Enclosure 2
PG&E Letter DCL-19-082

# Site-Specific Decommissioning Cost Estimate
# Diablo Canyon Power Plant
# Unit 1 and Unit 2

**(Redacted Version)**

# SITE-SPECIFIC DECOMMISSIONING COST ESTIMATE

## DIABLO CANYON POWER PLANT

## Unit 1 and Unit 2

December 2019

Pacific Gas and Electric

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# Acronyms

| | |
|---|---|
| CFR | Code of Federal Regulations |
| CPUC | California Public Utilities Commission |
| CSLC | California State Lands Commission |
| D&D | decontaminate and dismantle |
| DC | Diablo Canyon |
| DCE | decommissioning cost estimate |
| DCPP | Diablo Canyon Power Plant |
| DOE | Department of Energy |
| GTCC | greater than Class C |
| FTE | Full-Time Equivalent |
| HBPP | Humboldt Bay Power Plant |
| HSA | historical site assessment |
| ISFSI | independent spent fuel storage installation |
| MARSSIM | Multi-Agency Radiation Survey and Site Investigation Manual |
| NDT | Nuclear Decommissioning Trust |
| NRC | Nuclear Regulatory Commission |
| PG&E | Pacific Gas and Electric Company |
| PMP | project management plan |
| PSDAR | Post-Shutdown Decommissioning Activities Report |
| SFP | spent fuel pool |
| SNF | spent nuclear fuel |
| SSC | systems, structures, and components |
| SSDCE | Site-Specific Decommissioning Cost Estimate |

## Executive Summary

This report constitutes the site-specific decommissioning cost estimate (SSDCE) for Diablo Canyon Power Plant (DCPP), Units 1 and 2, in accordance with the requirements of 10 CFR 50.82, "Termination of license," paragraphs (a)(4)(i), (a)(8)(iii), and 10 CFR 50.75(f)(3).

A DCPP decommissioning cost estimate (DCE) was prepared by Pacific Gas and Electric Company (PG&E) and submitted to the California Public Utilities Commission (CPUC) in 2018. This DCE was submitted to the Nuclear Regulatory Commission (NRC) as part of the DCPP Decommissioning Funding Report in 2019 (Reference 1). Using the previously-submitted DCE, PG&E prepared the SSDCE to meet NRC guidance and industry precedent for SSDCE format and content.

The decommissioning approach that has been selected by PG&E for DCPP is the DECON method. While some decommissioning activities would begin after the Unit 1 shutdown, most decommissioning activities at the two units would begin soon after the Unit 2 shutdown and are sequenced and integrated to minimize the total cost and duration of the physical dismantling processes.

PG&E used a dedicated team of nuclear, decommissioning, and DCPP experts to form a decommissioning plan, schedule, and associated cost estimate instead of relying on a generic nuclear industry decommissioning unit cost factor methodology. The DCE is informed using cost-based and historical bid-based estimating, direct experience gained by PG&E after 10 years of full-scale decommissioning at Humboldt Bay Power Plant (HBPP) Unit 3, industry expertise, and benchmarking. The planning team includes experts in specific fields who understand the complexity and multi-discipline requirements for a project of this scale.

The cost to decommission the site, safeguard the spent fuel until it can be transferred to the Department of Energy (DOE) for storage at a permanent offsite repository, and restore the impacted area of the site is estimated to be $5.1 billion in 2019 dollars. The summary of the costs estimated for License Termination, Spent Fuel Management, and Site Restoration activities are presented in Table ES-1.

PG&E currently has more funds in the decommissioning trust fund for DCPP Units 1 and 2 than required to meet the minimum NRC decommissioning amount of $670.2 million (2019 dollars) for each unit that was calculated pursuant to the requirements of 10 CFR 50.75(c).

**Table ES-1: Diablo Canyon Power Plant Decommissioning Cost Estimate Summary (in thousands of 2019 dollars)**

| ID | Scope Description | A<br>Total Estimate | I<br>License Termination | J<br>Spent Fuel Management | K<br>Site Restoration |
|---|---|---|---|---|---|
| **Unassigned Costs** | | | | | |
| 1 | Program Management, Oversight, and Fees | $ 1,547,114 | $ 1,139,092 | $ 292,320 | $ 115,701 |
| 2 | Security Operations | $ 597,882 | $ 15,367 | $ 581,402 | $ 1,112 |
| 3 | Waste/Transportation/Material Management (Excluding: Breakwater, Reactor Vessel/Internal Segmentation, & Large Component Removal) | $ 953,944 | $ 800,419 | $ 69,267 | $ 84,258 |
| **Discrete Costs** | | | | | |
| 4 | Power Block Modifications | $ 85,116 | $ 85,116 | $ - | $ - |
| 5 | Site Infrastructure | $ 148,417 | $ 147,143 | $ 1,274 | $ - |
| 6 | Large Component Removal | $ 182,004 | $ 182,004 | $ - | $ - |
| 7 | Reactor/Internals Segmentation | $ 363,271 | $ 363,271 | $ - | $ - |
| 8 | Spent Fuel Transfer to ISFSI | $ 246,588 | $ 29,217 | $ 217,371 | $ - |
| 9 | Turbine Building | $ 72,557 | $ 72,557 | $ - | $ - |
| 10 | Auxiliary Building | $ 97,219 | $ 97,219 | $ - | $ - |
| 11 | Containment | $ 127,656 | $ 127,656 | $ - | $ - |
| 12 | Fuel Handling Building | $ 51,262 | $ 51,262 | $ - | $ - |
| 14 | Balance of Site | $ 85,021 | $ 26,644 | $ - | $ 58,377 |
| 15 | Intake Structure | $ 43,664 | $ 6,851 | $ - | $ 36,813 |
| 16 | Discharge Structure | $ 15,867 | $ 15,867 | $ - | $ - |
| 17 | Breakwater | $ 299,821 | $ - | $ - | $ 299,821 |
| 18 | Non-ISFSI Site Restoration | $ 142,232 | $ - | $ - | $ 142,232 |
| 19 | Spent Fuel Transfer to DOE | $ 26,382 | $ - | $ 26,382 | $ - |
| 20 | ISFSI Demolition and Site Restoration | $ 57,850 | $ - | $ 57,850 | $ - |
| | **GRAND TOTAL** | **$ 5,143,867** | **$ 3,159,685** | **$ 1,245,867** | **$ 738,315** |

