	45	253	-	-	253	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	563	81	643	-	643	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	440	63	502	-	502	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,589	-	-	-	-	-	1,629	9,218	-	-	9,218	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	678	145	823	-	-	823	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	45	359	-	359	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	885	127	1,012	-	1,012	-	-	-	-	-	-	-	-	-
3b.4.7	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	3,308	710	4,018	-	4,018	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,354	291	1,645	-	1,645	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	9,522	2,044	11,566	(0)	8,790	2,776	-	-	-	-	-	-	-	122,582
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	15,137	3,249	18,387	-	-	18,387	-	-	-	-	-	-	-	136,891
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	8,196	1,759	9,955	0	1,991	7,964	-	-	-	-	-	-	-	87,197
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,589	-	-	-	-	40,397	10,143	58,129	(0)	18,961	39,168	-	-	-	-	-	-	-	346,671
3b.0	TOTAL PERIOD 3b COST	-	27,951	-	-	-	-	52,110	17,028	97,088	1,050	18,961	77,078	-	-	-	-	-	-	165,784	353,379

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,141	736	5,876	-	5,876	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	4,015	575	4,589	-	4,589	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4,109	588	4,697	-	4,697	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	8,088	1,157	9,246	-	9,246	-	-	-	-	-	-	-	-	-
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	30,545	6,556	37,101	-	37,101	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	12,371	2,655	15,026	-	15,026	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	65,989	14,165	80,154	-	80,154	-	-	-	-	-	-	-	-	825,800
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	15,178	3,258	18,436	-	18,436	-	-	-	-	-	-	-	-	159,497
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	145,435	29,690	175,126	-	175,126	-	-	-	-	-	-	-	-	985,297
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	145,435	29,690	175,126	-	175,126	-	-	-	-	-	-	-	-	985,297
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	2,107	-	-	9,525	-	2,799	14,431	14,431	-	-	-	-	-	-	1,649	330,307	-	-
3d.1.1	Totals	-	-	2,107	-	-	9,525	-	2,799	14,431	14,431	-	-	-	-	-	-	1,649	330,307	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	2,107	-	-	9,525	-	2,799	14,431	14,431	-	-	-	-	-	-	1,649	330,307	-	-
Period 3d Collateral Costs																					
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	11	2	12	-	12	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	-	-	25	5	31	-	31	-	-	-	-	-	-	-	-	-
3d.4.5	Security Staff Cost	-	-	-	-	-	-	136	29	165	-	165	-	-	-	-	-	-	-	-	1,700
3d.4.6	Utility Staff Cost	-	-	-	-	-	-	31	7	38	-	38	-	-	-	-	-	-	-	-	328
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	211	44	255	-	255	-	-	-	-	-	-	-	-	2,028
3d.0	TOTAL PERIOD 3d COST	-	-	2,107	-	-	9,525	211	2,843	14,686	14,431	255	-	-	-	-	-	1,649	330,307	-	2,028
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	121	7	13	-	490	1,098	619	2,349	2,349	-	-	-	1,777	-	-	-	106,170	7,006	388
3e.2	Subtotal Period 3e Additional Costs	-	121	7	13	-	490	1,098	619	2,349	2,349	-	-	-	1,777	-	-	-	108,170	7,006	388
Period 3e Collateral Costs																					
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	79	28	107	107	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	59	21	80	80	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	141	50	191	191	-	-	-	-	-	-	-	-	-	1,901
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	184	66	250	250	-	-	-	-	-	-	-	-	-	1,901
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	462	165	628	628	-	-	-	-	-	-	-	-	-	3,803
3e.0	TOTAL PERIOD 3e COST	-	121	7	13	-	490	1,560	784	2,976	2,976	-	-	-	1,777	-	-	-	108,170	7,006	4,191

Table C-1
Diablo Canyon Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration ISFSI	-	1,642	-	-	-	-	2,749	942	5,333	-	-	5,333	-	-	-	-	-	-	20,443	80
3f.2.2	Soil / Sediment Control ISFSI Area	-	21	-	-	-	-	-	4	25	-	-	25	-	-	-	-	-	-	2,568	-
3f.2	Subtotal Period 3f Additional Costs	-	1,663	-	-	-	-	2,749	947	5,359	-	-	5,359	-	-	-	-	-	-	23,011	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	30	4	34	-	-	34	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	57	-	-	-	-	-	12	69	-	-	69	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	23	5	28	-	-	28	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	27	6	33	-	-	33	-	-	-	-	-	-	-	349
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	76	16	93	-	-	93	-	-	-	-	-	-	-	784
3f.4	Subtotal Period 3f Period-Dependent Costs	-	57	-	-	-	-	156	44	256	-	-	256	-	-	-	-	-	-	-	1,133
3f.0	TOTAL PERIOD 3f COST	-	1,744	-	-	-	-	2,905	996	5,645	-	-	5,645	-	-	-	-	-	-	23,011	1,213
PERIOD 3 TOTALS		-	29,816	2,115	13	-	10,016	202,221	51,341	295,522	18,457	194,342	82,723	-	1,777	-	-	1,649	438,477	195,800	1,346,109
TOTAL COST TO DECOMMISSION		**11,597**	**107,890**	**26,424**	**14,893**	**-**	**139,114**	**1,042,672**	**336,439**	**1,679,030**	**1,190,754**	**389,775**	**98,501**	**-**	**603,189**	**1,850**	**785**	**1,649**	**51,394,230**	**1,063,725**	**7,667,666**

TOTAL COST TO DECOMMISSION WITH 25.06% CONTINGENCY:	$1,679,030	thousands of 2014 dollars
TOTAL NRC LICENSE TERMINATION COST IS 70.92% OR:	$1,190,754	thousands of 2014 dollars
SPENT FUEL MANAGEMENT COST IS 23.21% OR:	$389,775	thousands of 2014 dollars
NON-NUCLEAR DEMOLITION COST IS 5.87% OR:	$98,501	thousands of 2014 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	605,824	Cubic Feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	1,649	Cubic Feet
TOTAL SCRAP METAL REMOVED:	49,707	Tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,063,725	Man-hours

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	133	29	162	162	-	-	-	-	-	-	-	-	-	856
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	305	66	372	372	-	-	-	-	-	-	-	-	-	1,969
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1a.1.10	End product description	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
1a.1.12	Define major work sequence	-	-	-	-	-	-	498	108	606	606	-	-	-	-	-	-	-	-	-	3,210
1a.1.13	Perform SER and EA	-	-	-	-	-	-	206	45	250	250	-	-	-	-	-	-	-	-	-	1,327
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	332	72	404	404	-	-	-	-	-	-	-	-	-	2,140
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	272	59	331	331	-	-	-	-	-	-	-	-	-	1,753
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	326	71	397	358	-	40	-	-	-	-	-	-	-	2,106
1a.1.17.2	Plant systems	-	-	-	-	-	-	277	60	337	303	-	34	-	-	-	-	-	-	-	1,783
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	33	7	40	40	-	-	-	-	-	-	-	-	-	214
1a.1.17.4	Reactor internals	-	-	-	-	-	-	471	102	573	573	-	-	-	-	-	-	-	-	-	3,039
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	431	94	525	525	-	-	-	-	-	-	-	-	-	2,782
1a.1.17.6	Biological shield	-	-	-	-	-	-	33	7	40	40	-	-	-	-	-	-	-	-	-	214
1a.1.17.7	Steam generators	-	-	-	-	-	-	207	45	252	252	-	-	-	-	-	-	-	-	-	1,335
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	106	23	129	65	-	65	-	-	-	-	-	-	-	685
1a.1.17.9	Main Turbine	-	-	-	-	-	-	27	6	32	-	-	32	-	-	-	-	-	-	-	171
1a.1.17.10	Main Condensers	-	-	-	-	-	-	27	6	32	-	-	32	-	-	-	-	-	-	-	171
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	207	45	252	126	-	126	-	-	-	-	-	-	-	1,335
1a.1.17.12	Waste management	-	-	-	-	-	-	305	66	372	372	-	-	-	-	-	-	-	-	-	1,969
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	60	13	73	36	-	36	-	-	-	-	-	-	-	385
1a.1.17	Total	-	-	-	-	-	-	2,510	545	3,055	2,690	-	365	-	-	-	-	-	-	-	16,190
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	159	35	194	194	-	-	-	-	-	-	-	-	-	1,027
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	651	3,651	3,651	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	93	20	113	113	-	-	-	-	-	-	-	-	-	599
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2.300	499	2,799	2,799	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	82	18	99	99	-	-	-	-	-	-	-	-	-	526
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	10.194	2,212	12.407	12,042	-	365	-	-	-	-	-	-	-	31,566
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	14.442	3.134	17.577	17,577	-	-	-	-	-	-	-	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	219	103	-	2,835	-	1,079	4.236	4,236	-	-	-	10,245	-	-	-	624,945	317	-
1a.2	Subtotal Period 1a Additional Costs	-	-	219	103	-	2,835	14.442	4,214	21.813	21,813	-	-	-	10,245	-	-	-	624.945	317	-
Period 1a Collateral Costs																					
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	949	206	1,155	1,155	-	-	-	-	-	-	-	-	-	-
1a.3.2	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	3,389	735	4,124	4,124	-	-	-	-	-	-	-	-	-	-
1a.3.3	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	1,571	341	1,912	1,912	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	5,909	1,282	7,192	7,192	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,132	164	1,296	1,296	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	177	26	203	203	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	495	-	-	-	-	-	179	674	674	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	567	-	-	-	-	-	123	690	690	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	4	-	15	-	8	40	40	-	-	-	565	-	-	-	11,299	18	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	594	3,331	3,331	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	834	121	954	954	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,001	145	1,146	-	1,146	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	792	172	964	-	964	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	547	119	665	-	665	-	-	-	-	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1a Period-Dependent Costs (continued)																					
1a.4.11	Severance Related Costs	-	-	-	-	-	-	45,943	9,970	55,913	55,913	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	21,315	4,626	25,941	25,941	-	-	-	-	-	-	-	-	-	286,786
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,883	6,485	36,368	36,368	-	-	-	-	-	-	-	-	-	346,229
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,062	13	4	-	15	104,362	22,731	128,186	125,409	2,776	-	-	565	-	-	-	11,299	18	633,014
1a.0	TOTAL PERIOD 1a COST	-	1,062	232	107	-	2,850	134,908	30,439	169,597	166,456	2,776	365	-	10,810	-	-	-	636,244	336	664,580
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	314	68	382	344	-	38	-	-	-	-	-	-	-	2,026
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1b.1.1.3	Reactor internals	-	-	-	-	-	-	166	36	202	202	-	-	-	-	-	-	-	-	-	1,070
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	90	19	109	27	-	82	-	-	-	-	-	-	-	578
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	66	14	81	81	-	-	-	-	-	-	-	-	-	428
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	241	52	293	293	-	-	-	-	-	-	-	-	-	1,554
1b.1.1.9	Facility closeout	-	-	-	-	-	-	80	17	97	48	-	48	-	-	-	-	-	-	-	514
1b.1.1.10	Missile shields	-	-	-	-	-	-	30	6	36	36	-	-	-	-	-	-	-	-	-	193
1b.1.1.11	Biological shield	-	-	-	-	-	-	80	17	97	97	-	-	-	-	-	-	-	-	-	514
1b.1.1.12	Steam generators	-	-	-	-	-	-	305	66	372	372	-	-	-	-	-	-	-	-	-	1,969
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	66	14	81	40	-	40	-	-	-	-	-	-	-	428
1b.1.1.14	Main Turbine	-	-	-	-	-	-	104	22	126	-	-	126	-	-	-	-	-	-	-	668
1b.1.1.15	Main Condensers	-	-	-	-	-	-	104	22	126	-	-	126	-	-	-	-	-	-	-	668
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	181	39	220	198	-	22	-	-	-	-	-	-	-	1,168
1b.1.1.17	Reactor building	-	-	-	-	-	-	181	39	220	198	-	22	-	-	-	-	-	-	-	1,168
1b.1.1	Total	-	-	-	-	-	-	2,206	479	2,685	2,180	-	505	-	-	-	-	-	-	-	14,228
1b.1.2	Decon primary loop	797	-	-	-	-	-	-	577	1,374	1,374	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	797	-	-	-	-	-	2,206	1,055	4,058	3,554	-	505	-	-	-	-	-	-	1,067	14,228
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	2,238	971	3,209	3,209	-	-	-	-	-	-	-	-	10,690	4,025
1b.2.2	Hazardous Waste Management	-	-	-	-	-	-	217	47	264	264	-	-	-	-	-	-	-	-	-	-
1b.2.3	Mixed Waste Management	-	-	-	-	-	-	287	62	349	349	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	2,742	1,081	3,823	3,823	-	-	-	-	-	-	-	-	10,690	4,025
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	942	-	-	-	-	-	-	204	1,147	1,147	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,465	318	1,784	1,784	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	46	-	32	54	-	151	-	104	388	388	-	-	-	291	-	-	-	17,471	57	-
1b.3.4	Process decommissioning chemical flush waste	2	-	94	251	-	5,783	-	2,161	8,292	8,292	-	-	-	-	887	-	-	94,531	166	-
1b.3.5	Small tool allowance	-	3	-	-	-	-	-	1	3	3	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	239	1,339	1,339	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,600	-	-	-	-	-	-	347	1,947	1,947	-	-	-	-	-	-	-	-	-	-
1b.3.8	Environmental Permits and Fees	-	-	-	-	-	-	471	102	573	573	-	-	-	-	-	-	-	-	-	-
1b.3.9	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	704	153	857	857	-	-	-	-	-	-	-	-	-	-
1b.3.10	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	613	133	746	746	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,590	1,103	127	305	-	5,934	3,254	3,763	17,076	17,076	-	-	-	291	887	-	-	112,002	223	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	29	-	-	-	-	-	-	10	39	39	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	561	81	642	642	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	269	-	-	-	-	-	97	367	367	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	281	-	-	-	-	-	61	342	342	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	2	-	9	-	5	23	23	-	-	-	322	-	-	-	6,439	11	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	2,714	589	3,303	3,303	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	231	33	264	264	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	497	72	568	-	568	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	393	85	478	-	478	-	-	-	-	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	271	59	330	-	330	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	10,570	2,294	12,864	12,864	-	-	-	-	-	-	-	-	-	142,214
1b.4.13	DOC Staff Cost	-	-	-	-	-	-	4,992	1,083	6,075	6,075	-	-	-	-	-	-	-	-	-	46,543
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	14,819	3,216	18,035	18,035	-	-	-	-	-	-	-	-	-	171,691
1b.4	Subtotal Period 1b Period-Dependent Costs	29	551	7	2	-	9	35,136	7,699	43,431	42,055	1,377	-	-	322	-	-	-	6,439	11	360,449
1b.0	TOTAL PERIOD 1b COST	3,416	1,653	134	307	-	5,943	43,338	13,598	68,388	66,507	1,377	505	-	613	887	-	-	118,441	11,900	378,701
PERIOD 1 TOTALS		3,416	2,715	366	414	-	8,793	178,246	44,037	237,985	232,963	4,153	870	-	11,423	887	-	-	754,685	12,325	1,043,282
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	390	361	48	38	-	1,181	-	856	2,874	2,874	-	-	-	2,276	-	-	-	260,153	10,138	-
2a.1.1.2	Pressurizer Quench Tank	41	37	7	6	-	166	-	106	363	363	-	-	-	329	-	-	-	36,557	1,073	-
2a.1.1.3	Reactor Coolant Pumps & Motors	153	131	159	213	-	1,431	-	745	2,831	2,831	-	-	-	4,701	-	-	-	774,960	4,568	100
2a.1.1.4	Pressurizer	53	70	448	114	-	750	-	425	1,859	1,859	-	-	-	2,443	-	-	-	286,592	2,366	938
2a.1.1.5	Steam Generators	503	3,330	3,239	2,034	-	12,696	-	7,070	28,872	28,872	-	-	-	41,712	-	-	-	3,350,761	23,233	1,750
2a.1.1.6	Retired Steam Generator Units	-	-	2,298	1,982	-	12,696	-	5,354	22,330	22,330	-	-	-	41,031	-	-	-	3,125,629	10,800	1,125
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	207	380	246	35	-	661	-	569	2,098	2,098	-	-	-	3,881	-	-	-	145,494	7,976	-
2a.1.1.8	Reactor Vessel Internals	185	10,112	9,705	1,509	-	18,920	334	23,069	63,834	63,834	-	-	-	1,878	963	393	-	344,339	30,833	1,365
2a.1.1.9	Reactor Vessel	161	7,612	2,639	858	-	3,469	334	7,818	22,890	22,890	-	-	-	9,420	-	-	-	963,382	30,833	1,365
2a.1.1	Totals	1,694	22,033	18,790	6,788	-	51,969	668	46,011	147,953	147,953	-	-	-	107,671	963	393	-	9,287,866	121,820	6,644
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	212	-	-	-	-	-	46	257	-	-	257	-	-	-	-	-	-	3,033	-
2a.1.3	Main Condensers	-	696	-	-	-	-	-	151	848	-	-	848	-	-	-	-	-	-	9,875	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	*Reactor	-	1,262	-	-	-	-	-	274	1,536	1,536	-	-	-	-	-	-	-	-	11,895	-
2a.1.4.2	Auxiliary	-	762	-	-	-	-	-	165	928	928	-	-	-	-	-	-	-	-	7,054	-
2a.1.4.3	Containment Penetration Area	-	78	-	-	-	-	-	17	96	96	-	-	-	-	-	-	-	-	704	-
2a.1.4.4	Radwaste Storage	-	97	-	-	-	-	-	21	118	118	-	-	-	-	-	-	-	-	918	-
2a.1.4.5	Fuel Handling	-	205	-	-	-	-	-	45	250	250	-	-	-	-	-	-	-	-	1,746	-
2a.1.4	Totals	-	2,405	-	-	-	-	-	522	2.927	2,927	-	-	-	-	-	-	-	-	22,317	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Steam	-	79	-	-	-	-	-	17	96	-	-	96	-	-	-	-	-	-	1,179	-
2a.1.5.2	Auxiliary Steam (RCA)	-	143	20	8	-	250	-	146	567	567	-	-	-	903	-	-	-	55.012	1,908	-
2a.1.5.3	Building Services (Non-Power Block)	-	7	-	-	-	-	-	2	9	-	-	9	-	-	-	-	-	-	106	-
2a.1.5.4	Condensate System	-	645	-	-	-	-	-	140	785	-	-	785	-	-	-	-	-	-	9,716	-
2a.1.5.5	Condensate System (Insulated)	-	286	-	-	-	-	-	62	348	-	-	348	-	-	-	-	-	-	4.253	-
2a.1.5.6	Containment Spray	-	238	117	46	-	1,453	-	638	2.492	2.492	-	-	-	5,251	-	-	-	320,048	3,420	-
2a.1.5.7	Extraction Steam & Heater Drip	-	240	-	-	-	-	-	52	292	-	-	292	-	-	-	-	-	-	3,625	-
2a.1.5.8	Feedwater System	-	70	-	-	-	-	-	15	85	-	-	85	-	-	-	-	-	-	1,038	-
2a.1.5.9	Feedwater System (Insulated)	-	168	-	-	-	-	-	37	205	-	-	205	-	-	-	-	-	-	2,547	-
2a.1.5.10	Feedwater System (RCA Insulated)	-	121	33	13	-	416	-	202	785	785	-	-	-	1,502	-	-	-	91,554	1,695	-
2a.1.5.11	Feedwater System (RCA)	-	6	2	1	-	22	-	10	41	41	-	-	-	79	-	-	-	4,819	81	-
2a.1.5.12	NSSS Sampling	-	165	7	3	-	87	-	93	354	354	-	-	-	315	-	-	-	19,173	2,400	-
2a.1.5.13	NSSS Sampling (Insulated)	-	49	1	0	-	8	-	21	79	79	-	-	-	30	-	-	-	1,852	711	-
2a.1.5.14	Nitrogen & Hydrogen	-	20	-	-	-	-	-	4	24	-	-	24	-	-	-	-	-	-	309	-
2a.1.5.15	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	16	-
2a.1.5.16	Nitrogen & Hydrogen (RCA Insulated)	-	6	0	0	-	4	-	3	13	13	-	-	-	14	-	-	-	834	73	-
2a.1.5.17	Nitrogen & Hydrogen (RCA)	-	105	6	2	-	72	-	65	250	250	-	-	-	260	-	-	-	15.841	1,391	-
2a.1.5.18	Oily Water Separator & TB Sump	-	30	7	3	-	88	-	44	171	171	-	-	-	317	-	-	-	19.303	403	-
2a.1.5.19	Saltwater System	-	188	-	-	-	-	-	41	229	-	-	229	-	-	-	-	-	-	2,779	-
2a.1.5.20	Turbine Steam Supply	-	794	-	-	-	-	-	172	966	-	-	966	-	-	-	-	-	-	12,007	-
2a.1.5.21	Turbine Steam Supply (RCA)	-	888	266	104	-	3,310	-	1,580	6.149	6,149	-	-	-	11,964	-	-	-	729,177	12,442	-
2a.1.5.22	Turbine and Generator	-	85	-	-	-	-	-	18	103	-	-	103	-	-	-	-	-	-	1,250	-
2a.1.5.23	Turbine and Generator (Insulated)	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	378	-
2a.1.5	Totals	-	4,357	458	179	-	5,710	-	3,369	14,074	10,900	-	3,174	-	20,636	-	-	-	1,257,612	63,726	-
2a.1.6	Scaffolding in support of decommissioning	-	4,424	32	9	-	56	-	1,627	6,148	6,148	-	-	-	1,444	-	-	-	64.977	35,763	-
2a.1	Subtotal Period 2a Activity Costs	1,694	34,127	19,281	6,977	-	57,734	668	51,726	172,206	167,928	-	4,279	-	129,750	963	393	-	10,610,460	256,534	6,644