# 1. Introduction and Summary

## 1.1. Introduction

This report constitutes the SSDCE for DCPP, Units 1 and 2, in accordance with the requirements of 10 CFR 50.82, "Termination of license," paragraphs (a)(4)(i), (a)(8)(iii), and 10 CFR 50.75(f)(3). This SSDCE contains the following:

- a description of the overall decommissioning project (Section 3),
- a summary decommissioning cost estimate by major activity and phase (Section 4),
- a description of the decommissioning cost estimating methodology (Section 4),
- a discussion of site-specific factors, such as staffing levels, radioactive waste volume estimates, and site characterization (Section 4.2), and
- a schedule of the major decommissioning activities (Section 5).

A DCPP DCE was prepared by PG&E and submitted to the CPUC in 2018. This DCE was submitted to the NRC as part of the DCPP Decommissioning Funding Report in 2019 (Reference 1). Using the previously-submitted DCE, PG&E prepared the SSDCE to meet NRC guidance and industry precedent for SSDCE format and content. References to the DCE are provided throughout.

The DCPP Decommissioning Funding Report submitted to the NRC in 2019 (Reference 1) also provided the minimum decommissioning fund estimate, and concludes PG&E currently has more funds in the decommissioning trust fund for DCPP Units 1 and 2 than required to meet the minimum NRC decommissioning amount of $670.2 million (2019 dollars) for each unit that was calculated pursuant to the requirements of 10 CFR 50.75(c).

The Irradiated Fuel Management Plan and Post-Shutdown Decommissioning Activities Report (PSDAR) are being submitted concurrently with the SSDCE. The technical, schedule, and cost information provided is consistent among these submittals.

## 1.2. Site Description

The two-unit DCPP consists of a pair of Westinghouse four loop pressurized water reactors. At full capacity, Unit 1 and Unit 2 each has a thermal rating of 3,411 megawatt-thermal, with corresponding gross electrical outputs of 1,190 megawatt-electrical. (Reference 1, Enclosure 5, Section 1.2) The current facility operating licenses for DCPP expire on November 2, 2024, for Unit 1 and August 26, 2025, for Unit 2.

The DCPP site is adjacent to the Pacific Ocean in San Luis Obispo County, California, and is approximately 12 miles west-southwest of the City of San Luis Obispo. The residential community of Los Osos is approximately 8 miles north of

the site. This community is in a coastal hillside area adjacent to Montaña de Oro State Park. The township of Avila Beach is located down the coast at approximately 7 miles southeast of the site. The City of Morro Bay is located up the coast approximately 11 miles northwest of the site. The plant is roughly equidistant between San Francisco and Los Angeles.

The principal structures of DCPP include two containment structures, turbine building, auxiliary building, radwaste buildings, administration building, training building, maintenance building, storage tanks, intake and discharge structures, and transmission switchyards. An independent spent fuel storage installation (ISFSI) is also located at DCPP that has capacity for all spent nuclear fuel (SNF) generated through the end of the operating licenses. The Diablo Canyon (DC) ISFSI is licensed under a 10 CFR 72 site-specific license.

By letter dated November 27, 2018 (Reference 2), PG&E provided formal notification to the NRC that it intends to permanently cease power operations of DCPP on November 2, 2024, for Unit 1 and August 26, 2025, for Unit 2. Once each DCPP unit has permanently ceased operation and fuel has been permanently removed from the reactor vessel, PG&E will submit written certifications to the NRC, in accordance with 10 CFR 50.82(a)(1)(ii) and 10 CFR 50.4(b)(8) and (9). Upon docketing of the certifications required by 10 CFR 50.82(a)(1)(i) and 10 CFR 50.82(a)(1)(ii), pursuant to 10 CFR 50.82(a)(2), the 10 CFR Part 50 licenses for DCPP will no longer authorize operation of the reactors or emplacement or retention of fuel in the reactor vessels.

## 1.3. Regulatory Guidance

Current regulations governing decommissioning, waste management, and spent fuel management; and the funding of those elements, include the following:

- Decommissioning is defined, in part, in 10 CFR 50.2 as the safe removal of a facility or site from service and the reduction of residual radioactivity to levels that permit release of the site and termination of the license.
- Pursuant to 10 CFR 50.51(b), each license for a facility that has permanently ceased operations continues in effect beyond the expiration date to authorize ownership and possession of the production or utilization facility, until the NRC notifies the licensee in writing that the license is terminated.
- Pursuant to 10 CFR 50.75(f)(3), at or about five years prior to cessation of operations, the licensee shall submit a preliminary DCE.
- Prior to, or within two years following permanent cessation of operations, the licensee is required by 10 CFR 50.82(a)(4)(i) to submit a PSDAR to the NRC. The PSDAR must contain a SSDCE, including the projected cost of managing irradiated fuel.
- Pursuant to 10 CFR 50.82(a)(7) the licensee is required to notify the NRC before performing any decommissioning activity inconsistent with, or making

any significant changes from, those actions and schedules described in the PSDAR, including changes that significantly increase decommissioning costs.

- Pursuant to 10 CFR 50.82(a)(8)(iii), within 2 years following permanent cessation of operations, if not already submitted, the licensee shall submit a SSDCE.
- In accordance with 10 CFR 72.30, licensees must have a proposed decommissioning plan for the ISFSI site and facilities that includes a cost estimate for the plan. The plan should contain sufficient information on the proposed practices and procedures for the decontamination of the ISFSI and for the disposal of residual radioactive materials after all spent fuel, high-level radioactive waste, and reactor-related greater than Class C (GTCC) waste have been removed.
- Use of the decommissioning funds is limited by 10 CFR 50.82(a)(8)(i) to legitimate decommissioning expenses that neither reduces the value of the trust fund below that necessary to place and maintain the reactor in a safe storage condition if unforeseen conditions or expenses arise, nor inhibits the ability of the licensee to complete funding of any shortfalls in the trust needed to ensure the availability of funds to ultimately release the site and terminate the license.
- As provided in 10 CFR 50.82(a)(8)(ii), a licensee may withdraw funds from the decommissioning trust up to a cumulative total of three percent of the generic amount calculated under 10 CFR 50.75 for decommissioning planning purposes at any time.
- After submittal of the certifications of permanent cessation of operations and fuel removal required under 10 CFR 50.82(a)(1) and commencing 90 days after the NRC has received the PSDAR, the licensee may use an additional 20 percent of the decommissioning funds prescribed in 10 CFR 50.75(c) for decommissioning purposes. The licensee is prohibited from using the remaining 77 percent of the generic decommissioning funds until a SSDCE is submitted to the NRC.
- Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Plants," (Reference 3) and NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," (Reference 4) provide the standard format and content to facilitate preparation and NRC review of required cost estimates.

## 2. Decommissioning Alternatives

The NRC has evaluated the environmental impacts of three general strategies for decommissioning power reactor facilities in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors" (Reference 5). The three general methods evaluated are summarized as follows:

- DECON: The systems, structures, and components (SSCs) that contain radioactive contaminants are promptly removed or decontaminated to a level

that permits termination of the 10 CFR 50 license shortly after cessation of operations.

- SAFSTOR: After the plant is shut down and defueled, the facility is placed in a safe, stable condition and maintained in that state (safe storage). The facility is decontaminated and dismantled at the end of the storage period to levels that permit 10 CFR 50 license termination. During SAFSTOR, a facility is left intact, or may be partially dismantled, but the SNF is removed from the reactor vessel, and radioactive liquids are drained from systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thereby reducing the quantity of contamination and radioactivity that must be disposed of during decontamination and dismantlement.

- ENTOMB: Radioactive SSCs are encased in a structurally long-lived substance, such as concrete. The entombed structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level that permits termination of the 10 CFR 50 license.

The decommissioning approach that has been selected by PG&E for DCPP is the DECON method. While some decommissioning activities would begin after the Unit 1 shutdown, most decommissioning activities at the two units would begin soon after the Unit 2 shutdown and are sequenced and integrated to minimize the total cost and duration of the physical dismantling processes (Reference 1, Enclosure 5, Section 1.5). DCPP decommissioning includes: permanent removal of fuel from the reactors; transfer SNF to the DC ISFSI; decontaminate and dismantle (D&D) SSCs to levels that permit license termination; and restore non-DC ISFSI site areas. In accordance with 10 CFR 50.82(a)(9), a license termination plan will be developed and submitted for NRC approval at least two years prior to termination of the licenses (Reference 1, Enclosure 5, Section 1.4.1). 10 CFR 50 license termination is targeted for approximately 13 years after Unit 2 shutdown. After SNF and GTCC waste are transferred to the DOE for storage at a permanent offsite repository, the DC ISFSI will be decommissioned in accordance with 10 CFR 72, and the site restored (including biological monitoring), within an additional 9 years. (Reference 1, Enclosure 5, Figures 5-1 and 5-2)

The decision to transition to immediate DECON is consistent with the CPUC and stakeholder preference and is also in the best interest of PG&E's customers because the total cost of decommissioning can be reduced by direct transition to decommissioning immediately upon plant shutdown. PG&E determined that immediate transition to decommissioning is more cost-effective than the SAFSTOR strategy based on the following considerations: (1) the operating licenses are terminated earlier; (2) earlier security staff and emergency plan reductions due to security modifications and earlier transfer of SNF to the DC ISFSI; (3) benchmarking experience of other plants supports more efficient resolution of technical challenges;

and (4) availability of experienced, in-house staff (Reference 1, Enclosure 5, Section 1.5).

Typically, initial planning efforts detailing the decommissioning process can take 18 to 24 months after reactor shutdown before physical decommissioning begins. To support a direct transition to immediate DECON, PG&E plans to leverage the CPUC's early approval of DCPP shutdown in 2024 and 2025 to continue decommissioning planning and permitting activities from 2019 to 2024. The planning would streamline the decommissioning effort, reduce decommissioning costs, and accelerate the schedule by allowing the majority of physical decommissioning of portions of the site to begin shortly after the Unit 2 permanent shut down. This also would shorten the overall decommissioning schedule. Industry experience indicates that early, detailed preparation and planning reduces the duration and cost of decommissioning while enhancing safety and efficiency (References 6 and 7). (Reference 1, Enclosure 5, Section 1.5)

## 3. Decommissioning Overview

DCPP expects to conduct decommissioning of DCPP in the following periods presented in Table 3-1.