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	5,302	2,301	7,603	7,603	-	-	-	-	-	-	-	-	64,068	-
2a.2.2	Retired Reactor Head	-	-	263	81	-	1,515	-	603	2,462	2,462	-	-	-	5,072	-	-	-	322,442	2,098	40
2a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	6,098	1,323	7,422	7,422	-	-	-	-	-	-	-	-	-	59,803
2a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	5,875	1,275	7,150	7,150	-	-	-	-	-	-	-	-	-	91,694
2a.2	Subtotal Period 2a Additional Costs	-	-	263	81	-	1,515	17,275	5,603	24,637	24,637	-	-	-	5,072	-	-	-	322,442	66,166	151,537
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	72	-	52	88	-	244	-	167	624	624	-	-	-	472	-	-	-	28,292	92	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	321	-	-	-	-	-	70	390	351	-	39	-	-	-	-	-	-	-	-
2a.3.4	Environmental Permits and Fees	-	-	-	-	-	-	2,926	635	3,561	3,561	-	-	-	-	-	-	-	-	-	-
2a.3.5	GTCC Storage Permitting (PG&E Labor)	-	-	-	-	-	-	1,722	374	2,096	2,096	-	-	-	-	-	-	-	-	-	-
2a.3.6	GTCC Storage Permitting (Contractor)	-	-	-	-	-	-	1,418	308	1,726	1,726	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	72	321	52	88	-	244	6,067	1,553	8,397	8,358	-	39	-	472	-	-	-	28,292	92	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	177	-	-	-	-	-	-	64	241	241	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,569	227	1,796	1,796	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	547	79	626	563	-	63	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	3,400	-	-	-	-	-	1,230	4,630	4,630	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	6,715	-	-	-	-	-	1,457	8,172	8,172	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	132	37	-	157	-	84	410	410	-	-	-	5,855	-	-	-	117,095	191	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	8,013	1,739	9,752	9,752	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	1,343	194	1,537	1,537	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	2,204	319	2,523	-	2,523	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	2,442	530	2,973	-	2,973	-	-	-	-	-	-	-	-	-
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	1,685	366	2,051	-	2,051	-	-	-	-	-	-	-	-	-
2a.4.12	Severance Related Costs	-	-	-	-	-	-	5,996	1,301	7,297	7,297	-	-	-	-	-	-	-	-	-	-
2a.4.13	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	2,500	543	3,043	-	3,043	-	-	-	-	-	-	-	-	-
2a.4.14	Security Staff Cost	-	-	-	-	-	-	58,331	12,659	70,989	70,989	-	-	-	-	-	-	-	-	-	800,357
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	70,100	15,213	85,313	85,313	-	-	-	-	-	-	-	-	-	642,857
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	107,381	23,303	130,685	130,685	-	-	-	-	-	-	-	-	-	1,205,357
2a.4	Subtotal Period 2a Period-Dependent Costs	177	10,115	132	37	-	157	262,112	59,307	332,037	321,386	10,589	63	-	5,855	-	-	-	117,095	191	2,648,572
2a.0	TOTAL PERIOD 2a COST	1,943	44,562	19,728	7,182	-	59,651	286,122	118,090	537,278	522,309	10,589	4,380	-	141,148	963	393	-	11,078,280	322,983	2,806,752
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Capital Additions 85-2002 (Clean)	-	467	-	-	-	-	-	101	568	-	-	568	-	-	-	-	-	-	7,040	-
2b.1.1.2	Capital Additions 85-2002 (contaminated)	-	492	54	22	-	699	-	443	1,710	1,710	-	-	-	2,525	-	-	-	153,905	6,599	-
2b.1.1.3	Chemical & Volume Control	849	1,090	127	52	-	1,653	-	1,636	5,408	5,408	-	-	-	5,975	-	-	-	364,137	24,672	-
2b.1.1.4	Chemical & Volume Control (Insulated)	307	436	24	10	-	317	-	500	1,595	1,595	-	-	-	1,146	-	-	-	69,872	9,920	-
2b.1.1.5	Component Cooling Water	-	198	-	-	-	-	-	43	241	-	-	241	-	-	-	-	-	-	2,984	-
2b.1.1.6	Component Cooling Water (RCA)	-	600	149	58	-	1,854	-	922	3,583	3,583	-	-	-	6,699	-	-	-	408,304	8,218	-
2b.1.1.7	Compressed Air	-	123	-	-	-	-	-	27	149	-	-	149	-	-	-	-	-	-	1,881	-
2b.1.1.8	Compressed Air (Insulated)	-	6	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	99	-
2b.1.1.9	Compressed Air (RCA Insulated)	-	29	2	1	-	24	-	20	75	75	-	-	-	85	-	-	-	5,193	400	-
2b.1.1.10	Compressed Air (RCA)	-	536	36	14	-	448	-	364	1,398	1,398	-	-	-	1,619	-	-	-	98,662	7,238	-
2b.1.1.11	Diesel Engine-Generator	-	143	-	-	-	-	-	31	174	-	-	174	-	-	-	-	-	-	2,089	-
2b.1.1.12	Diesel Engine-Generator (Insulated)	-	3	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	48	-
2b.1.1.13	Electrical (Clean)	-	3,257	-	-	-	-	-	707	3,963	-	-	3,963	-	-	-	-	-	-	47,918	-
2b.1.1.14	Electrical (Contaminated)	-	362	41	17	-	540	-	336	1,296	1,296	-	-	-	1,952	-	-	-	118,983	4,901	-
2b.1.1.15	Electrical (RCA)	-	1,963	-	-	-	-	-	426	2,389	-	-	2,389	-	-	-	-	-	-	27,955	-
2b.1.1.16	Fire Protection	-	374	122	50	-	1,584	-	737	2,866	2,866	-	-	-	5,725	-	-	-	348,902	5,149	-
2b.1.1.17	Gaseous Radwaste	-	135	14	6	-	183	-	118	456	456	-	-	-	660	-	-	-	40,203	1,833	-
2b.1.1.18	HVAC (Clean Insulated)	-	41	-	-	-	-	-	9	49	-	-	49	-	-	-	-	-	-	662	-
2b.1.1.19	HVAC (Clean)	-	438	-	-	-	-	-	95	533	-	-	533	-	-	-	-	-	-	7,019	-
2b.1.1.20	HVAC (Contaminated Insulated)	-	241	34	14	-	444	-	256	989	989	-	-	-	1,605	-	-	-	97,832	3,075	-
2b.1.1.21	HVAC (Contaminated)	-	1,073	173	71	-	2,250	-	1,242	4,808	4,808	-	-	-	8,132	-	-	-	495,632	13,888	-
2b.1.1.22	Liquid Radwaste	380	459	57	23	-	742	-	723	2,385	2,385	-	-	-	2,683	-	-	-	163,538	11,312	-
2b.1.1.23	Liquid Radwaste (Insulated)	31	44	3	1	-	33	-	51	163	163	-	-	-	120	-	-	-	7,330	1,002	-
2b.1.1.24	Lube Oil Distribution & Purification	-	132	-	-	-	-	-	29	160	-	-	160	-	-	-	-	-	-	1,964	-
2b.1.1.25	Make-up Water	-	255	-	-	-	-	-	55	311	-	-	311	-	-	-	-	-	-	3,794	-
2b.1.1.26	Make-up Water (Insulated)	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	376	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.27	Make-up Water (RCA Insulated)	-	33	4	2	-	52	-	31	121	121	-	-	-	186	-	-	-	11,355	441	-
2b.1.1.28	Make-up Water (RCA)	-	165	23	9	-	292	-	171	661	661	-	-	-	1,056	-	-	-	64,346	2,210	-
2b.1.1.29	Mechanical Department Equipment	-	1	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
2b.1.1.30	Miscellaneous Reactor Coolant	22	145	9	4	-	112	-	111	403	403	-	-	-	406	-	-	-	24,761	2,225	-
2b.1.1.31	Nuclear Steam Supply Sampling	-	22	1	1	-	16	-	14	53	53	-	-	-	59	-	-	-	3,566	280	-
2b.1.1.32	Nuclear Steam Supply Sampling (Insulated	-	9	1	0	-	7	-	6	23	23	-	-	-	25	-	-	-	1,528	120	-
2b.1.1.33	Residual Heat Removal	325	313	122	50	-	1,584	-	950	3,343	3,343	-	-	-	5,725	-	-	-	348,913	5,458	-
2b.1.1.34	Safety Injection	-	128	16	7	-	209	-	126	485	485	-	-	-	757	-	-	-	46,109	1,792	-
2b.1.1.35	Safety Injection (Insulated)	-	6	1	0	-	8	-	5	20	20	-	-	-	30	-	-	-	1,826	76	-
2b.1.1.36	Safety Injection (RCA Insulated)	-	39	6	2	-	75	-	42	164	164	-	-	-	270	-	-	-	16,433	517	-
2b.1.1.37	Safety Injection (RCA)	-	323	54	21	-	671	-	372	1,442	1,442	-	-	-	2,427	-	-	-	147,899	4,277	-
2b.1.1.38	Service Cooling Water	-	144	-	-	-	-	-	31	176	-	-	176	-	-	-	-	-	-	2,186	-
2b.1.1.39	Service Cooling Water (RCA)	-	37	6	2	-	74	-	42	162	162	-	-	-	269	-	-	-	16,409	505	-
2b.1.1.40	Sewer System Expansion	-	49	-	-	-	-	-	11	60	-	-	60	-	-	-	-	-	-	746	-
2b.1.1	Totals	1,914	14,335	1,078	436	-	13,873	-	10,789	42,424	33,606	-	8,816	-	50,136	-	-	-	3,055,638	222,884	-
2b.1.2	Scaffolding in support of decommissioning	-	5,530	41	12	-	70	-	2,034	7,686	7,686	-	-	-	1,805	-	-	-	81,221	44,703	-
Decontamination of Site Buildings																					
2b.1.3.1	*Reactor	983	2,637	1,132	5,306	-	25,386	-	12,162	47,607	47,607	-	-	-	349,938	-	-	-	33,233,450	43,340	-
2b.1.3.2	Auxiliary	1,359	773	62	92	-	691	-	1,541	4,518	4,518	-	-	-	6,804	-	-	-	582,052	28,093	-
2b.1.3.3	Capital Additions 85-2004	434	176	10	19	-	111	-	423	1,171	1,171	-	-	-	1,306	-	-	-	117,118	8,113	-
2b.1.3.4	Containment Penetration Area	335	225	25	27	-	328	-	452	1,391	1,391	-	-	-	2,129	-	-	-	172,793	7,352	-
2b.1.3.5	Radwaste Storage	9	65	4	9	-	35	-	45	166	166	-	-	-	606	-	-	-	55,154	867	-
2b.1.3	Totals	3,120	3,876	1,231	5,453	-	26,550	-	14,623	54,853	54,853	-	-	-	360,784	-	-	-	34,160,560	87,764	-
2b.1	Subtotal Period 2b Activity Costs	5,033	23,741	2,350	5,900	-	40,493	-	27,446	104,963	96,147	-	8,816	-	412,725	-	-	-	37,297,420	355,351	-
Period 2b Additional Costs																					
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,598	693	2,291	2,291	-	-	-	-	-	-	-	-	19,306	-
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	1,598	693	2,291	2,291	-	-	-	-	-	-	-	-	19,306	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	143	-	104	175	-	488	-	333	1,243	1,243	-	-	-	942	-	-	-	56,520	184	-
2b.3.2	Process decommissioning chemical flush waste	3	-	136	362	-	1,180	-	527	2,209	2,209	-	-	-	1,281	-	-	-	136,538	240	-
2b.3.3	Small tool allowance	-	436	-	-	-	-	-	95	531	531	-	-	-	-	-	-	-	-	-	-
2b.3.4	Environmental Permits and Fees	-	-	-	-	-	-	882	191	1,073	1,073	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	146	436	241	537	-	1,668	882	1,146	5,056	5,056	-	-	-	2,223	-	-	-	193,058	423	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,389	-	-	-	-	-	-	502	1,892	1,892	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	473	68	541	541	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	165	24	189	189	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,312	-	-	-	-	-	836	3,148	3,148	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	2,003	-	-	-	-	-	435	2,438	2,438	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	92	26	-	110	-	59	287	287	-	-	-	4,095	-	-	-	81,895	134	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,906	414	2,320	2,320	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	405	59	463	463	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	664	96	760	-	760	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	736	160	896	-	896	-	-	-	-	-	-	-	-	-
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	174	38	212	212	-	-	-	-	-	-	-	-	-	-
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	508	110	618	-	618	-	-	-	-	-	-	-	-	-
2b.4.13	Severance Related Costs	-	-	-	-	-	-	9,160	1,988	11,148	11,148	-	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	17,577	3,814	21,391	21,391	-	-	-	-	-	-	-	-	-	241,174
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	15,533	3,371	18,904	18,904	-	-	-	-	-	-	-	-	-	141,411
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	23,496	5,099	28,595	28,595	-	-	-	-	-	-	-	-	-	262,483
2b.4	Subtotal Period 2b Period-Dependent Costs	1,389	4,315	92	26	-	110	70,797	17,073	93,803	91,529	2,274	-	-	4,095	-	-	-	81,895	134	645,069
2b.0	TOTAL PERIOD 2b COST	6,568	28,493	2,683	6,463	-	42,271	73,277	46,358	206,113	195,022	2,274	8,816	-	419,043	-	-	-	37,572,380	375,214	645,069