**Table 3-1: Diablo Canyon Power Plant Decommissioning Periods Summary**

| Period | Period Title | Period Start | Period Finish | General Description |
|---|---|---|---|---|
| 1 | Pre-Shutdown Planning | Dec 2010 | Oct 2024 | Consists of detailed planning, engineering, contracting, licensing, and permitting efforts. |
| 2 | Power Block Modifications | Nov 2024 | Apr 2027 | Transitions the plant to a decommissioning configuration to support safe and efficient decommissioning. |
| 3 | Wet Storage | May 2027 | Jun 2032 | Designates the timeframe where SNF is cooling in the spent fuel pools (SFPs) and/or is being transferred to the DC ISFSI. Concurrently, preparations are being made for major D&D in the next period. |
| 4 | Building Demolition | Jul 2032 | Apr 2035 | Consists of D&D of radiological SSCs. Also includes removal of several ancillary (non-radiological) structures. |
| 5 | Site Restoration | May 2035 | Dec 2038 | Includes demolition of non-radiological structures, conduct of final radiological surveys to support license termination, and restoration of non-ISFSI areas. Period ends with 10 CFR 50 license termination. |
| 6 | ISFSI Operations | Jan 2039 | Aug 2067 | Designates the timeframe after 10 CFR 50 license termination where SNF and GTCC waste are stored only at the DC ISFSI and transferred to the DOE for storage at a permanent offsite repository. This period also |

| Period | Period Title | Period Start | Period Finish | General Description |
|---|---|---|---|---|
| | | | | includes biological monitoring of the plant site restoration. |
| 7 | ISFSI Restoration | Sep 2067 | Jan 2076 | Consists of removal of ISFSI structures, permitting, conduct of final radiological surveys for ISFSI license termination, restoration of affected areas, and biological monitoring. |

Reference 1, Enclosure 3

## 4. Decommissioning Cost Estimate Methodology

The DCE (Reference 1, Enclosure 5) is divided into three NRC-defined cost categories (or phases) – License Termination, Spent Fuel Management, and Site Restoration. Within each category, costs were estimated by scope of work (Reference 1, Enclosure 5, Section 4.1).

License Termination: 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 category is generally sufficient to terminate the plant's operating licenses, recognizing that spent fuel management represents an additional cost liability that will interact with the license termination effort.

Spent Fuel Management: Costs associated with the containerization and transfer of spent fuel from the SFPs to the DC ISFSI and the transfer of casks from the DC ISFSI to an approved offsite location. Costs also are included for the operations of the SFPs, management of the DC ISFSI until all SNF and GTCC waste is transferred to an approved offsite location, demolition of the DC ISFSI, and restoration of the associated area.

Site Restoration: Costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from radiological contamination. This includes structures never exposed to radioactive materials (such as office buildings), as well as those facilities that have been decontaminated to appropriate levels. Structures are removed to a depth of three feet (unless noted otherwise in Reference 1, Enclosure 5, Section 4.1.3.2) and backfilled to conform to local grade.

The cost to decommission the site, safeguard the spent fuel and GTCC waste until it can be transferred to the DOE for storage at a permanent offsite repository, and restore the impacted area of the site is estimated to be $5.1 billion in 2019 dollars. The summary of the costs estimated for License Termination, Spent Fuel Management, and Site Restoration activities are presented in Table ES-1.

A further discussion of cost estimate development, categorization, and site-specific considerations are provided in the subsections below.

## 4.1. Approach

PG&E used a dedicated team of nuclear, decommissioning, and DCPP experts to form a decommissioning plan, schedule, and associated cost estimate rather than relying on a generic nuclear industry decommissioning unit cost factor methodology. The SSDCE is based on cost-based and historical bid-based estimating, direct experience gained by PG&E after 10 years of full-scale decommissioning at HBPP Unit 3, industry expertise, and benchmarking. The planning team included experts in specific fields who understand the complexity and multi-discipline requirements for a project of this scale. This included PG&E leadership, decommissioning-experienced personnel, DCPP operating plant departmental personnel, specialty contractors, corporate legal, finance, and accounting. (Reference 1, Enclosure 5, Sections 1 and 2.2)

Project management plans (PMPs) and studies were prepared to establish the site-specific baseline for decommissioning activities, costs, and an executable schedule. PMPs were prepared to develop the plans for major decommissioning evolutions, while studies were prepared to gather information on specific topics. This methodology allowed PG&E to evaluate options that minimize costs while adhering to PG&E established risk minimization and safety principles.

After each cost estimate was developed, the costs were grouped into categories (see Section 4 for a description of the categories), broken down into specific milestones with specified scopes of work (see below), and time phased using the project schedule.

Costs were further identified as discrete or unassigned. Discrete costs are those expenses that are directly attributable to an activity with specific completion criteria such as reactor pressure vessel removal or establishing a SFP island. Unassigned costs are expenses not easily attributed to a discrete work scope such as staffing, waste, and transportation costs. Discrete and unassigned cost designations are identified in Table ES-1 and Attachment A (Reference 1, Enclosure 5, Sections 6.1 and 6.2).

Attachment A provides a complete listing of the milestones and specified scopes of work and assigned each an identification number. Below are summaries of each milestone (Reference 1, Enclosure 5, Section 6.1):

**(1) Program Management, Oversight, and Fees:**
This category includes general staff support and oversight, severance costs, metered energy usage, water and facility management, taxes, insurance fees,

regulatory and industry fees, public engagement, radiological characterization, license termination preparation, emergency planning staffing and fees, and consumables. These costs are necessary decommissioning costs and they are not associated with a discrete scope of work.

**(2) Security Operations:**
This category includes the general security staffing and associated departmental costs for the duration of the decommissioning project. The security modification costs are excluded from this category and are included in Power Block Modifications.

**(3) Waste/Transportation:**
This category includes costs for transportation and disposal of all waste classifications excluding those associated with Breakwater Removal, Reactor/Internals Segmentation, and Large Component Removal. Waste costs associated with those scopes are easily segregated and can be allocated to their discrete projects. This category also includes material management costs which includes costs for managing the sale of remaining assets.

**(4) Power Block Modifications:**
This category includes the SFP island, cold and dark, and security modifications. These modifications are all implemented early in the project lifecycle and will allow PG&E to either reduce staffing levels or enhance the ability to safely execute decommissioning.

**(5) Site Infrastructure:**
This category includes onsite and offsite infrastructure improvements required to complete decommissioning such as onsite building modifications and Pismo Beach rail yard modifications.

**(6) Large Component Removal:**
This category includes removal of steam generators (original and replacement), reactor heads (original and replacement), reactor coolant pumps, main generators, main turbines, and other various large components that must be removed prior to demolition. This category also includes the transportation and disposal costs of the components.

**(7) Reactor/Internals Segmentation:**
This category includes the reactor vessel and internals segmentation along with the packaging, transportation, and disposal costs. This scope of work is highly specialized and includes the design and fabrication of custom tooling.

**(8) Spent Fuel Transfer to Independent Spent Fuel Storage Installation:**
This category includes the procurement of storage canisters/casks for both GTCC waste and spent fuel, the cost of loading spent fuel into casks, and transferring of all casks from the fuel handling building to the DC ISFSI pad. The loading of GTCC waste into casks can be found in the Reactor/Internals Segmentation scope.

**(9) Turbine Building Removal:**
This category includes decontamination, system and area closure, and demolition of the Unit 1 and Unit 2 turbine building.

**(10) Auxiliary Building Removal:**
This category includes decontamination, system and area closure, and demolition of the Unit 1 and Unit 2 auxiliary building.

**(11) Containment Removal:**
This category includes decontamination, system and area closure, and demolition of the Unit 1 and Unit 2 containment buildings.

**(12) Fuel Handling Building Removal:**
This category includes decontamination, system and area closure, and demolition of the Unit 1 and Unit 2 fuel handling building.

**(13) Not Used.** Original scope included in this milestone was relocated into another milestone during cost estimate development.

**(14) Balance of Site Removal:**
This category includes decontamination, system and area closure, and demolition of all remaining common and unit specific structures.

**(15) Intake Structure Removal:**
This category includes installation of a coffer dam inside the breakwater lagoon, system and area closure, demolition of the intake structure, and removal of the coffer dam.

**(16) Discharge Structure Removal:**
This category includes installation of a coffer dam around the discharge structure, decontamination, system and area closure, demolition of the discharge structure, and removal of the coffer dam.

**(17) Breakwater Removal:**
This category includes demolition, transportation, and disposal of the east and west breakwaters.

**(18) Non-Independent Spent Fuel Storage Installation Site Restoration:**
This category includes underground utility and structure demolition, soil remediation, final site survey, and final grading, landscaping, and re-vegetation of the non-ISFSI portion of the site.

**(19) Spent Fuel Transfer to Department of Energy:**
This category includes the transfer of spent fuel and GTCC waste casks to the DOE.

**(20) Independent Spent Fuel Storage Installation Demolition and Site Restoration:**
This category includes underground utility and structure demolition, soil remediation, final site survey, and final grading, landscaping, and revegetation of the ISFSI portion of the site.

## 4.2. Basis of Estimate/Site-Specific Considerations

Regulatory Guide 1.202 (Reference 3) and NUREG-1713 (Reference 4) delineate the items to be addressed in the SSDCE. PG&E has addressed these items in the subsections that follow.

### 4.2.1. Major Radioactive Component Removal

The DCE provided in Reference 1, Enclosure 5 provides a significant amount of information regarding the process of removing radioactive components. Reference to these sections for additional information is included below. Estimated costs for the following are provided in Attachment A:

- **Reactor Coolant Loops**: Removal is designated as system and area closure work scope and is accounted for in the respective containment building unit specific cost line items 11.02 and 11.05. Decontamination is accounted for in line items 11.01 and 11.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of containment building system and area closure.

- **Reactor Coolant Pumps**: Line item 6.05 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of removal plans.

- **Bioshield**: The bioshield is comprised of mainly concrete and rebar. Therefore, its removal is designated as building demolition work scope. This work is accounted for in the respective containment unit specific demolition cost line items 11.03 and 11.06. Decontamination is accounted for in line items 11.01 and 11.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of containment demolition.

- **Pressurizer**: Line item 6.06 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of removal plans.

- **Steam Generators**: Line item 6.03 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of removal plans.

- **Reactor Vessel and Internals**: Line item 7 addresses removal, decontamination, packaging, transportation, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.4 for a detailed description of these plans.

- **Control Rod Drive System**: Removal will take place with the reactor heads. Cost line item 6.04 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.1 for a detailed description of these plans.

- **Spent Fuel Racks**: Removal is designated as system and area closure work scope and is accounted for in the respective fuel handling building unit specific cost line items 12.02 and 12.05. Decontamination is accounted for in line items 12.01 and 12.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.4 for a detailed description of fuel handling building system and area closure.

- **Spent Fuel Pool Cooling System**: Removal is designated as system and area closure work scope and is accounted for in the respective fuel handling building unit specific cost line items 12.02 and 12.05. Decontamination is accounted for in line items 12.01 and 12.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.4 for a detailed description of fuel handling building system and area closure.

- **Spent Fuel Pool Liner**: Removal is designated as building demolition work scope and is accounted for in the respective fuel handling building unit specific demolition cost line items 12.03 and 12.06. Decontamination is accounted for in line items 12.01 and 12.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.4 for a detailed description of fuel handling building demolition.

- **Draining and Processing of Spent Fuel Pool Water and Boron Waste**: The capability to process radiologically contaminated water is a necessary function during decommissioning. Existing liquid radiological waste facilities will be removed from service approximately 18 months after both units are shut down. Until that occurs, much of the liquid radiological waste inventory will be processed through this existing system. Because the water volume in the SFPs will need to be maintained for years after both units are shut down until all SNF and GTCC waste is transferred to the ISFSI, temporary liquid radiological waste and dilution systems will be installed to dispose of the SFP water and additional contaminated water in accordance with 10 CFR 20 Appendix B limitations. Costs for these new temporary systems are contained in line item 1.09. See Reference 1, Enclosure 5, Section 4.1.1.2.2 (page 154) for a detailed description of radiological waste water processing.

- **Contaminated Cranes**: Removal is designated as building demolition work scope and is accounted for in the respective building unit specific demolition cost items x.03 and x.06 (where x is the identification for each building in line items 9 through 12). Decontamination is accounted for in line items x.01 and x.04 and packaging and transportation of the waste is captured in line item 3. Removal, decontamination, packaging, and disposal of the containment manipulator cranes is designated in line item 6.07. See Reference 1, Enclosure 5, Sections 4.1.1.6 and 4.1.3.2 for detailed descriptions of building demolition.