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2c - Spent fuel delay prior to SFP decon																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	33,221	7,210	40,431	-	40,431	-	-	-	-	-	-	-	-	-
2c.3.2	Environmental Permits and Fees	-	-	-	-	-	-	4,271	927	5,198	5,198	-	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	37,492	8,136	45,628	5,198	40,431	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	2,290	331	2,622	2,622	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	798	115	914	914	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	978	-	-	-	-	-	354	1,331	1,331	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	43	12	-	51	-	27	133	133	-	-	-	1,902	-	-	-	38,042	62	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	9,233	2,004	11,237	11,237	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	1,689	244	1,934	1,934	-	-	-	-	-	-	-	-	-	-
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,217	465	3,682	-	3,682	-	-	-	-	-	-	-	-	-
2c.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	867	188	1,056	-	1,056	-	-	-	-	-	-	-	-	-
2c.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	844	183	1,027	1,027	-	-	-	-	-	-	-	-	-	-
2c.4.10	ISFSI Operating Costs	-	-	-	-	-	-	2,460	534	2,994	-	2,994	-	-	-	-	-	-	-	-	-
2c.4.11	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	38,783	8,417	47,200	-	47,200	-	-	-	-	-	-	-	-	-
2c.4.12	Security Staff Cost	-	-	-	-	-	-	98,076	21,284	119,359	59,680	59,680	-	-	-	-	-	-	-	-	1,349,724
2c.4.13	Utility Staff Cost	-	-	-	-	-	-	41,267	8,955	50,222	25,111	25,111	-	-	-	-	-	-	-	-	450,377
2c.4	Subtotal Period 2c Period-Dependent Costs	-	978	43	12	-	51	199,525	43,102	243,711	103,989	130,722	-	-	1,902	-	-	-	38,042	62	1,800,101
2c.0	TOTAL PERIOD 2c COST	-	978	43	12	-	51	237,017	51,239	289,339	109,187	180,153	-	-	1,902	-	-	-	38,042	62	1,800,101
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	602	59	163	33	-	1,066	-	873	2,796	2,796	-	-	-	3,852	-	-	-	234,773	965	-
Disposal of Plant Systems																					
2d.1.2.1	Electrical (Contaminated) - FHB	-	111	8	3	-	101	-	78	301	301	-	-	-	365	-	-	-	22,229	1,498	-
2d.1.2.2	Electrical (RCA)-FHB	-	681	74	29	-	918	-	595	2,297	2,297	-	-	-	3,317	-	-	-	202,180	8,927	-
2d.1.2.3	Fire Protection (RCA)	-	266	38	15	-	409	-	274	1,062	1,062	-	-	-	1,696	-	-	-	103,349	3,543	-
2d.1.2.4	HVAC (Contaminated) - FHB	-	240	37	15	-	476	-	267	1,034	1,034	-	-	-	1,719	-	-	-	104,757	3,086	-
2d.1.2.5	Spent Fuel Pit Cooling	-	96	47	19	-	609	-	266	1,037	1,037	-	-	-	2,200	-	-	-	134,079	1,410	-
2d.1.2.6	Spent Fuel Pit Cooling - FHB	-	133	50	21	-	655	-	297	1,156	1,156	-	-	-	2,367	-	-	-	144,255	1,921	-
2d.1.2	Totals	-	1,627	253	101	-	3,227	-	1,778	6,886	6,886	-	-	-	11,663	-	-	-	710,849	20,385	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling	845	899	60	38	-	466	-	1,122	3,430	3,430	-	-	-	3,325	-	-	-	248,142	23,547	-
2d.1.3	Totals	845	899	60	38	-	466	-	1,122	3,430	3,430	-	-	-	3,325	-	-	-	248,142	23,547	-
2d.1.4	Scaffolding in support of decommissioning	-	1,106	8	2	-	14	-	407	1,537	1,537	-	-	-	361	-	-	-	16,244	8,941	-
2d.1	Subtotal Period 2d Activity Costs	1,447	3,590	484	176	-	4,773	-	4,180	14,649	14,649	-	-	-	19,202	-	-	-	1,210,007	53,837	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	845	367	1,212	1,212	-	-	-	-	-	-	-	-	-	6,240
2d.2.2	Remedial Action Surveys	-	-	-	-	-	-	792	344	1,135	1,135	-	-	-	-	-	-	-	-	9,567	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,637	711	2,348	2,348	-	-	-	-	-	-	-	-	9,567	6,240
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	45	-	35	59	-	165	-	110	414	414	-	-	-	318	-	-	-	19,109	62	-
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	78	-	-	-	-	-	17	94	94	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	150	62	-	258	-	126	587	587	-	-	-	6,667	-	-	-	300,000	88	-
2d.3.5	Environmental Permits and Fees	-	-	-	-	-	-	437	95	532	532	-	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	45	78	185	111	-	423	437	348	1,627	1,627	-	-	-	6,985	-	-	-	319,109	150	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	212	-	-	-	-	-	-	77	288	288	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	234	34	268	268	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	82	12	93	93	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	528	-	-	-	-	-	191	719	719	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	993	-	-	-	-	-	215	1,208	1,208	-	-	-	-	-	-	-	-	-	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2d Period-Dependent Costs (continued)																					
2d.4.6	Disposal of DAW generated	-	-	40	11	-	48	-	26	125	125	-	-	-	1,781	-	-	-	35,629	58	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	504	109	613	613	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	168	24	193	193	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	165	24	188	-	188	-	-	-	-	-	-	-	-	-
2d.4.10	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	614	133	748	-	748	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	173	37	210	210	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	252	55	306	-	306	-	-	-	-	-	-	-	-	-
2d.4.13	Severance Related Costs	-	-	-	-	-	-	8,061	1,749	9,810	9,810	-	-	-	-	-	-	-	-	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1,771	384	2,155	2,155	-	-	-	-	-	-	-	-	-	22,800
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	5,269	1,143	6,412	6,412	-	-	-	-	-	-	-	-	-	48,000
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	8.490	1,842	10,332	10,332	-	-	-	-	-	-	-	-	-	91,680
2d.4	Subtotal Period 2d Period-Dependent Costs	212	1,520	40	11	-	48	25.781	6,056	33.669	32,427	1,242	-	-	1,781	-	-	-	35.629	58	162,480
2d.0	TOTAL PERIOD 2d COST	1,703	5.188	709	298	-	5,244	27,856	11,295	52.293	51,050	1,242	-	-	27,968	-	-	-	1,564,745	63,613	168,720
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	183	79	262	262	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	183	79	262	262	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	15,199	6,597	21,796	21,796	-	-	-	-	-	-	-	-	200,468	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	15,199	6,597	21,796	21,796	-	-	-	-	-	-	-	-	200,468	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,465	318	1,784	1,784	-	-	-	-	-	-	-	-	-	-
2f.3.2	Environmental Permits and Fees	-	-	-	-	-	-	715	155	870	870	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	2,181	473	2,654	2,654	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	342	50	392	392	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	134	19	153	153	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	904	-	-	-	-	-	327	1,231	1,231	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	2	-	9	-	5	24	24	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	412	89	502	502	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	302	44	346	346	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	269	39	308	-	308	-	-	-	-	-	-	-	-	-
2f.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	1,004	218	1,222	-	1,222	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	412	89	501	-	501	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	2.899	629	3,528	3,528	-	-	-	-	-	-	-	-	-	37,321
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	5.073	1,101	6,174	6,174	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5.744	1,247	6.990	6,990	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	904	8	2	-	9	16,592	3,857	21.371	19,339	2,031	-	-	337	-	-	-	6,734	11	144,179
2f.0	TOTAL PERIOD 2f COST	-	904	8	2	-	9	34,154	11,006	46,083	44,052	2,031	-	-	337	-	-	-	6.734	200,479	147,299
PERIOD 2 TOTALS		10,214	80,124	23,171	13.958	-	107,226	658,425	237,987	1,131,106	921,620	196,289	13,197	-	590,398	963	393	-	50,260,180	962,351	5,567,940
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	*Reactor	-	7,188	-	-	-	-	-	1,560	8,748	-	-	8,748	-	-	-	-	-	-	67,914	-
3b.1.1.2	Administration	-	1,150	-	-	-	-	-	250	1,400	-	-	1,400	-	-	-	-	-	-	10,358	-
3b.1.1.3	Auxiliary	-	6,986	-	-	-	-	-	1,516	8,502	-	-	8,502	-	-	-	-	-	-	64,471	-
3b.1.1.4	Capital Additions 85-2004	-	4,627	-	-	-	-	-	1,004	5,631	-	-	5,631	-	-	-	-	-	-	47,403	-
3b.1.1.5	Chemical Storage	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	46	-
3b.1.1.6	Chlorination	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	99	-
3b.1.1.7	Circulating Water Tunnels	-	1,214	-	-	-	-	-	264	1,478	-	-	1,478	-	-	-	-	-	-	12,194	-
3b.1.1.8	Cold Machine Shop	-	427	-	-	-	-	-	93	520	-	-	520	-	-	-	-	-	-	3,785	-
3b.1.1.9	Communication	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	44	-
3b.1.1.10	Condensate Polishing/Technical Support	-	926	-	-	-	-	-	201	1,127	-	-	1,127	-	-	-	-	-	-	9,300	-
3b.1.1.11	Containment Penetration Area	-	730	-	-	-	-	-	158	889	-	-	889	-	-	-	-	-	-	6,565	-
3b.1.1.12	Discharge Structure	-	997	-	-	-	-	-	216	1,214	-	-	1,214	-	-	-	-	-	-	8,321	-

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Demolition of Remaining Site Buildings (continued)																					
3b.1.1.13	Fabrication Shop	-	129	-	-	-	-	-	28	157	-	-	157	-	-	-	-	-	-	1,223	-
3b.1.1.14	Fire Pump House	-	5	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	55	-
3b.1.1.15	Hazardous Waste Storage Facility	-	42	-	-	-	-	-	9	52	-	-	52	-	-	-	-	-	-	430	-
3b.1.1.16	Intake Structure	-	5,655	-	-	-	-	-	1,227	6,882	-	-	6,882	-	-	-	-	-	-	46,364	-
3b.1.1.17	Maintenance Shop	-	394	-	-	-	-	-	86	480	-	-	480	-	-	-	-	-	-	3,444	-
3b.1.1.18	Miscellaneous Structures	-	68	-	-	-	-	-	15	83	-	-	83	-	-	-	-	-	-	673	-
3b.1.1.19	NPO Permanent Warehouse	-	1,468	-	-	-	-	-	310	1,787	-	-	1,787	-	-	-	-	-	-	14,093	-
3b.1.1.20	Ponds	-	2	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	24	-
3b.1.1.21	Portable Fire Pump & Fuel Cart	-	1	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	14	-
3b.1.1.22	Pretreatment	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	108	-
3b.1.1.23	Radwaste Storage	-	1,892	-	-	-	-	-	411	2,302	-	-	2,302	-	-	-	-	-	-	17,854	-
3b.1.1.24	Radwaste Storage Facility (Additional)	-	53	-	-	-	-	-	11	64	-	-	64	-	-	-	-	-	-	662	-
3b.1.1.25	Rotor Warehouse	-	902	-	-	-	-	-	196	1,098	-	-	1,098	-	-	-	-	-	-	9,938	-
3b.1.1.26	Security	-	367	-	-	-	-	-	80	447	-	-	447	-	-	-	-	-	-	3,944	-
3b.1.1.27	Security Buildings (additional)	-	57	-	-	-	-	-	12	70	-	-	70	-	-	-	-	-	-	722	-
3b.1.1.28	Security Modifications (2010 to 2015)	-	935	-	-	-	-	-	203	1,138	-	-	1,138	-	-	-	-	-	-	9,527	-
3b.1.1.29	Simulator	-	444	-	-	-	-	-	96	541	-	-	541	-	-	-	-	-	-	4,191	-
3b.1.1.30	Steam Generator Storage Facility	-	968	-	-	-	-	-	210	1,178	-	-	1,178	-	-	-	-	-	-	8,888	-
3b.1.1.31	Telephone Terminal	-	3	-	-	-	-	-	1	3	-	-	3	-	-	-	-	-	-	28	-
3b.1.1.32	Turbine	-	5,908	-	-	-	-	-	1,282	7,190	-	-	7,190	-	-	-	-	-	-	57,744	-
3b.1.1.33	Turbine Pedestal	-	1,404	-	-	-	-	-	305	1,709	-	-	1,709	-	-	-	-	-	-	11,300	-
3b.1.1.34	Vehicle Maintenance	-	37	-	-	-	-	-	8	45	-	-	45	-	-	-	-	-	-	367	-
3b.1.1.35	Waste Water Holding & Treatment Facility	-	24	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	238	-
3b.1.1.36	Fuel Handling	-	1,979	-	-	-	-	-	429	2,408	-	-	2,408	-	-	-	-	-	-	16,750	-
3b.1.1	Totals	-	47,015	-	-	-	-	-	10,203	57,218	-	-	57,218	-	-	-	-	-	-	439,079	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	2,337	-	-	-	-	-	507	2,844	-	-	2,844	-	-	-	-	-	-	4,587	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	104	22	126	126	-	-	-	-	-	-	-	-	-	668
3b.1	Subtotal Period 3b Activity Costs	-	49,352	-	-	-	-	104	10,733	60,188	126	-	60,062	-	-	-	-	-	-	443,666	668
Period 3b Additional Costs																					
3b.2.1	Backfill Structures & Concrete Removal (out of state disposal)	-	24,700	-	-	-	-	44,417	14,999	84,117	-	-	84,117	-	-	-	-	-	-	31,448	-
3b.2.2	Breakwater Demolition and Removal (out of state disposal)	-	73,657	-	-	-	-	168,613	63,233	305,503	-	-	305,503	-	-	-	-	-	-	294,408	-
3b.2.3	Cofferdam Construction and Teardown	-	478	-	-	-	-	-	104	582	-	-	582	-	-	-	-	-	-	4,004	-
3b.2.4	Concrete Crushing	-	1,473	-	-	-	-	7	321	1,801	-	-	1,801	-	-	-	-	-	-	6,359	-
3b.2.5	Disposal of Galbestos Siding	-	-	-	-	-	-	421	91	512	-	-	512	-	-	-	-	-	-	-	-
3b.2.6	Disposition of Mobile Barriers (out of state disposal)	-	168	-	-	-	-	472	139	779	-	-	779	-	-	-	-	-	-	1,445	-
3b.2.7	Soil / Sediment Control Plant Area	-	1,334	-	-	-	-	-	289	1,623	-	-	1,623	-	-	-	-	-	-	10,271	-
3b.2.8	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	5,870	1,274	7,144	-	-	7,144	-	-	-	-	-	-	-	-
3b.2.9	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	7,837	1,701	9,538	-	-	9,538	-	-	-	-	-	-	-	-
3b.2.10	FSS Manager	-	-	-	-	-	-	622	135	757	757	-	-	-	-	-	-	-	-	-	5,148
3b.2	Subtotal Period 3b Additional Costs	-	101,810	-	-	-	-	228,261	82,286	412,358	757	-	411,600	-	-	-	-	-	-	347,935	5,148
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	1,160	-	-	-	-	-	252	1,412	-	-	1,412	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	1,160	-	-	-	-	-	252	1,412	-	-	1,412	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	563	81	644	-	644	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	440	64	503	-	503	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,589	-	-	-	-	-	1,647	9,236	-	-	9,236	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	678	147	825	-	-	825	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	45	360	-	360	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	885	128	1,014	-	1,014	-	-	-	-	-	-	-	-	-
3b.4.7	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	3,308	718	4,026	-	4,026	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	1,354	294	1,648	-	1,648	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	9,529	2,068	11,598	0	8,814	2,783	-	-	-	-	-	-	-	122,686
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	15,137	3,285	18,423	-	-	18,423	-	-	-	-	-	-	-	136,891
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	8,196	1,779	9,974	(0)	1,995	7,979	-	-	-	-	-	-	-	87,197
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,589	-	-	-	-	40,405	10,256	58,249	0	19,004	39,246	-	-	-	-	-	-	-	346,774
3b.0	TOTAL PERIOD 3b COST	-	159,911	-	-	-	-	268,769	103,527	532,207	883	19,004	512,320	-	-	-	-	-	-	791,601	352,590

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,143	744	5,887	-	5,887	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	4,016	581	4,597	-	4,597	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4,111	595	4,705	-	4,705	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	8,091	1,171	9,262	-	9,262	-	-	-	-	-	-	-	-	-
3c.4.6	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	30,555	6,631	37,186	-	37,186	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	12,375	2,686	15,061	-	15,061	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	66,013	14,326	80,339	-	80,339	-	-	-	-	-	-	-	-	826,100
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	15,184	3,295	18,479	-	18,479	-	-	-	-	-	-	-	-	159,555
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	145,488	30,028	175,516	-	175,516	-	-	-	-	-	-	-	-	985,655
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	145,488	30,028	175,516	-	175,516	-	-	-	-	-	-	-	-	985,655
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	2,107	-	-	9,525	-	2,829	14,462	14,462	-	-	-	-	-	-	1,649	330,307	-	-
3d.1.1	Totals	-	-	2,107	-	-	9,525	-	2,829	14,462	14,462	-	-	-	-	-	-	1,649	330,307	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	2,107	-	-	9,525	-	2,829	14,462	14,462	-	-	-	-	-	-	1,649	330,307	-	-
Period 3d Collateral Costs																					
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	11	2	12	-	12	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	ISFSI Operating Costs	-	-	-	-	-	-	25	6	31	-	31	-	-	-	-	-	-	-	-	-
3d.4.5	Security Staff Cost	-	-	-	-	-	-	136	29	165	-	165	-	-	-	-	-	-	-	-	1,700
3d.4.6	Utility Staff Cost	-	-	-	-	-	-	31	7	38	-	38	-	-	-	-	-	-	-	-	328
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	211	45	256	-	256	-	-	-	-	-	-	-	-	2,028
3d.0	TOTAL PERIOD 3d COST	-	-	2,107	-	-	9,525	211	2,874	14,718	14,462	256	-	-	-	-	-	1,649	330,307	-	2,028
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	121	7	13	-	490	1,098	626	2,356	2,356	-	-	-	1,777	-	-	-	108,170	7,006	388
3e.2	Subtotal Period 3e Additional Costs	-	121	7	13	-	490	1,098	626	2,356	2,356	-	-	-	1,777	-	-	-	108,170	7,006	388
Period 3e Collateral Costs																					
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	79	28	107	107	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	59	21	80	80	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	141	51	192	192	-	-	-	-	-	-	-	-	-	1,901
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	184	66	250	250	-	-	-	-	-	-	-	-	-	1,901
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	462	167	629	629	-	-	-	-	-	-	-	-	-	3,803
3e.0	TOTAL PERIOD 3e COST	-	121	7	13	-	490	1,560	793	2,985	2,985	-	-	-	1,777	-	-	-	108,170	7,006	4,191

Table C-2
Diablo Canyon Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Demolition and Site Restoration ISFSI	-	1,642	-	-	-	-	2,749	953	5,344	-	-	5,344	-	-	-	-	-	-	20,443	80
3f.2.2	Area Soil / Sediment Control ISFSI	-	21	-	-	-	-	-	5	25	-	-	25	-	-	-	-	-	-	2,568	-
3f.2	Subtotal Period 3f Additional Costs	-	1,663	-	-	-	-	2,749	957	5,369	-	-	5,369	-	-	-	-	-	-	23,011	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	30	4	34	-	-	34	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	57	-	-	-	-	-	12	69	-	-	69	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	23	5	28	-	-	28	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	27	6	33	-	-	33	-	-	-	-	-	-	-	349
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	76	17	93	-	-	93	-	-	-	-	-	-	-	784
3f.4	Subtotal Period 3f Period-Dependent Costs	-	57	-	-	-	-	156	44	257	-	-	257	-	-	-	-	-	-	-	1,133
3f.0	TOTAL PERIOD 3f COST	-	1,744	-	-	-	-	2,905	1,007	5,656	-	-	5,656	-	-	-	-	-	-	23,011	1,213
PERIOD 3 TOTALS		-	161,776	2,115	13	-	10,016	418,934	138,228	731,081	18,330	194,775	517,976	-	1,777	-	-	1,649	438,477	821,617	1,345,678
TOTAL COST TO DECOMMISSION		**13,630**	**244,615**	**25,651**	**14,385**	**-**	**126,035**	**1,255,605**	**420,251**	**2,100,172**	**1,172,913**	**395,217**	**532,042**	**-**	**603,598**	**1,850**	**393**	**1,649**	**51,453,840**	**1,796,293**	**7,956,900**