- **Turbine Generator(s)**: Line item 6.08 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Turbine Condenser(s)**: Line item 6.11 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Moisture Separator Reheaters**: Line item 6.11 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Feedwater Heaters**: Line item 6.11 addresses removal, decontamination, packaging, and disposal. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Feedwater Condensate System**: Removal is designated as building demolition work scope and is accounted for in the respective turbine building unit specific demolition cost line items 9.03 and 9.06. Prior to demolition, the components will be made safe for removal during system and area closure that is accounted for in line items 9.02 and 9.05. Packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Feedwater Pumps/Turbine Drives**: Removal is designated as building demolition work scope and is accounted for in the respective turbine building unit specific demolition cost line items 9.03 and 9.06. Prior to demolition, the components will be made safe for removal during system and area closure that is accounted for in line items 9.02 and 9.05. Packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.1.6.2 for a detailed description of turbine building demolition.

- **Floor Drains**: Removal will occur with the structures during building demolition. If they are embedded in the portions of concrete foundations

that are not being removed (i.e., the base slabs and exterior walls of the auxiliary and turbine buildings), then they will be sampled and decontaminated if possible, and abandoned with the foundation. If they cannot be decontaminated successfully, they will be locally removed from those foundations prior to abandonment. The costs for removal of the floor drains is therefore captured in the building demolition line items x.03 and x.06 (where x is the identification for each building in line items 9 through 12) for each individual affected structure. Decontamination is accounted for in line items x.01 and x.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Sections 4.1.1.6 and 4.1.3.2 for detailed descriptions of building demolition.

- **Heating, Ventilation, and Air Conditioning Ducts, Equipment**: Removal is designated as building demolition work scope and is accounted for in the respective building unit specific demolition cost items x.03 and x.06 (where x is the identification for each building in line items 9 through 12). Decontamination is accounted for in line items x.01 and x.04 and packaging and transportation of the waste is captured in line item 3. See Reference 1, Enclosure 5, Section 4.1.3.1.4 for detailed descriptions of building demolition.

### 4.2.2. Radiological Decontamination

As discussed in Reference 1, Enclosure 5, Section 4.1.1.3.2, after removal, remediation, and/or abatement of all known hazardous and/or regulated materials, there are two remaining scopes of work related to building decontamination.

- Before open-air structural demolition, structures are prepared by applying either a fixative and/or some other form of lockdown media to seal off loose radiological contamination to prevent the migration of loose radiological contamination during demolition activities in the form of airborne radiological contamination.
- After demolition is complete, remaining surfaces of a structure that will be left in-place will be radiologically decontaminated. The decontamination will support final status survey operations and the follow-up independent third-party confirmatory surveys before 10 CFR Part 50 licenses are terminated (see Section 4.2.3 below).

Structural surfaces (concrete or steel) will be radiologically decontaminated to accomplish either of the following:

- Prepare a structure for open-air demolition when the application of either fixative or some other form of lockdown media is deemed insufficient to seal off loose contamination.
- Remediate remaining structural surfaces to the site-specific Derived Concentration Guideline Level, thereby enabling and facilitating termination of the 10 CFR Part 50 licenses.

Remaining concrete surfaces of impacted structures will be decontaminated by removing concrete either by scabbling or other abrasive means in accordance with the structure's NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Reference 8) Classification. Similarly, remaining structural steel surfaces of impacted structures will be decontaminated to a bare bright finish by either abrasive blasting or mechanical abrading in accordance with the same MARSSIM Classification. See Reference 1, Enclosure 5, Section 4.1.1.3.2 for detailed description of building decontamination.

To support a decontamination cost estimate, PG&E used plant drawings and subject matter experts to estimate the amount of contaminated concrete (see Table 4-1) and determine contaminated equipment (Table 4-2).

**Table 4-1: Concrete Requiring Radiological Decontamination or Removal**

| Building | Area of Concrete Decontaminated ($ft^2$) | Decontamination Concrete Removal ($ft^3$) | Total contaminated concrete removed ($ft^3$) |
|---|---|---|---|
| Containment | 242,014 | 5,042 | 3,560,000 |
| Turbine | 51,470 | 1,072 | 386,000 |
| Auxiliary | 129,988 | 2,708 | 1,840,000 |
| Fuel Handling | 4,084 | 85 | |
| Discharge Piping | 7,854 | 164 | 164 |
| Misc. Buildings | | | 1,216,545 |
| **Total contaminated concrete removed from site** | | | **7,002,709** |

**Table 4-2: Contaminated Equipment and Piping**

| Equipment Category | Length of Piping in Feet or Number of Items in Each Category |
|---|---|
| Piping diameter > 3 inches | 14,232 ft. |
| Piping diameter < 3 inches | 42,069 ft. |
| Tanks of all sizes | 87 |
| Pumps | 161 |
| Heat Exchangers | 40 |
| Miscellaneous Components | 172 |

In addition to surface decontamination, PG&E evaluated various methods available for reducing the radioactive source term in contaminated systems exposed to radioactive fluids. The DCE includes costs in the respective building unit specific decontamination Attachment A line items 10.01, 10.04, 11.01, and 11.04 for performing chemical decontamination of the reactor coolant piping, pressurizer, chemical volume and control system, and residual heat removal system to reduce worker exposure during the decommissioning work. Reference 1, Enclosure 5, Section 4.1.1.3.3 provides additional details on the decontamination evaluation process and results.

Reference 1, Enclosure 5, Section 4.1.3.2 provides a description of the buildings inside the radiologically controlled area. As noted in Section 4.2.3 below, there are currently not any known inaccessible areas that may contain radiological contamination.