TOTAL COST TO DECOMMISSION WITH 25.02% CONTINGENCY:	**$2,100,172 thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 55.85% OR:	**$1,172,913 thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 18.82% OR:	**$395,217 thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 25.33% OR:	**$532,042 thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**605,840 Cubic Feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**1,649 Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**78,297 Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,796,293 Man-hours**

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX D

DETAILED COST ANALYSIS

SAFSTOR

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	600	206	805	805	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	202	45	246	246	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	310	69	379	379	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	202	45	246	246	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	233	51	284	284	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	481	106	587	587	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	775	172	947	947	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	763	169	932	932	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	646	143	789	789	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	484	107	591	591	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	310	69	379	379	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	310	69	379	379	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,513	556	3,069	3,069	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	183	41	224	224	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	186	41	227	227	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	370	82	451	451	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	16	3	19	19	-	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	6,165	1,497	7,662	7,662	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	21,664	4,796	26,459	26,459	-	-	-	-	-	-	-	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	219	103	-	2,835	-	1,101	4,258	4,258	-	-	-	10,245	-	-	-	624,945	317	-
1a.2	Subtotal Period 1a Additional Costs	-	-	219	103	-	2,835	21,664	5,897	30,717	30,717	-	-	-	10,245	-	-	-	624,945	317	-
Period 1a Collateral Costs																					
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	949	210	1,160	1,160	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	949	210	1,160	1,160	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,132	167	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	177	26	204	204	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	526	-	-	-	-	-	194	720	720	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	567	-	-	-	-	-	126	692	692	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	4	-	16	-	9	43	43	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	606	3,342	3,342	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	174	1,355	1,355	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,001	148	1,149	-	1,149	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	792	175	968	-	968	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	547	121	668	-	668	-	-	-	-	-	-	-	-	-
1a.4.11	Severance Related Costs	-	-	-	-	-	-	41,741	9,240	50,982	50,982	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	22,783	5,043	27,826	27,826	-	-	-	-	-	-	-	-	-	302,908
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	37,370	8,273	45,643	45,643	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,093	14	4	-	16	109,462	24,302	134,891	132,106	2,785	-	-	610	-	-	-	12,190	20	726,308
1a.0	TOTAL PERIOD 1a COST	-	1,093	233	107	-	2,851	138,239	31,907	174,429	171,645	2,785	-	-	10,855	-	-	-	637,135	337	762,198

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	*Reactor	1,015	-	-	-	-	-	-	749	1,764	1,764	-	-	-	-	-	-	-	-	13,155	-
1b.1.1.2	Containment Penetration Area	284	-	-	-	-	-	-	210	494	494	-	-	-	-	-	-	-	-	3,917	-
1b.1.1.3	Fuel Handling	731	-	-	-	-	-	-	539	1,270	1,270	-	-	-	-	-	-	-	-	9,816	-
1b.1.1	Totals	2,030	-	-	-	-	-	-	1,498	3,528	3,528	-	-	-	-	-	-	-	-	26,888	-
1b.1	Subtotal Period 1b Activity Costs	2,030	-	-	-	-	-	-	1,498	3,528	3,528	-	-	-	-	-	-	-	-	26,888	-
Period 1b Additional Costs																					
1b.2.1	Hazardous Waste Management	-	-	-	-	-	-	217	48	265	265	-	-	-	-	-	-	-	-	-	-
1b.2.2	Mixed Waste Management	-	-	-	-	-	-	287	64	351	351	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	504	112	616	616	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	942	-	-	-	-	-	-	209	1,151	1,151	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	158	-	111	185	-	517	-	365	1,336	1,336	-	-	-	998	-	-	-	59,867	195	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	34	-	-	-	-	-	8	42	42	-	-	-	-	-	-	-	-	-	-
1b.3.5	Environmental Permits and Fees	-	-	-	-	-	-	239	53	292	292	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,100	34	111	185	-	517	239	634	2,821	2,821	-	-	-	998	-	-	-	59,867	195	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	847	-	-	-	-	-	-	313	1,160	1,160	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	285	42	327	327	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	45	7	51	51	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	264	-	-	-	-	-	97	361	361	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	143	-	-	-	-	-	32	175	175	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	9	3	-	11	-	6	29	29	-	-	-	412	-	-	-	8,244	13	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	690	153	842	842	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	174	26	200	200	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	252	37	290	-	290	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	200	44	244	-	244	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	138	31	168	-	168	-	-	-	-	-	-	-	-	-
1b.4.12	Severance Related Costs	-	-	-	-	-	-	328	73	401	401	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	5,373	1,189	6,562	6,562	-	-	-	-	-	-	-	-	-	72,286
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	9,419	2,085	11,504	11,504	-	-	-	-	-	-	-	-	-	106,720
1b.4	Subtotal Period 1b Period-Dependent Costs	847	406	9	3	-	11	16,904	4,134	22,315	21,613	702	-	-	412	-	-	-	8,244	13	179,006
1b.0	TOTAL PERIOD 1b COST	3,977	441	120	188	-	528	17,647	6,377	29,279	28,577	702	-	-	1,410	-	-	-	68,112	27,096	179,006
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	501	-	-	-	-	-	111	612	612	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	52	-	-	-	-	-	11	63	63	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	324	1,057	1,057	-	-	-	-	-	-	-	-	8,547	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	90	20	110	110	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	553	-	-	-	-	823	467	1,843	1,843	-	-	-	-	-	-	-	-	12,247	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	195	-	137	230	-	641	-	452	1,655	1,655	-	-	-	1,237	-	-	-	74,216	241	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Environmental Permits and Fees	-	-	-	-	-	-	231	51	283	283	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	195	5	137	230	-	641	231	504	1,944	1,944	-	-	-	1,237	-	-	-	74,216	241	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	276	41	317	317	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	43	6	50	50	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	188	-	-	-	-	-	70	258	258	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	138	-	-	-	-	-	31	169	169	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	1	-	4	-	2	10	10	-	-	-	149	-	-	-	2,972	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	667	148	815	815	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	168	25	193	193	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	244	36	280	-	280	-	-	-	-	-	-	-	-	-
1c.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	193	43	236	-	236	-	-	-	-	-	-	-	-	-
1c.4.10	ISFSI Operating Costs	-	-	-	-	-	-	133	30	163	-	163	-	-	-	-	-	-	-	-	-
1c.4.11	Severance Related Costs	-	-	-	-	-	-	16,227	3,592	19,819	19,819	-	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	5,197	1,151	6,348	6,348	-	-	-	-	-	-	-	-	-	69,929
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	9,112	2,017	11,129	11,129	-	-	-	-	-	-	-	-	-	103,240
1c.4	Subtotal Period 1c Period-Dependent Costs	-	327	3	1	-	4	32,262	7,190	39,787	39,108	679	-	-	149	-	-	-	2,972	5	173,169
1c.0	TOTAL PERIOD 1c COST	195	885	140	231	-	645	33,317	8,161	43,575	42,896	679	-	-	1,386	-	-	-	77,188	12,493	173,752
PERIOD 1 TOTALS		4,173	2,418	493	526	-	4,025	189,203	46,445	247,283	243,117	4,166	-	-	13,650	-	-	-	782,435	39,926	1,114,956
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,182	436	1,618	1,618	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,182	436	1,618	1,618	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Severance Related Costs	-	-	-	-	-	-	10,864	2,405	13,268	13,268	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	10,864	2,405	13,268	13,268	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	40,531	8,972	49,503	-	49,503	-	-	-	-	-	-	-	-	-
2a.3.2	Environmental Permits and Fees	-	-	-	-	-	-	8,079	1,788	9,867	9,867	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	48,609	10,761	59,370	9,867	49,503	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	4,333	639	4,072	4,277	695	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	1,510	223	1,733	1,733	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,849	-	-	-	-	-	682	2,532	2,532	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	46	13	-	55	-	30	144	144	-	-	-	2,045	-	-	-	40,900	67	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	4,658	1,031	5,689	2,844	2,844	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,462	363	2,826	2,826	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	6,084	898	6,982	-	6,982	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	6,743	1,493	8,236	-	8,236	-	-	-	-	-	-	-	-	-
2a.4.9	ISFSI Operating Costs	-	-	-	-	-	-	4,653	1,030	5,683	-	5,683	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	49,817	11,028	60,844	-	60,844	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	162,990	36,081	199,071	9,832	189,239	-	-	-	-	-	-	-	-	2,231,705
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	78,060	17,280	95,340	16,821	78,519	-	-	-	-	-	-	-	-	851,931
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,849	46	13	-	55	321,310	70,779	394,052	41,008	353,044	-	-	2,045	-	-	-	40,900	67	3,083,637
2a.0	TOTAL PERIOD 2a COST	-	1,849	46	13	-	55	381,965	84,380	468,309	65,762	402,547	-	-	2,045	-	-	-	40,900	67	3,083,637
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	3,776	1,393	5,169	5,169	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	3,776	1,393	5,169	5,169	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	12,353	1,823	14,176	13,664	512	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	4,824	712	5,536	5,536	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	2,772	-	-	-	-	-	1,023	3,795	3,795	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	68	19	-	81	-	44	211	211	-	-	-	3,004	-	-	-	60,088	98	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	7,439	1,647	9,086	9,086	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	7,502	1,107	8,609	8,609	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	9,718	1,434	11,153	-	11,153	-	-	-	-	-	-	-	-	-
2b.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	36,349	8,047	44,396	-	44,396	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	14,863	3,290	18,154	-	18,154	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	103,874	22.995	126,868	31,407	95,462	-	-	-	-	-	-	-	-	1.335,785
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	82,779	18.325	101,104	53,733	47,371	-	-	-	-	-	-	-	-	907,154
2b.4	Subtotal Period 2b Period-Dependent Costs	-	2.772	68	19	-	81	279,702	60,446	343,088	126,041	217,047	-	-	3,004	-	-	-	60,088	98	2,242,939
2b.0	TOTAL PERIOD 2b COST	-	2.772	68	19	-	81	283,478	61,839	348,257	131,210	217.047	-	-	3,004	-	-	-	60,088	98	2,242.939
PERIOD 2 TOTALS		-	4.622	114	32	-	136	665,443	146,220	816,566	196,972	619,594	-	-	5,049	-	-	-	100,987	165	5,326.576
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	202	45	246	246	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	713	158	871	871	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	202	45	246	246	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	1,163	257	1,420	1,420	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	481	106	587	587	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	775	172	947	947	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	635	141	776	776	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	1,143	253	1,396	1,256	-	140	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	646	143	789	710	-	79	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	1,101	244	1,345	1,345	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	1,008	223	1,231	1,231	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	78	17	95	95	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	484	107	591	591	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	248	55	303	151	-	151	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	62	14	76	-	-	76	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	62	14	76	-	-	76	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	484	107	591	295	-	295	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	713	158	871	871	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	140	31	170	85	-	85	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	6,167	1,365	7,533	6,631	-	902	-	-	-	-	-	-	-	39.777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	372	82	454	454	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	664	3,664	3,664	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	217	48	265	265	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	509	2,809	2,809	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	191	42	233	233	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	16,573	3,669	20,241	19,339	-	902	-	-	-	-	-	-	-	72,703
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,234	2,317	7,551	7,551	-	-	-	-	-	-	-	-	25,000	9,412
3a.2	Subtotal Period 3a Additional Costs	-	-	-	-	-	-	5,234	2,317	7,551	7,551	-	-	-	-	-	-	-	-	25,000	9,412
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	438	65	503	503	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	177	26	204	204	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	458	-	-	-	-	-	169	627	627	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	567	-	-	-	-	-	126	692	692	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	12	3	-	14	-	8	36	36	-	-	-	514	-	-	-	10,287	17	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3a Period-Dependent Costs (continued)																					
3a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	606	3,342	3,342	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	56	434	434	-	-	-	-	-	-	-	-	-	-
3a.4.8	Security Staff Cost	-	-	-	-	-	-	946	209	1,155	1,155	-	-	-	-	-	-	-	-	-	13,036
3a.4.9	Utility Staff Cost	-	-	-	-	-	-	23,187	5,133	28,319	28,319	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,025	12	3	-	14	27,863	6,397	35,313	35,313	-	-	-	514	-	-	-	10,287	17	271,664
3a.0	TOTAL PERIOD 3a COST	-	1,025	12	3	-	14	49,669	12,383	63,106	62,204	-	902	-	514	-	-	-	10,287	25,017	353,779
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	734	162	896	807	-	90	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	388	86	473	473	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	209	46	256	64	-	192	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	155	34	189	189	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	563	125	687	687	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	186	41	227	114	-	114	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	70	15	85	85	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	186	41	227	227	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	713	158	871	871	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	155	34	189	95	-	95	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	242	54	295	-	-	295	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	242	54	295	-	-	295	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	423	94	517	465	-	52	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	423	94	517	465	-	52	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,999	1,107	6,106	4,922	-	1,184	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,999	1,107	6,106	4,922	-	1,184	-	-	-	-	-	-	-	32,243
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	942	-	-	-	-	-	-	209	1,151	1,151	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,465	324	1,790	1,790	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	244	1,344	1,344	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	942	1,100	-	-	-	-	1,465	776	4,284	4,284	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	11	39	39	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	89	13	102	102	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	253	-	-	-	-	-	93	346	346	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	284	-	-	-	-	-	63	347	347	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	7	2	-	8	-	4	21	21	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	1,372	304	1,676	1,676	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	28	218	218	-	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	474	105	579	579	-	-	-	-	-	-	-	-	-	6,536
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	6,551	1,450	8,001	8,001	-	-	-	-	-	-	-	-	-	58,560
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	11,025	2,573	14,199	14,199	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	29	537	7	2	-	8	20,556	4,682	25,821	25,821	-	-	-	292	-	-	-	5,834	10	194,764
3b.0	TOTAL PERIOD 3b COST	971	1,637	7	2	-	8	27,021	6,565	36,211	35,027	-	1,184	-	292	-	-	-	5,834	10	227,007
PERIOD 3 TOTALS		971	2,662	18	5	-	22	76,690	18,948	99,316	97,230	-	2,086	-	806	-	-	-	16,121	25,026	580,786

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	83	327	48	27	-	1,181	-	630	2,296	2,296	-	-	-	2,276	-	-	-	260,153	5,614	-
4a.1.1.2	Pressurizer Quench Tank	9	33	7	4	-	166	-	82	301	301	-	-	-	329	-	-	-	36,557	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	36	116	87	198	-	1,431	-	654	2,520	2,520	-	-	-	4,701	-	-	-	774,960	2,706	80
4a.1.1.4	Pressurizer	11	70	370	110	-	750	-	390	1,702	1,702	-	-	-	2,443	-	-	-	267,055	1,501	750
4a.1.1.5	Steam Generators	107	3,330	2,250	1,982	-	12,696	-	6,762	27,126	27,126	-	-	-	41,712	-	-	-	3,350,761	20,508	1,125
4a.1.1.6	Retired Steam Generator Units	-	-	2,250	1,982	-	12,696	-	5,455	22,382	22,382	-	-	-	41,031	-	-	-	3,125,629	10,800	1,125
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	44	335	246	26	-	661	-	442	1,763	1,763	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.8	Reactor Vessel Internals	104	9,418	7,188	1,195	-	24,572	243	26,220	68,940	68,940	-	-	-	2,532	501	798	-	402,858	21,533	993
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,525	-	2,109	11,634	11,634	-	-	-	-	-	-	1,649	330,307	-	-
4a.1.1.10	Reactor Vessel	-	6,918	1,646	210	-	2,901	243	6,453	18,371	18,371	-	-	-	9,531	-	-	-	963,812	21,533	993
4a.1.1	Totals	393	20,545	14,093	5,735	-	66,577	486	49,195	157,025	157,025	-	-	-	108,436	501	798	1,649	9,657,585	90,114	5,067
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	212	-	-	-	-	-	47	258	-	-	258	-	-	-	-	-	-	3,033	-
4a.1.3	Main Condensers	-	696	-	-	-	-	-	154	851	-	-	851	-	-	-	-	-	-	9,875	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	*Reactor	-	1,262	-	-	-	-	-	279	1,542	1,542	-	-	-	-	-	-	-	-	11,895	-
4a.1.4.2	Containment Penetration Area	-	78	-	-	-	-	-	17	95	95	-	-	-	-	-	-	-	-	704	-
4a.1.4.3	Fuel Handling	-	205	-	-	-	-	-	45	251	251	-	-	-	-	-	-	-	-	1,746	-
4a.1.4	Totals	-	1,545	-	-	-	-	-	342	1,888	1,888	-	-	-	-	-	-	-	-	14,345	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Steam	-	154	-	-	-	-	-	34	188	-	-	188	-	-	-	-	-	-	2,310	-
4a.1.5.2	Auxiliary Steam (RCA)	-	278	41	16	-	508	-	299	1,142	1,142	-	-	-	1,835	-	-	-	111,862	3,714	-
4a.1.5.3	Condensate System	-	708	-	-	-	-	-	157	865	-	-	865	-	-	-	-	-	-	10,671	-
4a.1.5.4	Condensate System (Insulated)	-	293	-	-	-	-	-	65	358	-	-	358	-	-	-	-	-	-	4,367	-
4a.1.5.5	Containment Spray	-	252	121	47	-	1,506	-	677	2,603	2,603	-	-	-	5,441	-	-	-	331,619	3,631	-
4a.1.5.6	Extraction Steam & Heater Drip	-	274	-	-	-	-	-	61	334	-	-	334	-	-	-	-	-	-	4,152	-
4a.1.5.7	Feedwater System	-	48	-	-	-	-	-	11	58	-	-	58	-	-	-	-	-	-	706	-
4a.1.5.8	Feedwater System (Insulated)	-	176	-	-	-	-	-	39	214	-	-	214	-	-	-	-	-	-	2,655	-
4a.1.5.9	Feedwater System (RCA Insulated)	-	128	34	13	-	420	-	210	805	805	-	-	-	1,517	-	-	-	92,470	1,793	-
4a.1.5.10	Feedwater System (RCA)	-	6	2	1	-	22	-	11	42	42	-	-	-	80	-	-	-	4,867	86	-
4a.1.5.11	Lube Oil Distribution & Purification	-	120	-	-	-	-	-	27	147	-	-	147	-	-	-	-	-	-	1,817	-
4a.1.5.12	Nitrogen & Hydrogen	-	20	-	-	-	-	-	5	25	-	-	25	-	-	-	-	-	-	315	-
4a.1.5.13	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
4a.1.5.14	Nitrogen & Hydrogen (RCA Insulated)	-	6	0	0	-	4	-	4	14	14	-	-	-	15	-	-	-	937	77	-
4a.1.5.15	Nitrogen & Hydrogen (RCA)	-	111	6	3	-	81	-	72	273	273	-	-	-	292	-	-	-	17,803	1,463	-
4a.1.5.16	Oily Water Separator & TB Sump	-	39	10	4	-	132	-	66	252	252	-	-	-	478	-	-	-	29,138	501	-
4a.1.5.17	Saltwater System	-	198	-	-	-	-	-	44	242	-	-	242	-	-	-	-	-	-	2,926	-
4a.1.5.18	Turbine Steam Supply	-	790	-	-	-	-	-	175	965	-	-	965	-	-	-	-	-	-	11,955	-
4a.1.5.19	Turbine Steam Supply (RCA)	-	871	254	99	-	3,162	-	1,548	5,935	5,935	-	-	-	11,428	-	-	-	696,509	12,203	-
4a.1.5.20	Turbine and Generator	-	84	-	-	-	-	-	19	103	-	-	103	-	-	-	-	-	-	1,244	-
4a.1.5.21	Turbine and Generator (Insulated)	-	28	-	-	-	-	-	6	34	-	-	34	-	-	-	-	-	-	422	-
4a.1.5	Totals	-	4,586	469	183	-	5,835	-	3,527	14,601	11,066	-	3,535	-	21,087	-	-	-	1,285,205	67,025	-
4a.1.6	Scaffolding in support of decommissioning	-	2,199	15	4	-	25	-	824	3,067	3,067	-	-	-	652	-	-	-	29,323	15,949	-
4a.1	Subtotal Period 4a Activity Costs	393	29,784	14,576	5,923	-	72,437	486	54,090	177,689	173,045	-	4,644	-	130,175	501	798	1,649	10,972,110	200,340	5,067
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	4,703	2,082	6,786	6,786	-	-	-	-	-	-	-	-	56,835	-
4a.2.2	Retired Reactor Head	-	-	263	81	-	1,515	-	616	2,474	2,474	-	-	-	5,072	-	-	-	322,442	2,098	40
4a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	4,269	945	5,214	5,214	-	-	-	-	-	-	-	-	-	41,862
4a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	4,113	910	5,023	5,023	-	-	-	-	-	-	-	-	-	64,186
4a.2	Subtotal Period 4a Additional Costs	-	-	263	81	-	1,515	13,085	4,553	19,497	19,497	-	-	-	5,072	-	-	-	322,442	58,933	106,088
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	6	-	9	15	-	42	-	25	97	97	-	-	-	82	-	-	-	4,895	16	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	239	-	-	-	-	-	53	291	262	-	29	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	6	239	9	15	-	42	-	78	389	300	-	29	-	82	-	-	-	4,895	16	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	157	-	-	-	-	-	-	58	215	215	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	1,392	205	1,598	1,598	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	485	72	557	501	-	56	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,809	-	-	-	-	-	1,037	3,846	3,846	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	5,957	-	-	-	-	-	1,319	7,276	7,276	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	95	27	-	113	-	62	297	297	-	-	-	4,218	-	-	-	84,365	138	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	7,108	1,574	8,682	8,682	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	1,650	244	1,894	1,894	-	-	-	-	-	-	-	-	-	-
4a.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,026	227	1,253	1,253	-	-	-	-	-	-	-	-	-	-
4a.4.10	Security Staff Cost	-	-	-	-	-	-	2,586	573	3,159	3,159	-	-	-	-	-	-	-	-	-	35,643
4a.4.11	DOC Staff Cost	-	-	-	-	-	-	56,486	12,504	68,990	68,990	-	-	-	-	-	-	-	-	-	523,123
4a.4.12	Utility Staff Cost	-	-	-	-	-	-	81,582	18,060	99,641	99,641	-	-	-	-	-	-	-	-	-	928,140
4a.4	Subtotal Period 4a Period-Dependent Costs	157	8,766	95	27	-	113	152,316	35,933	197,408	197,352	-	56	-	4,218	-	-	-	84,365	138	1,486,906
4a.0	TOTAL PERIOD 4a COST	556	38,789	14,943	6,045	-	74,108	165,887	94,653	394,983	390,254	-	4,729	-	139,547	501	798	1,649	11,383,810	259,427	1,598,061
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	544	59	163	33	-	1,066	-	848	2,714	2,714	-	-	-	3,852	-	-	-	234,773	965	-
Disposal of Plant Systems																					
4b.1.2.1	Capital Additions 85-2002 (clean)	-	190	-	-	-	-	-	42	232	-	-	232	-	-	-	-	-	-	2,830	-
4b.1.2.2	Capital Additions 85-2002 (contaminated)	-	436	38	16	-	494	-	352	1,335	1,335	-	-	-	1,785	-	-	-	108,808	5,953	-
4b.1.2.3	Chemical & Volume Control	-	1,135	148	61	-	1,927	-	1,165	4,436	4,436	-	-	-	6,965	-	-	-	424,520	15,526	-
4b.1.2.4	Chemical & Volume Control (Insulated)	-	426	26	11	-	342	-	290	1,095	1,095	-	-	-	1,235	-	-	-	75,243	5,660	-
4b.1.2.5	Component Cooling Water	-	204	-	-	-	-	-	45	249	-	-	249	-	-	-	-	-	-	3,078	-
4b.1.2.6	Component Cooling Water (RCA)	-	622	149	58	-	1,852	-	947	3,628	3,628	-	-	-	6,692	-	-	-	407,837	8,514	-
4b.1.2.7	Compressed Air	-	181	-	-	-	-	-	40	221	-	-	221	-	-	-	-	-	-	2,744	-
4b.1.2.8	Compressed Air (Insulated)	-	6	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	98	-
4b.1.2.9	Compressed Air (RCA Insulated)	-	29	2	1	-	22	-	19	73	73	-	-	-	80	-	-	-	4,883	393	-
4b.1.2.10	Compressed Air (RCA)	-	538	34	13	-	421	-	362	1,369	1,369	-	-	-	1,522	-	-	-	92,770	7,199	-
4b.1.2.11	Diesel Engine-Generator	-	187	-	-	-	-	-	41	229	-	-	229	-	-	-	-	-	-	2,760	-
4b.1.2.12	Diesel Engine-Generator (Insulated)	-	12	-	-	-	-	-	3	14	-	-	14	-	-	-	-	-	-	178	-
4b.1.2.13	Electrical (Clean)	-	2,227	-	-	-	-	-	493	2,720	-	-	2,720	-	-	-	-	-	-	32,770	-
4b.1.2.14	Electrical (Contaminated)	-	573	86	35	-	1,124	-	647	2,465	2,465	-	-	-	4,061	-	-	-	247,499	7,746	-
4b.1.2.15	Electrical (Contaminated) - FHB	-	167	13	5	-	171	-	128	484	484	-	-	-	619	-	-	-	37,721	2,230	-
4b.1.2.16	Electrical (Decontaminated)	-	3,481	-	-	-	-	-	770	4,251	-	-	4,251	-	-	-	-	-	-	49,541	-
4b.1.2.17	Electrical (Decontaminated) - FHB	-	1,149	126	49	-	1,569	-	1,032	3,926	3,926	-	-	-	5,670	-	-	-	345,553	15,063	-
4b.1.2.18	Fire Protection	-	407	123	50	-	1,607	-	773	2,961	2,961	-	-	-	5,808	-	-	-	353,970	5,616	-
4b.1.2.19	Fire Protection (RCA)	-	250	28	11	-	342	-	225	856	856	-	-	-	1,237	-	-	-	75,373	3,308	-
4b.1.2.20	Gaseous Radwaste	-	81	6	2	-	72	-	58	220	220	-	-	-	262	-	-	-	15,953	1,049	-
4b.1.2.21	HVAC (Clean Insulated)	-	29	-	-	-	-	-	6	36	-	-	36	-	-	-	-	-	-	475	-
4b.1.2.22	HVAC (Clean)	-	381	-	-	-	-	-	84	465	-	-	465	-	-	-	-	-	-	6,016	-
4b.1.2.23	HVAC (Contaminated Insulated)	-	288	49	20	-	643	-	355	1,356	1,356	-	-	-	2,324	-	-	-	141,631	3,550	-
4b.1.2.24	HVAC (Contaminated)	-	1,280	247	101	-	3,214	-	1,717	6,559	6,559	-	-	-	11,615	-	-	-	707,889	16,045	-
4b.1.2.25	HVAC (Contaminated) - FHB	-	305	56	23	-	734	-	397	1,516	1,515	-	-	-	2,654	-	-	-	161,763	3,795	-
4b.1.2.26	Liquid Radwaste	-	725	82	34	-	1,072	-	683	2,596	2,596	-	-	-	3,874	-	-	-	236,137	9,848	-
4b.1.2.27	Liquid Radwaste (Insulated)	-	79	5	2	-	67	-	55	208	208	-	-	-	241	-	-	-	14,718	1,042	-
4b.1.2.28	Make-up Water	-	376	-	-	-	-	-	83	460	-	-	460	-	-	-	-	-	-	5,614	-
4b.1.2.29	Make-up Water (Insulated)	-	34	-	-	-	-	-	8	42	-	-	42	-	-	-	-	-	-	521	-
4b.1.2.30	Make-up Water (RCA Insulated)	-	45	5	2	-	59	-	39	149	149	-	-	-	212	-	-	-	12,896	594	-
4b.1.2.31	Make-up Water (RCA)	-	237	27	10	-	332	-	216	822	822	-	-	-	1,199	-	-	-	73,076	3,139	-
4b.1.2.32	Miscellaneous Reactor Coolant	-	126	9	3	-	111	-	90	339	339	-	-	-	402	-	-	-	24,489	1,787	-
4b.1.2.33	Nuclear Steam Supply Sampling	-	168	9	4	-	121	-	109	412	412	-	-	-	438	-	-	-	26,671	2,436	-
4b.1.2.34	Nuclear Steam Supply Sampling (Insulated	-	51	1	0	-	15	-	25	93	93	-	-	-	55	-	-	-	3,352	744	-
4b.1.2.35	Residual Heat Removal	-	309	123	50	-	1,603	-	735	2,820	2,820	-	-	-	5,793	-	-	-	353,070	4,438	-
4b.1.2.36	Safety Injection	-	119	16	7	-	210	-	125	476	476	-	-	-	759	-	-	-	46,248	1,655	-
4b.1.2.37	Safety Injection (Insulated)	-	6	1	0	-	8	-	5	21	21	-	-	-	30	-	-	-	1,841	80	-
4b.1.2.38	Safety Injection (RCA Insulated)	-	42	6	2	-	75	-	45	170	170	-	-	-	272	-	-	-	16,571	558	-
4b.1.2.39	Safety Injection (RCA)	-	352	54	21	-	677	-	392	1,497	1,497	-	-	-	2,447	-	-	-	149,139	4,655	-
4b.1.2.40	Service Cooling Water	-	123	-	-	-	-	-	27	150	-	-	150	-	-	-	-	-	-	1,856	-
4b.1.2.41	Service Cooling Water (RCA)	-	30	4	2	-	55	-	33	124	124	-	-	-	200	-	-	-	12,159	406	-
4b.1.2.42	Spent Fuel Pit Cooling	-	86	46	19	-	602	-	265	1,017	1,017	-	-	-	2,174	-	-	-	132,511	1,258	-
4b.1.2.43	Spent Fuel Pit Cooling - FHB	-	120	50	20	-	645	-	294	1,129	1,129	-	-	-	2,332	-	-	-	142,103	1,724	-
4b.1.2	Totals	-	17,613	1,570	634	-	20,187	-	13,222	53,226	44,150	-	9,076	-	72,955	-	-	-	4,446,392	244,496	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
4b.1.3	Scaffolding in support of decommissioning	-	3,299	22	6	-	38	-	1,236	4,601	4,601	-	-	-	977	-	-	-	43,984	23,924	-
Decontamination of Site Buildings																					
4b.1.4.1	*Reactor	1,015	2,748	1,132	5,306	-	25,386	-	12,471	48,058	48,058	-	-	-	349,938	-	-	-	33,233,450	44,903	-
4b.1.4.2	Capital Additions 85-2004	30	26	7	3	-	85	-	65	216	216	-	-	-	320	-	-	-	18,671	752	-
4b.1.4.3	Containment Penetration Area	298	170	24	22	-	310	-	405	1,229	1,229	-	-	-	1,838	-	-	-	143,690	6,140	-
4b.1.4.4	Fuel Handling	753	746	59	32	-	443	-	1,010	3,044	3,044	-	-	-	2,951	-	-	-	210,684	20,265	-
4b.1.4	Totals	2,097	3,689	1,221	5,364	-	26,224	-	13,951	52,547	52,547	-	-	-	355,047	-	-	-	33,606,490	72,060	-
4b.1	Subtotal Period 4b Activity Costs	2,641	24,660	2,976	6,038	-	47,514	-	29,257	113,087	104,011	-	9,076	-	432,831	-	-	-	38,331,640	341,444	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	845	374	1,220	1,220	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,083	922	3,005	3,005	-	-	-	-	-	-	-	-	25,171	-
4b.2.3	License Termination ISFSI	-	121	7	13	-	490	1,560	809	3,001	3,001	-	-	-	1,777	-	-	-	108,170	7,006	4,191
4b.2	Subtotal Period 4b Additional Costs	-	121	7	13	-	490	4,488	2,105	7,226	7,226	-	-	-	1,777	-	-	-	108,170	32,177	10,431
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	15	-	22	37	-	103	-	60	238	238	-	-	-	200	-	-	-	11,971	39	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	431	-	-	-	-	-	95	526	526	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	150	52	-	258	-	129	589	589	-	-	-	6,667	-	-	-	300,000	88	-
4b.3	Subtotal Period 4b Collateral Costs	15	431	172	89	-	361	-	285	1,353	1,353	-	-	-	6,866	-	-	-	311,971	127	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	903	-	-	-	-	-	-	333	1,236	1,236	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	617	91	708	708	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	215	32	247	247	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,376	-	-	-	-	-	877	3,253	3,253	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,612	-	-	-	-	-	578	3,190	3,190	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	86	24	-	103	-	56	269	269	-	-	-	3,830	-	-	-	76,609	125	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,485	550	3,036	3,036	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	731	108	839	839	-	-	-	-	-	-	-	-	-	-
4b.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	455	101	555	555	-	-	-	-	-	-	-	-	-	-
4b.4.10	Security Staff Cost	-	-	-	-	-	-	1,146	254	1,399	1,399	-	-	-	-	-	-	-	-	-	15,786
4b.4.11	DOC Staff Cost	-	-	-	-	-	-	12,208	2,702	14,910	14,910	-	-	-	-	-	-	-	-	-	118,709
4b.4.12	Utility Staff Cost	-	-	-	-	-	-	18,533	4,103	22,636	22,636	-	-	-	-	-	-	-	-	-	212,160
4b.4	Subtotal Period 4b Period-Dependent Costs	903	4,988	86	24	-	103	36,389	9,784	52,277	52,277	-	-	-	3,830	-	-	-	76,609	125	346,654
4b.0	TOTAL PERIOD 4b COST	3,550	30,201	3,241	6,165	-	48,469	40,877	41,431	173,942	164,866	-	9,076	-	445,305	-	-	-	38,828,390	373,873	357,085
PERIOD 4e - Delay before License Termination																					
Period 4e Direct Decommissioning Activities																					
Period 4e Collateral Costs																					
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	181	27	208	208	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	96	-	-	-	-	-	36	132	132	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	2	1	-	3	-	1	7	7	-	-	-	102	-	-	-	2,032	3	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	259	38	297	297	-	-	-	-	-	-	-	-	-	-
4e.4.7	Security Staff Cost	-	-	-	-	-	-	964	213	1,178	1,178	-	-	-	-	-	-	-	-	-	13,286
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,316	291	1,607	1,607	-	-	-	-	-	-	-	-	-	14,880
4e.4	Subtotal Period 4e Period-Dependent Costs	-	96	2	1	-	3	2,719	607	3,428	3,428	-	-	-	102	-	-	-	2,032	3	28,166
4e.0	TOTAL PERIOD 4e COST	-	96	2	1	-	3	2,719	607	3,428	3,428	-	-	-	102	-	-	-	2,032	3	28,166