### 4.2.3. Site Characterization/Final Site Survey/Remediation

Site characterization will be conducted in two phases: (1) a preliminary characterization during plant operations, and (2) a post-shutdown site characterization. Once physical dismantlement and any necessary decontamination is completed for a given area, final status surveys are conducted to demonstrate that an area conforms to the radiological release criteria for license termination. Furthermore, remediation may be necessary to meet regulatory requirements. Each topic is discussed below.

**Preliminary Characterization** (Reference 1, Enclosure 5, Section 2.3)
A historical site assessment (HSA) was performed for the site in 2018. This investigation collected information regarding the site history from the start of operations to the present and used the following sources of information:

- annual environmental reports
- annual effluent reports

- licensee event reports
- 10 CFR 50.75(g) files
- groundwater sampling data
- radiation survey data
- area and boundary locations for radiological areas
- corrective action reports
- personnel interviews

The HSA identified potential non-radiological contamination (i.e., petroleum hydrocarbons, asbestos, and lead paint) and potential radioactive contamination. Both radiological and potential non-radiological contamination warrant additional investigation as part of the site characterization plan to be performed upon plant shutdown. Based on the results of the HSA, there are currently not any known inaccessible areas that may contain radiological contamination. See Reference 1, Enclosure 5, Section 2.3 for examples of radiological and non-radiological findings.

Regulations require minimizing, preventing, and documenting both radiological and chemical-related contamination and spill events. Robust programs and initiatives are in place to minimize and prevent both. They include:

- the 2006 Nuclear Energy Institute groundwater protection initiative (GPI 07-007), which establishes standards for sampling and reporting groundwater monitoring;
- the Buried Piping Program, which analyzes and inspects below-grade piping;
- the Radiological and Environmental Monitoring Program, which monitors for radioactive contamination in the environment;
- the Effluents Control Program administered by the Offsite Dose Calculation Manual, which regulates and monitors radioactive effluents;
- the Spill Prevention Countermeasure and Control Program, which catalogs and develops procedures and controls to prevent hydrocarbon spills; and
- the Storm Water Pollution Prevention Plan, which controls site exposure to rainfall and potential pollutants

As a result of these initiatives, all feasible efforts are being made to prevent chemical or radiological contamination that could harm humans and/or the environment. If a significant spill occurs, the event is immediately documented in the corrective action program. If a spill cannot be completely cleaned up or mitigated, the event will be documented as required by 10 CFR 50.75(g). Any

government regulatory agency may require interim or complete cleanup of a spill or contamination event if the event could harm humans or the environment.

**Post-Shutdown Site Characterization** (Reference 1, Enclosure 5, Section 4.1.1.1.4)
The approximately 750-acre industrial portion of the DCPP site will be characterized for both radiological contamination and non-radiological contaminants of concern. Physical sampling and analysis will occur after Unit 1 and Unit 2 are shut down. The purpose of the Site Characterization Study is, through the formal Data Quality Objectives process, to determine the extent and nature of radiological and non-radiological contamination that may exist at DCPP.

Radiological characterization will be conducted in accordance with NUREG-1575 (Reference 8). Non-radiological hazardous characterization will be in accordance with both federal and California Environmental Protection Agency standards.

The following are the types of processes that may be used in the Site Characterization Study:

- grab sample techniques for surface soils
- soil boring for subsurface soils
- coring for volumetric concrete samples
- smear techniques for loose surface contamination
- direct radiation measurements
- gamma radiation spectroscopy
- liquid scintillation counting for tritium analysis
- radiochemical analysis for hard-to-detect species such as iron-55 and nickel-63
- volumetric samples for hazardous materials analysis (for non-radiological characterization only)
- scrape samples for coatings analysis (for non-radiological characterization only)

Estimated costs for site characterization are shown in Attachment A, line 1.14.

**Final Status Surveys**
After completing site decommissioning activities, the final status surveys will be performed to demonstrate that the remediated portion of the site (excluding the ISFSI containing the spent fuel and GTCC waste) can be released for unrestricted use and terminate the 10 CFR 50 license. The site release criteria is

defined by the MARSSIM protocol and is in general 25 millirem per year from all pathways. Adherence to the NRC-approved License Termination Plan and MARSSIM guidance will ensure that the surveys are conducted so that applicable regulatory criteria are satisfied.

Estimated final status survey costs are shown in Attachment A, line 18.03.

**Soil Remediation** (Reference 1, Enclosure 5, Sections 4.1.2.2.4 and 4.1.3.1.1) The extent of soil contamination within the site will be defined by the Post-Shutdown Site Characterization. Soil remediation is carried out to reduce (1) soil radioactive contamination to levels that meet NRC's radiological release criteria for unrestricted use and (2) non-radioactive soil contamination to levels that meet the California Department Toxic Substances Control (governed by the California Environmental Protection Agency) chemical cleanup standards which will comply with federal Environmental Protection Agency water quality standards at a minimum. Soil remediation includes the logistical, planning, resources, and physical work required to excavate contaminated soils in conjunction with demolition, excavation, and final site restoration activities. Estimated costs for soil remediation are shown in Attachment A line item 18.02.

Active groundwater remediation is not anticipated for DCPP, as groundwater monitoring has not identified tritium at the well that is used for a drinking water source (located up DC, away from the power block).

### 4.2.4. Waste Disposal

Prior to demolition, material slated for removal will be evaluated to identify what can be repurposed (or reused), recycled, or disposed of as waste. This approach minimizes costs and is environmentally responsible. Materials designated for reuse will be clean materials that have another use onsite, avoiding transportation and disposal costs. Materials designated for recycling will be clean materials that still possess usable value but are not usable onsite. These materials will be transported to a recycling facility, incurring transportation costs but no disposal costs. Offsite disposal will be considered in cases where neither reuse nor recycling are possible because the material contains radiological (as defined by 10 CFR 20.2002 and 10 CFR 61 classifications) or hazardous/regulated contaminants, is not suitable for recycling, or when it is not economical.