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
	PERIOD 4f - License Termination																				
	Period 4f Direct Decommissioning Activities																				
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	183	81	264	264	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	183	81	264	264	-	-	-	-	-	-	-	-	-	-
	Period 4f Additional Costs																				
4f.2.1	License Termination Survey	-	-	-	-	-	-	9,761	4,321	14,082	14,082	-	-	-	-	-	-	-	-	126,393	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	9,761	4,321	14,082	14,082	-	-	-	-	-	-	-	-	126,393	3,120
	Period 4f Collateral Costs																				
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,465	324	1,790	1,790	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,465	324	1,790	1,790	-	-	-	-	-	-	-	-	-	-
	Period 4f Period-Dependent Costs																				
4f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	134	20	153	153	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	683	-	-	-	-	-	252	935	935	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	2	-	9	-	5	24	24	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	412	91	504	504	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	455	67	523	523	-	-	-	-	-	-	-	-	-	-
4f.4.7	Security Staff Cost	-	-	-	-	-	-	713	158	870	870	-	-	-	-	-	-	-	-	-	9,821
4f.4.8	DOC Staff Cost	-	-	-	-	-	-	5,073	1,123	6,196	6,196	-	-	-	-	-	-	-	-	-	46,750
4f.4.9	Utility Staff Cost	-	-	-	-	-	-	5,452	1,207	6,659	6,659	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	683	8	2	-	9	12,240	2,923	15,864	15,864	-	-	-	335	-	-	-	6,698	11	113,536
4f.0	TOTAL PERIOD 4f COST	-	683	8	2	-	9	23,648	7,650	32,000	32,000	-	-	-	335	-	-	-	6,698	126,404	116,656
	PERIOD 4 TOTALS	4,115	69,769	18,195	12,213	-	122,589	233,132	144,341	604,352	590,548	-	13,805	-	585,289	501	798	1,649	50,220,940	759,707	2,099,967
	PERIOD 5b - Site Restoration																				
	Period 5b Direct Decommissioning Activities																				
	Demolition of Remaining Site Buildings																				
5b.1.1.1	*Reactor	-	7,188	-	-	-	-	-	1,591	8,779	-	-	8,779	-	-	-	-	-	-	67,914	-
5b.1.1.2	Capital Additions 85-2004	-	320	-	-	-	-	-	71	391	-	-	391	-	-	-	-	-	-	3,572	-
5b.1.1.3	Containment Penetration Area	-	730	-	-	-	-	-	162	892	-	-	892	-	-	-	-	-	-	6,563	-
5b.1.1.4	Miscellaneous	-	31	-	-	-	-	-	7	37	-	-	37	-	-	-	-	-	-	249	-
5b.1.1.5	Turbine	-	3,897	-	-	-	-	-	863	4,760	-	-	4,760	-	-	-	-	-	-	38,603	-
5b.1.1.6	Turbine Pedestal	-	1,404	-	-	-	-	-	311	1,715	-	-	1,715	-	-	-	-	-	-	11,300	-
5b.1.1.7	Fuel Handling	-	1,979	-	-	-	-	-	438	2,417	-	-	2,417	-	-	-	-	-	-	16,750	-
5b.1.1	Totals	-	15,549	-	-	-	-	-	3,442	18,991	-	-	18,991	-	-	-	-	-	-	144,951	-
	Site Closeout Activities																				
5b.1.2	Grade & landscape site	-	2,337	-	-	-	-	-	517	2,854	-	-	2,854	-	-	-	-	-	-	4,587	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	242	54	296	295	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	17,886	-	-	-	-	242	4,013	22,140	295	-	21,845	-	-	-	-	-	-	149,538	1,560
	Period 5b Additional Costs																				
5b.2.1	Concrete Crushing	-	457	-	-	-	-	2	102	560	-	-	560	-	-	-	-	-	-	1,971	-
5b.2.2	Cofferdam Construction and Teardown	-	478	-	-	-	-	-	106	584	-	-	584	-	-	-	-	-	-	4,004	-
5b.2.3	Soil / Sediment Control Plant Area	-	1,355	-	-	-	-	-	300	1,655	-	-	1,655	-	-	-	-	-	-	12,839	-
5b.2.4	Demolition and Site Restoration ISFSI	-	1,642	-	-	-	-	2,749	609	4,999	-	-	4,999	-	-	-	-	-	-	20,443	80
5b.2.5	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	5,870	1,300	7,170	-	-	7,170	-	-	-	-	-	-	-	-
5b.2.6	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	4,976	1,101	6,077	-	-	6,077	-	-	-	-	-	-	-	-
5b.2.7	FSS Manager	-	-	-	-	-	-	622	138	760	760	-	-	-	-	-	-	-	-	-	5,148
5b.2	Subtotal Period 5b Additional Costs	-	3,931	-	-	-	-	14,220	3,655	21,805	760	-	21,045	-	-	-	-	-	-	39,257	5,228
	Period 5b Collateral Costs																				
5b.3.1	Small tool allowance	-	232	-	-	-	-	-	51	284	-	-	284	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	232	-	-	-	-	-	51	284	-	-	284	-	-	-	-	-	-	-	-

Table D-1
Diablo Canyon Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	440	65	504	-	-	504	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,589	-	-	-	-	-	1,680	9,269	-	-	9,269	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	678	150	828	-	-	828	-	-	-	-	-	-	-	-
5b.4.5	Security Staff Cost	-	-	-	-	-	-	2,343	519	2,861	-	-	2,861	-	-	-	-	-	-	-	32,286
5b.4.6	DOC Staff Cost	-	-	-	-	-	-	15,137	3,351	18,488	-	-	18,488	-	-	-	-	-	-	-	136,891
5b.4.7	Utility Staff Cost	-	-	-	-	-	-	6,355	1,407	7,762	-	-	7,762	-	-	-	-	-	-	-	67,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,589	-	-	-	-	24,953	7,171	39,713	-	-	39,713	-	-	-	-	-	-	-	236,331
5b.0	TOTAL PERIOD 5b COST	-	29,638	-	-	-	-	39,414	14,890	83,942	1,056	-	82,887	-	-	-	-	-	-	188,795	243,120
PERIOD 5 TOTALS		-	29,638	-	-	-	-	39,414	14,890	83,942	1,056	-	82,887	-	-	-	-	-	-	188,795	243,120
TOTAL COST TO DECOMMISSION		9,259	109,109	18,819	12,775	-	126,771	1,203,882	370,844	1,851,460	1,128,923	623,759	98,778	-	604,794	501	798	1,649	51,120,480	1,013,618	9,365,404

TOTAL COST TO DECOMMISSION WITH 25.05% CONTINGENCY:	$1,851,460	thousands of 2014 dollars
TOTAL NRC LICENSE TERMINATION COST IS 60.97% OR:	$1,128,923	thousands of 2014 dollars
SPENT FUEL MANAGEMENT COST IS 33.69% OR:	$623,759	thousands of 2014 dollars
NON-NUCLEAR DEMOLITION COST IS 5.34% OR:	$98,778	thousands of 2014 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	606,094	Cubic Feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	1,649	Cubic Feet
TOTAL SCRAP METAL REMOVED:	49,707	Tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,013,618	Man-hours

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	600	204	863	863	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	133	29	162	162	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	100	22	121	121	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	206	45	251	251	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	332	73	405	405	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	326	72	398	398	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	277	61	337	337	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	207	45	253	253	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	133	29	162	162	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	133	29	162	162	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	1,075	236	1,312	1,312	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	79	17	96	96	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	80	17	97	97	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	158	35	193	193	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	7	1	8	8	-	-	-	-	-	-	-	-	-	43
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	2,982	787	3,768	3,768	-	-	-	-	-	-	-	-	-	15,361
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	14,442	3,173	17,615	17,616	-	-	-	-	-	-	-	-	-	-
1a.2.2	Disposal of Contaminated Tools & Equipment	-	-	219	103	-	2,835	-	1,093	4,250	4,250	-	-	-	10,245	-	-	-	624,945	317	-
1a.2	Subtotal Period 1a Additional Costs	-	-	219	103	-	2,835	14,442	4,265	21,865	21,865	-	-	-	10,245	-	-	-	624,945	317	-
Period 1a Collateral Costs																					
1a.3.1	Environmental Permits and Fees	-	-	-	-	-	-	949	209	1,158	1,158	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	949	209	1,158	1,158	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,132	166	1,298	1,298	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	177	26	203	203	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	495	-	-	-	-	-	181	676	676	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	567	-	-	-	-	-	125	691	691	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	4	-	15	-	8	40	40	-	-	-	565	-	-	-	11,299	18	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	601	3,338	3,338	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	834	122	956	956	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,001	147	1,148	-	1,148	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	792	174	967	-	967	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	547	120	667	-	667	-	-	-	-	-	-	-	-	-
1a.4.11	Severance Related Costs	-	-	-	-	-	-	45,943	10,093	56,036	56,036	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	21,316	4,683	25,998	25,998	-	-	-	-	-	-	-	-	-	286,786
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,883	6,565	36,448	36,448	-	-	-	-	-	-	-	-	-	346,229
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,062	13	4	-	15	104,362	23,010	128,465	125,684	2,781	-	-	565	-	-	-	11,299	18	633,014
1a.0	TOTAL PERIOD 1a COST	-	1,062	232	107	-	2,850	122,735	28,271	155,256	152,475	2,781	-	-	10,810	-	-	-	636,244	336	648,375

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	*Reactor	1,015	-	-	-	-	-	-	743	1,759	1,759	-	-	-	-	-	-	-	-	13,156	-
1b.1.1.2	Auxiliary	1,150	-	-	-	-	-	-	842	1,992	1,992	-	-	-	-	-	-	-	-	15,861	-
1b.1.1.3	Capital Additions 85-2004	372	-	-	-	-	-	-	273	645	645	-	-	-	-	-	-	-	-	5,109	-
1b.1.1.4	Containment Penetration Area	284	-	-	-	-	-	-	208	492	492	-	-	-	-	-	-	-	-	3,917	-
1b.1.1.5	Fuel Handling	731	-	-	-	-	-	-	535	1,266	1,266	-	-	-	-	-	-	-	-	9,816	-
1b.1.1	Totals	3,553	-	-	-	-	-	-	2,601	6,154	6,154	-	-	-	-	-	-	-	-	47,858	-
1b.1	Subtotal Period 1b Activity Costs	3,553	-	-	-	-	-	-	2,601	6,154	6,154	-	-	-	-	-	-	-	-	47,858	-
Period 1b Additional Costs																					
1b.2.1	Hazardous Waste Management	-	-	-	-	-	-	217	48	265	265	-	-	-	-	-	-	-	-	-	-
1b.2.2	Mixed Waste Management	-	-	-	-	-	-	287	63	350	350	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	504	111	615	615	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	942	-	-	-	-	-	-	207	1,149	1,149	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	172	-	121	202	-	564	-	395	1,454	1,454	-	-	-	1,088	-	-	-	65,290	212	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	60	-	-	-	-	-	13	73	73	-	-	-	-	-	-	-	-	-	-
1b.3.5	Environmental Permits and Fees	-	-	-	-	-	-	239	53	292	292	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,114	60	121	202	-	564	239	668	2,968	2,968	-	-	-	1,088	-	-	-	65,290	212	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,468	-	-	-	-	-	-	538	2,006	2,006	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	285	42	327	327	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	45	7	51	51	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	358	-	-	-	-	-	131	489	489	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	143	-	-	-	-	-	31	174	174	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	16	4	-	19	-	10	49	49	-	-	-	695	-	-	-	13,892	23	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	690	152	841	841	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	117	17	135	135	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	252	37	289	-	289	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	200	44	244	-	244	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	138	30	168	-	168	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	5,373	1,180	6,553	6,553	-	-	-	-	-	-	-	-	-	72,286
1b.4.13	Utility Staff Cost	-	-	-	-	-	-	7,532	1,655	9,187	9,187	-	-	-	-	-	-	-	-	-	87,269
1b.4	Subtotal Period 1b Period-Dependent Costs	1,468	501	16	4	-	19	14,632	3,873	20,513	19,812	701	-	-	695	-	-	-	13,892	23	159,554
1b.0	TOTAL PERIOD 1b COST	6,135	561	136	207	-	583	15,375	7,253	30,250	29,549	701	-	-	1,783	-	-	-	79,181	48,093	159,554
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	501	-	-	-	-	-	110	612	612	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	52	-	-	-	-	-	11	63	63	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	322	1,055	1,055	-	-	-	-	-	-	-	-	8,547	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	39	9	47	47	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	553	-	-	-	-	772	452	1,777	1,777	-	-	-	-	-	-	-	-	12,247	250
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	195	-	137	230	-	641	-	448	1,652	1,652	-	-	-	1,237	-	-	-	74,216	241	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Environmental Permits and Fees	-	-	-	-	-	-	231	51	282	282	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	195	5	137	230	-	641	231	500	1,940	1,940	-	-	-	1,237	-	-	-	74,216	241	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	276	40	316	316	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	43	6	50	50	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	181	-	-	-	-	-	66	247	247	-	-	-	-	-	-	-	-	-	-

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1c Period-Dependent Costs (continued)																					
1c.4.4	Heavy equipment rental	-	138	-	-	-	-	-	30	169	169	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	1	-	4	-	2	10	10	-	-	-	138	-	-	-	2,755	4	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	667	147	814	814	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	114	17	130	130	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	244	36	280	-	280	-	-	-	-	-	-	-	-	-
1c.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	193	42	236	-	236	-	-	-	-	-	-	-	-	-
1c.4.10	ISFSI Operating Costs	-	-	-	-	-	-	133	29	163	-	163	-	-	-	-	-	-	-	-	-
1c.4.11	Severance Related Costs	-	-	-	-	-	-	15,703	3,450	19,153	19,153	-	-	-	-	-	-	-	-	-	-
1c.4.12	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	2,500	549	3,049	-	3,049	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	5,197	1,142	6,339	6,339	-	-	-	-	-	-	-	-	-	69,929
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	7,287	1,601	8,887	8,887	-	-	-	-	-	-	-	-	-	84,423
1c.4	Subtotal Period 1c Period-Dependent Costs	-	319	3	1	-	4	32.358	7,158	39.843	36.115	3,727	-	-	138	-	-	-	2,755	4	154,351
1c.0	TOTAL PERIOD 1c COST	195	877	140	231	-	645	33,361	8.110	43.560	39,832	3,727	-	-	1,375	-	-	-	76,971	12,493	154,601
PERIOD 1 TOTALS		6,331	2,499	508	544	-	4,078	171,472	43,634	220.006	221,856	7,210	-	-	13,967	-	-	-	792.396	60.921	962,531
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	39	9	48	48	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,182	433	1,615	1,615	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,221	441	1,663	1,663	-	-	-	-	-	-	-	-	-	-
Period 2a Additional Costs																					
2a.2.1	Severance Related Costs	-	-	-	-	-	-	7,514	1,651	9.164	9.164	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	7,514	1,651	9.164	9.164	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Transfer - Pool to ISFSI	-	-	-	-	-	-	33,221	7,298	40,520	-	40,520	-	-	-	-	-	-	-	-	-
2a.3.2	Environmental Permits and Fees	-	-	-	-	-	-	8,079	1,775	9,853	9,853	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	41,300	9,073	50,373	9,853	40,520	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	4,333	635	4,967	4,273	694	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	1,510	221	1,731	1,731	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,622	-	-	-	-	-	594	2.216	2.216	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	39	11	-	46	-	25	121	121	-	-	-	1,717	-	-	-	34.340	56	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	4,658	1,023	5,681	2,840	2.840	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2.262	331	2.593	2,593	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	6.084	891	6.976	-	6,976	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	867	191	1.058	-	1,058	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	6,743	1,481	8.225	-	8.225	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	4,653	1,022	5.675	-	5,675	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	173.983	38,221	212.205	9.062	202.542	-	-	-	-	-	-	-	-	2,391,265
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	25,600	5,624	31,223	7,406	23.817	-	-	-	-	-	-	-	-	283,977
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,622	39	11	-	46	230,693	50,259	282,670	30,843	251,827	-	-	1.717	-	-	-	34,340	56	2,675,242
2a.0	TOTAL PERIOD 2a COST	-	1,622	39	11	-	46	280,728	61.424	343.870	51,523	292,347	-	-	1,717	-	-	-	34,340	56	2,675,242
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	122	27	149	149	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	3,663	1,341	5.004	5,004	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	3,785	1,368	5,153	5,153	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	11,983	1,755	13,738	13,242	496	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	4,679	685	5,365	5,365	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	2,425	-	-	-	-	-	888	3,313	3,313	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	57	16	-	68	-	37	178	178	-	-	-	2,533	-	-	-	50,666	83	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	7,216	1,585	8,802	8,802	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	6,744	988	7,732	7,732	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	9,427	1,381	10,808	-	10,808	-	-	-	-	-	-	-	-	-
2b.4.8	Spent Fuel Transfer - ISFSI to DOE	-	-	-	-	-	-	35,482	7,795	43,277	-	43,277	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	14,418	3,168	17,586	-	17,586	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Storage Canisters/Overpacks	-	-	-	-	-	-	38,783	8,520	47,304	-	47,304	-	-	-	-	-	-	-	-	-
2b.4.11	Security Staff Cost	-	-	-	-	-	-	101,474	22,292	123,766	29,942	93,824	-	-	-	-	-	-	-	-	1,306,250
2b.4.12	Utility Staff Cost	-	-	-	-	-	-	18,817	4,134	22,951	22,951	-	-	-	-	-	-	-	-	-	220,000
2b.4	Subtotal Period 2b Period-Dependent Costs	-	2,425	57	16	-	68	249,026	53,227	304,819	91,524	213,294	-	-	2,533	-	-	-	50,666	83	1,526,250
2b.0	TOTAL PERIOD 2b COST	-	2,425	57	16	-	68	252,811	54,595	309,972	96,678	213,294	-	-	2,533	-	-	-	50,666	83	1,526,250
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	139	51	190	190	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	144	52	195	195	-	-	-	-	-	-	-	-	-	-
Period 2c Collateral Costs																					
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	438	64	502	502	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	177	26	203	203	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	92	-	-	-	-	-	34	126	126	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	2	1	-	3	-	1	7	7	-	-	-	96	-	-	-	1,921	3	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	274	60	334	334	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	246	36	282	282	-	-	-	-	-	-	-	-	-	-
2c.4.7	Security Staff Cost	-	-	-	-	-	-	931	205	1,135	1,135	-	-	-	-	-	-	-	-	-	13,036
2c.4.8	Utility Staff Cost	-	-	-	-	-	-	714	157	870	870	-	-	-	-	-	-	-	-	-	8,343
2c.4	Subtotal Period 2c Period-Dependent Costs	-	92	2	1	-	3	2,780	583	3,460	3,460	-	-	-	96	-	-	-	1,921	3	21,379
2c.0	TOTAL PERIOD 2c COST	-	92	2	1	-	3	2,923	635	3,655	3,655	-	-	-	96	-	-	-	1,921	3	21,379
PERIOD 2 TOTALS		-	4,139	98	28	-	117	536,462	116,654	657,497	151,856	505,641	-	-	4,346	-	-	-	86,927	142	4,222,870
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	305	67	372	372	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	86	19	105	105	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	498	109	607	607	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	206	45	251	251	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	332	73	405	405	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	272	60	332	332	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	489	107	597	537	-	60	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	277	61	337	304	-	34	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	471	104	575	575	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	431	95	526	526	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	33	7	40	40	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	207	45	253	253	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	106	23	130	65	-	65	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	27	6	32	-	-	32	-	-	-	-	-	-	-	171

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Activity Specifications (continued)																					
3a.1.11.9	Main Condensers	-	-	-	-	-	-	27	6	32	-	-	32	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	207	45	253	126	-	126	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	305	67	372	372	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	60	13	73	36	-	36	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,640	580	3,220	2,834	-	386	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	159	35	194	194	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	659	3,659	3,659	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	93	20	113	113	-	-	-	-	-	-	-	-	-	509
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	505	2,805	2,805	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	82	18	100	100	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	10,125	2,224	12,349	11,963	-	386	-	-	-	-	-	-	-	31,117
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	5,234	2,300	7,534	7,534	-	-	-	-	-	-	-	-	25,000	9,412
3a.2	Subtotal Period 3a Additional Costs	-	-	-	-	-	-	5,234	2,300	7,534	7,534	-	-	-	-	-	-	-	-	25,000	9,412
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	438	64	502	502	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	177	26	203	203	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	435	-	-	-	-	-	159	594	594	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	567	-	-	-	-	-	125	691	691	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	3	-	13	-	7	34	34	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	2,737	601	3,338	3,338	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	49	381	381	-	-	-	-	-	-	-	-	-	-
3a.4.8	Security Staff Cost	-	-	-	-	-	-	946	208	1,154	1,154	-	-	-	-	-	-	-	-	-	13,036
3a.4.9	Utility Staff Cost	-	-	-	-	-	-	17,380	3,818	21,198	21,198	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,002	11	3	-	13	22,010	5,057	28,095	28,095	-	-	-	481	-	-	-	9,613	16	213,264
3a.0	TOTAL PERIOD 3a COST	-	1,002	11	3	-	13	37,369	9,580	47,978	47,592	-	386	-	481	-	-	-	9,613	25,016	253,793
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	314	69	383	345	-	38	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	166	36	202	202	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	90	20	109	27	-	82	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	66	15	81	81	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	241	53	294	294	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	80	17	97	49	-	49	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	30	7	36	36	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	80	17	97	97	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	305	67	372	372	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	66	15	81	40	-	40	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	104	23	126	-	-	126	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	104	23	126	-	-	126	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	181	40	221	199	-	22	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	181	40	221	199	-	22	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	2,140	470	2,610	2,104	-	506	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,140	470	2,610	2,104	-	506	-	-	-	-	-	-	-	13,800
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	942	-	-	-	-	-	-	207	1,149	1,149	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,465	322	1,787	1,787	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	242	1,342	1,342	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	942	1,100	-	-	-	-	1,465	771	4,278	4,278	-	-	-	-	-	-	-	-	-	-

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	11	39	39	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	255	37	293	293	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	89	13	102	102	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	235	-	-	-	-	-	86	321	321	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	284	-	-	-	-	-	62	347	347	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	2	-	7	-	4	19	19	-	-	-	266	-	-	-	5,315	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	1,372	301	1,673	1,673	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	167	24	191	191	-	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	474	104	578	578	-	-	-	-	-	-	-	-	-	6,536
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	4,540	997	5,537	5,537	-	-	-	-	-	-	-	-	-	42,874
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	8,714	1,914	10,628	10,628	-	-	-	-	-	-	-	-	-	100,389
3b.4	Subtotal Period 3b Period-Dependent Costs	29	519	6	2	-	7	15,611	3,555	19,729	19,729	-	-	-	266	-	-	-	5,315	9	149,799
3b.0	TOTAL PERIOD 3b COST	971	1,619	6	2	-	7	19,216	4,796	26,617	26,111	-	506	-	266	-	-	-	5,315	9	163,559
PERIOD 3 TOTALS		971	2,621	17	5	-	20	56,585	14,376	74,594	73,703	-	892	-	746	-	-	-	14,927	25,024	417,392
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	83	327	48	27	-	1,181	-	626	2,292	2,292	-	-	-	2,276	-	-	-	260,153	5,614	-
4a.1.1.2	Pressurizer Quench Tank	9	33	7	4	-	166	-	81	301	301	-	-	-	329	-	-	-	36,557	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	36	116	87	198	-	1,431	-	649	2,515	2,515	-	-	-	4,701	-	-	-	774,960	2,795	80
4a.1.1.4	Pressurizer	11	70	370	110	-	750	-	387	1,699	1,699	-	-	-	2,443	-	-	-	267,055	1,501	750
4a.1.1.5	Steam Generators	107	3,330	2,250	1,982	-	12,696	-	6,711	27,074	27,074	-	-	-	41,712	-	-	-	3,350,761	20,508	1,125
4a.1.1.6	Retired Steam Generator Units	-	-	2,250	1,982	-	12,696	-	5,413	22,341	22,341	-	-	-	41,031	-	-	-	3,125,629	10,800	1,125
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	44	335	246	26	-	661	-	438	1,749	1,749	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.8	Reactor Vessel Internals	77	9,244	6,709	701	-	13,994	220	17,836	48,871	48,871	-	-	-	2,532	501	406	-	342,784	19,200	900
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,525	-	2,093	11,618	11,618	-	-	-	-	-	-	1,649	330,307	-	-
4a.1.1.10	Reactor Vessel	-	6,744	1,452	210	-	2,901	220	6,238	17,765	17,765	-	-	-	9,531	-	-	-	963,812	19,200	900
4a.1.1	Totals	366	20,197	13,509	5,241	-	56,000	440	40,471	136,224	136,224	-	-	-	108,436	501	406	1,649	9,597,511	85,447	4,880
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	212	-	-	-	-	-	46	258	-	-	258	-	-	-	-	-	-	3,033	-
4a.1.3	Main Condensers	-	696	-	-	-	-	-	153	849	-	-	849	-	-	-	-	-	-	9,875	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	*Reactor	-	1,262	-	-	-	-	-	277	1,540	1,540	-	-	-	-	-	-	-	-	11,805	-
4a.1.4.2	Auxiliary	-	762	-	-	-	-	-	167	930	930	-	-	-	-	-	-	-	-	7,054	-
4a.1.4.3	Containment Penetration Area	-	78	-	-	-	-	-	17	95	95	-	-	-	-	-	-	-	-	704	-
4a.1.4.4	Radwaste Storage	-	97	-	-	-	-	-	21	118	118	-	-	-	-	-	-	-	-	918	-
4a.1.4.5	Fuel Handling	-	205	-	-	-	-	-	45	250	250	-	-	-	-	-	-	-	-	1,746	-
4a.1.4	Totals	-	2,405	-	-	-	-	-	528	2,933	2,933	-	-	-	-	-	-	-	-	22,317	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Steam	-	79	-	-	-	-	-	17	96	-	-	96	-	-	-	-	-	-	1,179	-
4a.1.5.2	Auxiliary Steam (RCA)	-	143	20	8	-	250	-	148	568	568	-	-	-	903	-	-	-	55,012	1,908	-
4a.1.5.3	Condensate System	-	645	-	-	-	-	-	142	787	-	-	787	-	-	-	-	-	-	9,716	-
4a.1.5.4	Condensate System (Insulated)	-	286	-	-	-	-	-	63	349	-	-	349	-	-	-	-	-	-	4,253	-
4a.1.5.5	Containment Spray	-	238	117	46	-	1,453	-	646	2,499	2,499	-	-	-	5,251	-	-	-	320,048	3,420	-
4a.1.5.6	Extraction Steam & Heater Drip	-	240	-	-	-	-	-	53	293	-	-	293	-	-	-	-	-	-	3,625	-
4a.1.5.7	Feedwater System	-	70	-	-	-	-	-	15	86	-	-	86	-	-	-	-	-	-	1,038	-
4a.1.5.8	Feedwater System (Insulated)	-	168	-	-	-	-	-	37	205	-	-	205	-	-	-	-	-	-	2,547	-
4a.1.5.9	Feedwater System (RCA Insulated)	-	121	33	13	-	416	-	204	787	787	-	-	-	1,502	-	-	-	91,554	1,695	-
4a.1.5.10	Feedwater System (RCA)	-	6	2	1	-	22	-	11	41	41	-	-	-	79	-	-	-	4,819	81	-
4a.1.5.11	NSSS Sampling	-	147	7	3	-	87	-	87	331	331	-	-	-	315	-	-	-	19,173	2,158	-
4a.1.5.12	NSSS Sampling (Insulated)	-	43	1	0	-	8	-	19	72	72	-	-	-	30	-	-	-	1,852	642	-
4a.1.5.13	Nitrogen & Hydrogen	-	20	-	-	-	-	-	4	24	-	-	24	-	-	-	-	-	-	309	-
4a.1.5.14	Nitrogen & Hydrogen (Insulated)	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	16	-
4a.1.5.15	Nitrogen & Hydrogen (RCA Insulated)	-	6	0	0	-	4	-	3	13	13	-	-	-	14	-	-	-	834	73	-
4a.1.5.16	Nitrogen & Hydrogen (RCA)	-	105	6	2	-	72	-	66	251	251	-	-	-	260	-	-	-	15,841	1,391	-
4a.1.5.17	Oily Water Separator & TB Sump	-	31	7	3	-	88	-	45	173	173	-	-	-	317	-	-	-	19,303	417	-
4a.1.5.18	Saltwater System	-	188	-	-	-	-	-	41	229	-	-	229	-	-	-	-	-	-	2,779	-
4a.1.5.19	Turbine Steam Supply	-	794	-	-	-	-	-	174	968	-	-	968	-	-	-	-	-	-	12,007	-
4a.1.5.20	Turbine Steam Supply (RCA)	-	888	266	104	-	3,310	-	1,599	6,168	6,168	-	-	-	11,964	-	-	-	729,177	12,442	-

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.21	Turbine and Generator	-	85	-	-	-	-	-	19	103	-	-	103	-	-	-	-	-	-	1,250	-
4a.1.5.22	Turbine and Generator (Insulated)	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	378	-
4a.1.5	Totals	-	4,328	458	179	-	5,710	-	3,401	14,076	10,904	-	3,172	-	20,635	-	-	-	1,257,612	63,323	-
4a.1.6	Scaffolding in support of decommissioning	-	4,250	32	9	-	56	-	1,583	5,931	5,931	-	-	-	1,444	-	-	-	64,977	33,097	-
4a.1	Subtotal Period 4a Activity Costs	366	32,088	14,000	5,429	-	61,765	440	46,183	160,272	155,992	-	4,279	-	130,515	501	406	1,649	10,920,100	217,092	4,880
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	4,241	1,864	6,105	6,105	-	-	-	-	-	-	-	-	51,254	-
4a.2.2	Retired Reactor Head	-	-	263	81	-	1,515	-	611	2,470	2,470	-	-	-	5,072	-	-	-	322,442	2,098	40
4a.2.3	PG&E RPV Staff Support Team	-	-	-	-	-	-	4,269	938	5,206	5,206	-	-	-	-	-	-	-	-	-	41,862
4a.2.4	DOC RPV Staff Support Team	-	-	-	-	-	-	4,113	904	5,016	5,016	-	-	-	-	-	-	-	-	-	64,186
4a.2	Subtotal Period 4a Additional Costs	-	-	263	81	-	1,515	12,623	4,316	18,797	18,797	-	-	-	5,072	-	-	-	322,442	53,352	106,088
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	6	-	9	15	-	43	-	25	98	98	-	-	-	82	-	-	-	4,929	16	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	258	-	-	-	-	-	57	315	283	-	31	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	6	258	9	15	-	43	-	81	413	381	-	31	-	82	-	-	-	4,929	16	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	142	-	-	-	-	-	-	52	194	194	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	1,255	184	1,439	1,439	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	438	64	502	451	-	50	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,731	-	-	-	-	-	1,000	3,731	3,731	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	5,372	-	-	-	-	-	1,180	6,552	6,552	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	101	28	-	121	-	65	316	316	-	-	-	4,496	-	-	-	89,915	147	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	6,410	1,408	7,819	7,819	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	1,033	151	1,184	1,184	-	-	-	-	-	-	-	-	-	-
4a.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	926	203	1,129	1,129	-	-	-	-	-	-	-	-	-	-
4a.4.10	Security Staff Cost	-	-	-	-	-	-	2,336	513	2,850	2,850	-	-	-	-	-	-	-	-	-	32,143
4a.4.11	DOC Staff Cost	-	-	-	-	-	-	51,881	11,397	63,278	63,278	-	-	-	-	-	-	-	-	-	478,286
4a.4.12	Utility Staff Cost	-	-	-	-	-	-	78,257	17,192	95,449	95,449	-	-	-	-	-	-	-	-	-	879,429
4a.4	Subtotal Period 4a Period-Dependent Costs	142	8,103	101	28	-	121	142,535	33,410	184,441	184,391	-	50	-	4,496	-	-	-	89,915	147	1,389,857
4a.0	TOTAL PERIOD 4a COST	514	40,449	14,373	5,554	-	63,443	155,599	83,991	363,923	359,562	-	4,361	-	140,165	501	406	1,649	11,337,300	270,607	1,500,825
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	544	59	163	33	-	1,066	-	842	2,707	2,707	-	-	-	3,852	-	-	-	234,773	965	-
Disposal of Plant Systems																					
4b.1.2.1	Building Services (Non-Power Block)	-	7	-	-	-	-	-	2	9	-	-	9	-	-	-	-	-	-	107	-
4b.1.2.2	Capital Additions 85-2002 (Clean)	-	467	-	-	-	-	-	103	569	-	-	569	-	-	-	-	-	-	7,040	-
4b.1.2.3	Capital Additions 85-2002 (contaminated)	-	437	54	22	-	699	-	429	1,640	1,640	-	-	-	2,525	-	-	-	153,905	5,777	-
4b.1.2.4	Chemical & Volume Control	-	985	127	52	-	1,653	-	996	3,812	3,812	-	-	-	5,975	-	-	-	364,137	13,445	-
4b.1.2.5	Chemical & Volume Control (Insulated)	-	397	24	10	-	317	-	267	1,015	1,015	-	-	-	1,146	-	-	-	69,872	5,264	-
4b.1.2.6	Component Cooling Water	-	198	-	-	-	-	-	43	241	-	-	241	-	-	-	-	-	-	2,984	-
4b.1.2.7	Component Cooling Water (RCA)	-	600	149	58	-	1,854	-	933	3,594	3,594	-	-	-	6,699	-	-	-	408,304	8,218	-
4b.1.2.8	Compressed Air	-	123	-	-	-	-	-	27	150	-	-	150	-	-	-	-	-	-	1,881	-
4b.1.2.9	Compressed Air (Insulated)	-	6	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	99	-
4b.1.2.10	Compressed Air (RCA Insulated)	-	29	2	1	-	24	-	20	76	76	-	-	-	85	-	-	-	5,193	400	-
4b.1.2.11	Compressed Air (RCA)	-	536	36	14	-	448	-	309	1,403	1,403	-	-	-	1,619	-	-	-	98,662	7,238	-
4b.1.2.12	Diesel Engine-Generator	-	143	-	-	-	-	-	31	174	-	-	174	-	-	-	-	-	-	2,089	-
4b.1.2.13	Diesel Engine-Generator (Insulated)	-	3	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	48	-
4b.1.2.14	Electrical (Clean)	-	3,257	-	-	-	-	-	715	3,972	-	-	3,972	-	-	-	-	-	-	47,918	-
4b.1.2.15	Electrical (Contaminated)	-	326	41	17	-	540	-	327	1,252	1,252	-	-	-	1,952	-	-	-	118,983	4,389	-
4b.1.2.16	Electrical (Contaminated) - FHB	-	100	8	3	-	101	-	75	287	287	-	-	-	365	-	-	-	22,229	1,340	-
4b.1.2.17	Electrical (RCA)	-	1,963	-	-	-	-	-	431	2,394	-	-	2,394	-	-	-	-	-	-	27,955	-
4b.1.2.18	Electrical (RCA)-FHB	-	681	74	29	-	918	-	602	2,304	2,304	-	-	-	3,317	-	-	-	202,180	8,927	-
4b.1.2.19	Fire Protection	-	384	122	50	-	1,584	-	749	2,889	2,889	-	-	-	5,725	-	-	-	348,902	5,294	-
4b.1.2.20	Fire Protection (RCA)	-	266	38	15	-	469	-	278	1,065	1,065	-	-	-	1,696	-	-	-	103,349	3,543	-
4b.1.2.21	Gaseous Radwaste	-	123	14	6	-	183	-	115	440	440	-	-	-	660	-	-	-	40,203	1,644	-
4b.1.2.22	HVAC (Clean Insulated)	-	41	-	-	-	-	-	9	50	-	-	50	-	-	-	-	-	-	662	-
4b.1.2.23	HVAC (Clean)	-	438	-	-	-	-	-	96	534	-	-	534	-	-	-	-	-	-	7,019	-

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.24	HVAC (Contaminated Insulated)	-	217	34	14	-	444	-	250	959	959	-	-	-	1,605	-	-	-	97,832	2,660	-
4b.1.2.25	HVAC (Contaminated)	-	964	173	71	-	2,250	-	1,218	4,075	4,075	-	-	-	8,132	-	-	-	495,632	12,062	-
4b.1.2.26	HVAC (Contaminated) - FHB	-	216	37	15	-	476	-	262	1,004	1,004	-	-	-	1,719	-	-	-	104,757	2,677	-
4b.1.2.27	Liquid Radwaste	-	415	57	23	-	742	-	437	1,675	1,675	-	-	-	2,683	-	-	-	163,538	5,697	-
4b.1.2.28	Liquid Radwaste (Insulated)	-	40	3	1	-	33	-	28	105	105	-	-	-	120	-	-	-	7,330	536	-
4b.1.2.29	Lube Oil Distribution & Purification	-	132	-	-	-	-	-	29	161	-	-	161	-	-	-	-	-	-	1,964	-
4b.1.2.30	Make-up Water	-	255	-	-	-	-	-	56	311	-	-	311	-	-	-	-	-	-	3,794	-
4b.1.2.31	Make-up Water (Insulated)	-	25	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	376	-
4b.1.2.32	Make-up Water (RCA Insulated)	-	33	4	2	-	52	-	32	122	122	-	-	-	186	-	-	-	11.355	441	-
4b.1.2.33	Make-up Water (RCA)	-	165	23	9	-	292	-	173	663	663	-	-	-	1,056	-	-	-	64.346	2,210	-
4b.1.2.34	Mechanical Department Equipment	-	1	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	19	-
4b.1.2.35	Miscellaneous Reactor Coolant	-	130	9	4	-	112	-	91	346	346	-	-	-	406	-	-	-	24.761	1,847	-
4b.1.2.36	Nuclear Steam Supply Sampling	-	20	1	1	-	16	-	13	51	51	-	-	-	59	-	-	-	3.566	252	-
4b.1.2.37	Nuclear Steam Supply Sampling (Insulated	-	8	1	0	-	7	-	6	22	22	-	-	-	25	-	-	-	1,528	108	-
4b.1.2.38	Residual Heat Removal	-	281	122	50	-	1,584	-	712	2.748	2,748	-	-	-	5,725	-	-	-	348,913	4,045	-
4b.1.2.39	Safety Injection	-	115	16	7	-	209	-	122	469	469	-	-	-	757	-	-	-	46,109	1,601	-
4b.1.2.40	Safety Injection (Insulated)	-	5	1	0	-	8	-	5	19	19	-	-	-	30	-	-	-	1,826	68	-
4b.1.2.41	Safety Injection (RCA Insulated)	-	39	6	2	-	75	-	43	165	165	-	-	-	270	-	-	-	16,433	517	-
4b.1.2.42	Safety Injection (RCA)	-	323	54	21	-	671	-	377	1,447	1,447	-	-	-	2,427	-	-	-	147,899	4,277	-
4b.1.2.43	Service Cooling Water	-	144	-	-	-	-	-	32	176	-	-	176	-	-	-	-	-	-	2,186	-
4b.1.2.44	Service Cooling Water (RCA)	-	37	6	2	-	74	-	42	163	163	-	-	-	269	-	-	-	16,409	505	-
4b.1.2.45	Sewer System Expansion	-	49	-	-	-	-	-	11	60	-	-	60	-	-	-	-	-	-	746	-
4b.1.2.46	Spent Fuel Pit Cooling	-	87	47	19	-	609	-	266	1,027	1,027	-	-	-	2,200	-	-	-	134,079	1,266	-
4b.1.2.47	Spent Fuel Pit Cooling - FHB	-	120	50	21	-	655	-	295	1,141	1,141	-	-	-	2,367	-	-	-	144,255	1,721	-
4b.1.2	Totals	-	15,329	1,331	537	-	17,100	-	11,125	45,422	36,578	-	8,844	-	61,799	-	-	-	3,766.486	214,853	-
4b.1.3	Scaffolding in support of decommissioning	-	6,375	49	14	-	84	-	2,375	8,897	8,897	-	-	-	2,166	-	-	-	97,465	49,645	-
Decontamination of Site Buildings																					
4b.1.4.1	*Reactor	1,015	2,748	1,132	5,306	-	25,386	-	12,376	47,963	47,963	-	-	-	349,938	-	-	-	33,233,450	44,904	-
4b.1.4.2	Auxiliary	1,210	561	58	73	-	617	-	1,341	3,860	3,860	-	-	-	5,613	-	-	-	462,994	23,319	-
4b.1.4.3	Capital Additions 85-2004	386	123	9	14	-	94	-	367	994	994	-	-	-	1,047	-	-	-	91,174	6,755	-
4b.1.4.4	Containment Penetration Area	298	170	24	22	-	310	-	402	1,226	1,226	-	-	-	1,838	-	-	-	143,657	6,139	-
4b.1.4.5	Radwaste Storage	6	45	3	7	-	27	-	33	121	121	-	-	-	476	-	-	-	42,164	602	-
4b.1.4.6	Fuel Handling	753	746	59	32	-	443	-	1,003	3,036	3,036	-	-	-	2,951	-	-	-	210,684	20,265	-
4b.1.4	Totals	3,668	4,393	1,284	5,455	-	26,877	-	16,522	57,200	57,200	-	-	-	361,863	-	-	-	34,184,120	101,985	-
4b.1	Subtotal Period 4b Activity Costs	4,213	26,156	2,827	6,040	-	45,127	-	29,863	114,226	105,381	-	8,844	-	429,681	-	-	-	38,282.840	367,447	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	845	371	1,217	1.217	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,578	1,133	3,710	3,710	-	-	-	-	-	-	-	-	31,151	-
4b.2.3	License Termination ISFSI	-	121	7	13	-	490	1,560	803	2,995	2.995	-	-	-	1,777	-	-	-	108,170	7,006	4,191
4b.2	Subtotal Period 4b Additional Costs	-	121	7	13	-	490	4,983	2,307	7,922	7,922	-	-	-	1,777	-	-	-	108,170	38,157	10,431
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	15	-	23	39	-	110	-	63	251	251	-	-	-	211	-	-	-	12,675	41	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	461	-	-	-	-	-	101	562	562	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	150	52	-	258	-	128	588	588	-	-	-	6,667	-	-	-	300,000	88	-
4b.3	Subtotal Period 4b Collateral Costs	15	461	173	91	-	368	-	293	1,401	1,401	-	-	-	6,878	-	-	-	312,675	129	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,540	-	-	-	-	-	-	564	2.104	2,104	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	763	112	875	875	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	266	39	305	305	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,733	-	-	-	-	-	1.001	3.733	3.733	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	3.232	-	-	-	-	-	710	3.942	3.942	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	103	29	-	123	-	67	323	323	-	-	-	4,593	-	-	-	91,855	150	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,076	676	3,752	3,752	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	628	92	719	719	-	-	-	-	-	-	-	-	-	-
4b.4.9	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	563	124	686	686	-	-	-	-	-	-	-	-	-	-
4b.4.10	Security Staff Cost	-	-	-	-	-	-	1,413	310	1,724	1,724	-	-	-	-	-	-	-	-	-	19,536
4b.4.11	DOC Staff Cost	-	-	-	-	-	-	22,899	5,031	27,930	27,930	-	-	-	-	-	-	-	-	-	209,423
4b.4.12	Utility Staff Cost	-	-	-	-	-	-	33,048	7,260	40,308	40.308	-	-	-	-	-	-	-	-	-	368,834
4b.4	Subtotal Period 4b Period-Dependent Costs	1,540	5,965	103	29	-	123	62,655	15,984	86,401	86.401	-	-	-	4,593	-	-	-	91,855	150	597,793
4b.0	TOTAL PERIOD 4b COST	5,768	32,703	3,111	6.174	-	46,108	67.638	48,447	209,950	201.105	-	8,844	-	442,928	-	-	-	38,795.540	405,883	608,224

Table D-2
Diablo Canyon Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	183	80	263	263	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	183	80	263	263	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	15,199	6.678	21.877	21,877	-	-	-	-	-	-	-	-	200,468	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	15,199	6,678	21,877	21,877	-	-	-	-	-	-	-	-	200,468	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1.465	322	1.787	1,787	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1.465	322	1.787	1,787	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	134	20	153	153	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	902	-	-	-	-	-	330	1,233	1,233	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	2	-	9	-	5	24	24	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	412	91	503	503	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	302	44	347	347	-	-	-	-	-	-	-	-	-	-
4f.4.7	Security Staff Cost	-	-	-	-	-	-	713	157	869	869	-	-	-	-	-	-	-	-	-	9,821
4f.4.8	DOC Staff Cost	-	-	-	-	-	-	5,073	1,114	6,187	6,187	-	-	-	-	-	-	-	-	-	46,750
4f.4.9	Utility Staff Cost	-	-	-	-	-	-	5,452	1,198	6,650	6,650	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	902	8	2	-	9	12,087	2,959	15,966	15,966	-	-	-	335	-	-	-	6,698	11	113,536
4f.0	TOTAL PERIOD 4f COST	-	902	8	2	-	9	28,934	10,039	39,894	39,894	-	-	-	335	-	-	-	6,698	200,479	116,656
PERIOD 4 TOTALS		6,282	74,055	17,492	11,730	-	109,561	252,171	142,477	613.766	600.561	-	13,205	-	583,428	501	406	1.649	50,139,630	876,969	2,225,705
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	*Reactor	-	7,188	-	-	-	-	-	1,579	8,767	-	-	8,767	-	-	-	-	-	-	67,914	-
5b.1.1.2	Administration	-	1,150	-	-	-	-	-	253	1.403	-	-	1,403	-	-	-	-	-	-	10,358	-
5b.1.1.3	Auxiliary	-	6,986	-	-	-	-	-	1,535	8,521	-	-	8,521	-	-	-	-	-	-	64,471	-
5b.1.1.4	Capital Additions 85-2004	-	4,627	-	-	-	-	-	1,016	5,643	-	-	5,643	-	-	-	-	-	-	47,403	-
5b.1.1.5	Chemical Storage	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	46	-
5b.1.1.6	Chlorination	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	99	-
5b.1.1.7	Circulating Water Tunnels	-	1,214	-	-	-	-	-	267	1,481	-	-	1,481	-	-	-	-	-	-	12,194	-
5b.1.1.8	Cold Machine Shop	-	427	-	-	-	-	-	94	521	-	-	521	-	-	-	-	-	-	3,785	-
5b.1.1.9	Communication	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	44	-
5b.1.1.10	Condensate Polishing/Technical Support	-	926	-	-	-	-	-	203	1.129	-	-	1.129	-	-	-	-	-	-	9.300	-
5b.1.1.11	Containment Penetration Area	-	730	-	-	-	-	-	160	891	-	-	891	-	-	-	-	-	-	6.565	-
5b.1.1.12	Discharge Structure	-	997	-	-	-	-	-	219	1,216	-	-	1,216	-	-	-	-	-	-	8.321	-
5b.1.1.13	Fabrication Shop	-	129	-	-	-	-	-	28	157	-	-	157	-	-	-	-	-	-	1,223	-
5b.1.1.14	Fire Pump House	-	5	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	55	-
5b.1.1.15	Hazardous Waste Storage Facility	-	42	-	-	-	-	-	9	52	-	-	52	-	-	-	-	-	-	430	-
5b.1.1.16	Intake Structure	-	5,655	-	-	-	-	-	1,242	6,897	-	-	6,897	-	-	-	-	-	-	46,364	-
5b.1.1.17	Maintenance Shop	-	394	-	-	-	-	-	87	481	-	-	481	-	-	-	-	-	-	3.444	-
5b.1.1.18	Miscellaneous Structures	-	68	-	-	-	-	-	15	83	-	-	83	-	-	-	-	-	-	673	-
5b.1.1.19	NPO Permanent Warehouse	-	1,468	-	-	-	-	-	323	1,791	-	-	1,791	-	-	-	-	-	-	14,093	-
5b.1.1.20	Ponds	-	2	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	24	-
5b.1.1.21	Portable Fire Pump & Fuel Cart	-	1	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	14	-
5b.1.1.22	Pretreatment	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	108	-
5b.1.1.23	Radwaste Storage	-	1,892	-	-	-	-	-	416	2,307	-	-	2,307	-	-	-	-	-	-	17,854	-
5b.1.1.24	Radwaste Storage Facility (Additional)	-	53	-	-	-	-	-	12	64	-	-	64	-	-	-	-	-	-	662	-
5b.1.1.25	Rotor Warehouse	-	902	-	-	-	-	-	198	1.100	-	-	1,100	-	-	-	-	-	-	9,938	-
5b.1.1.26	Security	-	367	-	-	-	-	-	81	448	-	-	448	-	-	-	-	-	-	3,944	-
5b.1.1.27	Security Buildings (Additional)	-	57	-	-	-	-	-	13	70	-	-	70	-	-	-	-	-	-	722	-
5b.1.1.28	Security Modifications (2010 to 2015)	-	935	-	-	-	-	-	205	1,141	-	-	1,141	-	-	-	-	-	-	9,527	-
5b.1.1.29	Simulator	-	444	-	-	-	-	-	98	542	-	-	542	-	-	-	-	-	-	4,191	-
5b.1.1.30	Steam Generator Storage Facility	-	968	-	-	-	-	-	213	1,181	-	-	1,181	-	-	-	-	-	-	8,888	-
5b.1.1.31	Telephone Terminal	-	3	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	28	-
5b.1.1.32	Turbine	-	5,908	-	-	-	-	-	1,298	7,206	-	-	7,206	-	-	-	-	-	-	57,744	-

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Demolition of Remaining Site Buildings (continued)																					
5b.1.1.33	Turbine Pedestal	-	1,404	-	-	-	-	-	308	1,713	-	-	1,713	-	-	-	-	-	-	11,300	-
5b.1.1.34	Vehicle Maintenance	-	37	-	-	-	-	-	8	45	-	-	45	-	-	-	-	-	-	367	-
5b.1.1.35	Waste Water Holding & Treatment Facility	-	24	-	-	-	-	-	5	30	-	-	30	-	-	-	-	-	-	238	-
5b.1.1.36	Fuel Handling	-	1,979	-	-	-	-	-	435	2,413	-	-	2,413	-	-	-	-	-	-	16,750	-
5b.1.1	Totals	-	47,015	-	-	-	-	-	10,328	57,344	-	-	57,344	-	-	-	-	-	-	439,079	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	2,337	-	-	-	-	-	513	2,850	-	-	2,850	-	-	-	-	-	-	4,587	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	104	23	126	126	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	49,352	-	-	-	-	104	10,865	60,320	126	-	60,194	-	-	-	-	-	-	443,666	668
Period 5b Additional Costs																					
5b.2.1	Backfill Structures & Concrete Removal (out of state disposal)	-	24,700	-	-	-	-	44,417	15,184	84,301	-	-	84,301	-	-	-	-	-	-	31,448	-
5b.2.2	Breakwater Demolition and Removal (out of state disposal)	-	73,657	-	-	-	-	168,613	64,011	306,281	-	-	306,281	-	-	-	-	-	-	294,408	-
5b.2.3	Cofferdam Construction and Teardown	-	478	-	-	-	-	-	105	583	-	-	583	-	-	-	-	-	-	4,004	-
5b.2.4	Concrete Crushing	-	1,473	-	-	-	-	7	325	1,805	-	-	1,805	-	-	-	-	-	-	6,359	-
5b.2.5	Disposal of Galbestos Siding	-	-	-	-	-	-	421	93	514	-	-	514	-	-	-	-	-	-	-	-
5b.2.6	Disposition of Mobile Barriers (out of state disposal)	-	168	-	-	-	-	472	141	780	-	-	780	-	-	-	-	-	-	1,445	-
5b.2.7	Soil / Sediment Control Plant Area	-	1,355	-	-	-	-	-	298	1,652	-	-	1,652	-	-	-	-	-	-	12,839	-
5b.2.8	Demolition and Site Restoration ISFSI	-	1,642	-	-	-	-	2,749	604	4,995	-	-	4,995	-	-	-	-	-	-	20,443	80
5b.2.9	Miscellaneous Construction Debris (out of state disposal)	-	-	-	-	-	-	5,870	1,290	7,160	-	-	7,160	-	-	-	-	-	-	-	-
5b.2.10	Scrap Metal Transportation (out of state)	-	-	-	-	-	-	7,837	1,722	9,559	-	-	9,559	-	-	-	-	-	-	-	-
5b.2.11	FSS Manager	-	-	-	-	-	-	622	137	759	759	-	-	-	-	-	-	-	-	-	5,148
5b.2	Subtotal Period 5b Additional Costs	-	103,473	-	-	-	-	231,010	83,907	418,390	759	-	417,631	-	-	-	-	-	-	370,946	5,228
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	1,184	-	-	-	-	-	260	1,444	-	-	1,444	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	1,184	-	-	-	-	-	260	1,444	-	-	1,444	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	440	64	504	-	-	504	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,589	-	-	-	-	-	1,667	9,256	-	-	9,256	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	678	149	827	-	-	827	-	-	-	-	-	-	-	-
5b.4.5	Security Staff Cost	-	-	-	-	-	-	2,343	515	2,858	-	-	2,858	-	-	-	-	-	-	-	32,286
5b.4.6	DOC Staff Cost	-	-	-	-	-	-	15,137	3,325	18,463	-	-	18,463	-	-	-	-	-	-	-	136,891
5b.4.7	Utility Staff Cost	-	-	-	-	-	-	6,355	1,396	7,751	-	-	7,751	-	-	-	-	-	-	-	67,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,589	-	-	-	-	24,953	7,117	39,658	-	-	39,658	-	-	-	-	-	-	-	236,331
5b.0	TOTAL PERIOD 5b COST	-	161,598	-	-	-	-	256,066	102,149	519,813	885	-	518,928	-	-	-	-	-	-	814,611	242,227
PERIOD 5 TOTALS		-	161,598	-	-	-	-	256,066	102,149	519,813	885	-	518,928	-	-	-	-	-	-	814,611	242,227
TOTAL COST TO DECOMMISSION		13,584	244,911	18,114	12,306	-	113,775	1,272,756	419,290	2,094,736	1,048,860	512,851	533,025	-	602,488	501	406	1,649	51,033,880	1,777,668	6,070,724

TOTAL COST TO DECOMMISSION WITH 25.03% CONTINGENCY:	$2,094,736 thousands of 2014 dollars
TOTAL NRC LICENSE TERMINATION COST IS 50.07% OR:	$1,048,860 thousands of 2014 dollars
SPENT FUEL MANAGEMENT COST IS 24.48% OR:	$512,851 thousands of 2014 dollars
NON-NUCLEAR DEMOLITION COST IS 25.45% OR:	$533,025 thousands of 2014 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	603,394 Cubic Feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	1,649 Cubic Feet
TOTAL SCRAP METAL REMOVED:	78,297 Tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,777,668 Man-hours

End Notes:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX E

ISFSI LICENSE TERMINATION ESTIMATE

Table E
Diablo Caynon Power Plant
ISFSI Decommissioning Cost Estimate
(thousands of 2014 dollars)

								Person-Hours		
Activity Description	**Removal Costs**	**Packaging Costs**	**Transport Costs**	**LLRW Disposal Costs**	**Other Costs**	**Total Costs**	**Burial Volume Class A (cubic feet)**	**Contractor**	**Licensee**	**NRC / NRC Contractor Manhours**
Decommissioning Contractor										
Planning (characterization, specs and procedures)	-	-	-	-	423	423	-	1,264	-	-
Decontamination (activated disposition)	243	15	27	981	55	1,320	3,555	852	-	-
License Termination (radiological surveys)	-	-	-	-	1,557	1,557	-	11,895	-	-
Subtotal	243	15	27	981	2,036	3,300	3,555	14,011	-	-
Supporting Costs										
NRC and NRC Contractor Fees and Costs	-	-	-	-	160	160	-	-	-	776
Insurance	-	-	-	-	158	158	-	-	-	-
Property Taxes	-	-	-	-	118	118	-	-	-	-
Security	-	-	-	-	282	282	-	-	3,803	-
PG&E Oversight Staff	-	-	-	-	368	368	-	-	3,803	-
Subtotal	-	-	-	-	1,084	1,084	-	-	7,606	776
Total (w/o contingency)	**243**	**15**	**27**	**981**	**3,119**	**4,384**	**3,555**	**14,011**	**7,606**	**776**
Total (w/25% contingency)	**303**	**18**	**34**	**1,226**	**3,899**	**5,480**				

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012). Note: The costs shown in this Appendix will differ from values in Appendices C and D costs tables due. These two appendices include a additional contingencyto achieve an overall project contingency of 25%.

Variance of the 2016 Forecast

Estimated Costs:
Forecast of 2016 per PG&E Letter DCL-15-044, Enclosure 4, dated March 31, 2015, in 2015 dollars:

Unit 1:

NRC Scope (Radiological)	$0
Non-NRC Scope	$0
Spent Fuel Management	$0

Unit 2:

NRC Scope (Radiological)	$0
Non-NRC Scope	$0
Spent Fuel Management	$0

Actual Costs:
Actual 2016 Incurred Costs, provided in Enclosure 4 of this letter, reflects the actuals for 2016 in nominal dollars.

Unit 1:

NRC Scope (Radiological)	$250,623
Non-NRC Scope	$0
Spent Fuel Management	$0

Unit 2:

NRC Scope (Radiological)	$241,031
Non-NRC Scope	$0
Spent Fuel Management	$0

Variance: (Unfavorable)

Unit 1:

NRC Scope (Radiological)	-$250,623
Non-NRC Scope	$0
Spent Fuel Management	$0

Unit 1:

NRC Scope (Radiological)	-$241,031
Non-NRC Scope	$0
Spent Fuel Management	$0

Decommissioning costs were overspent in 2016 primarily due to PG&E's decision not to extend the operating license and began the planning process for decommissioning the two units. The costs for planning the decommissioning commenced in 2016.