Demolition methods and handling techniques will be selected to minimize cross-contaminating clean materials with those required to be disposed of as wastes. To minimize cross-contamination with clean materials, the clean materials will be removed first prior to building demolition if it will be reused, recycled, or

repurposed and segregated from the transportation and storage areas used for radiological or hazardous/regulated materials.

PG&E has evaluated the site and detailed the types and quantities of each material on site to determine the lowest cost option, including what quantities of material could be reused onsite instead of shipped offsite for recycling or disposal. PG&E determined the estimated cost of disposal based on the type and amount of material, disposal location, and transportation method. Table 4-3 provides a comparison of total Class A, B/C, and GTCC waste volumes for DCPP decommissioning. Estimated radiological and non-radiological waste volumes, transportation details, and costs for transportation and disposal (including processing fees where applicable) are presented in Table 4-4 with no contingency (Reference 1, Enclosure 5, Table 3-9 updated to 2019 dollars). Table 4-4 also identifies the associated cost lines items in Attachment A (which include contingency). Costs for packaging low-level waste are embedded within Attachment A cost line item 3.01.

**Table 4-3: Waste Material Volumes**

| Waste Class | Volume ($ft^3$) | Percent |
|---|---|---|
| Class A | 3,147,194 | |
| Class B and C | | |
| GTCC | | |
| **Total** | | |

Due to the availability of a PG&E rail spur approximately 16 miles from DCPP, PG&E plans to ship the bulk of radiological waste first by truck from DCPP to the Pismo Beach Rail Yard using intermodal containers, then the majority of the distance to the disposal site by rail using gondola railcars; however, there may be times when direct truck shipments will be required, such as for large components.

GTCC waste will be managed and stored onsite until the DOE accepts the waste for final disposition, or until an appropriately licensed facility becomes available. The GTCC waste consists of materials presently stored in the SFPs and waste generated during reactor internal segmentation. The segmentation plan will use characterization information and an activation analysis to minimize the quantity of GTCC waste, and the packaging plan will reflect the segmentation plan. It is anticipated that up to 10 GTCC waste canisters will be required for the storage of GTCC waste from decommissioning activities.

Reference 1, Enclosure 5, Sections 3.3, 4.1.1.7, 4.1.2.4, and 4.1.3.3 provide additional information related to waste reduction and transportation and disposal site options evaluated.

### 4.2.5. Decommissioning Staffing and Fees

**Staffing**

Table 4-5 presents labor costs and the average labor requirements by decommissioning period as defined in Table 3-1. "Management/Support Staff" include staffing for Attachment A line items 1 and 2. "Decommissioning Crews" identifies the staffing requirements for Attachment A line items 3 through 20. Attachment A, Columns L and M further provide labor costs by each cost line item. Personnel costs are based upon established PG&E rates and established industry rates.

At permanent cessation of Unit 2 operations, staffing is estimated to be reduced from current levels and is expected to decrease as the SNF is moved from the SFP to the ISFSI, and as requirements for security and emergency planning are reduced.

**Fees**

Estimated costs for the following are provided in Attachment A. Further description of the following items are provided in Reference 1, Enclosure 5, Section 4.1.1.9.14.

- Energy: line item 1.03
- Insurance: line item 1.04
- Property Tax: line item 1.05
- NRC Reviews and Fees: line item 1.06
- Consumables: line item 1.17

**Diablo Canyon Power Plant**
**Site-Specific Decommissioning Cost Estimate**

## Table 4-4: Materials Transportation and Disposal Costs (2019 dollars)[1]

| Type of Waste | Waste Volumes (tons) | Waste Volumes ($ft^3$) | Preferred Disposal/Recycle Facility | Chosen Transportation Option | Transportation Cost | Disposal Cost | Total T & D Cost | Attachment A Cost Line Items [1] |
|---|---|---|---|---|---|---|---|---|
| *Clean Waste* | | | | | | | | |
| Non-Rad Disposal (including BW) | 794,000 | 9,925,004 | [redacted] | IMC Tipper to Gondola | [redacted] | [redacted] | [redacted] | Combination 3 and 17 |
| Non-Rad Metal Recycle | 72,281 | 803,123 | [redacted] | IMC on Railcar | [redacted] | [redacted] | [redacted] | Portion of 3 |
| Non-Rad Concrete Recycle | 87,887 | 1,098,584 | [redacted] | Direct Truck | [redacted] | [redacted] | [redacted] | Portion of 3 |
| | | | | *Non-Rad Subtotal* | [redacted] | [redacted] | [redacted] | |
| *Radiological and Regulated Waste* | | | | | | | | |
| **Other Regulated Waste** | 34,263 | 856,572 | US Ecology Nevada | Direct Truck | [redacted] | [redacted] | [redacted] | Portion of 3 |
| **LARW (20.2002)** | 231,385 | 5,019,379 | [redacted] | IMC Tipper to Gondola | [redacted] | [redacted] | [redacted] | |
| **Licensed Class A** | 129,910 | 2,885,408 | [redacted] | Combination | [redacted] | [redacted] | [redacted] | |
| **Class B/C** | N/A | [redacted] | [redacted] | Direct Truck | [redacted] | [redacted] | [redacted] | |
| **GTCC Wastes** | N/A | N/A | [redacted] | On-Site Storage | [redacted] | [redacted] | [redacted] | 3.06 |
| **Large Component Class A** | 7,760 | 174,326 | [redacted] | Direct Truck/ Specialty | [redacted] | [redacted] | [redacted] | Portion of 6 |
| **RPV/RVI Activities** | | | [redacted] | Combination Rail/ Truck | [redacted] | [redacted] | [redacted] | Portion of 7 |
| **Class A (Containerized and bulk)** | 1,735 | 87,460 | | | | | | |
| **Class B** | 206 | [redacted] | | | | | | |
| **Class C** | 105 | [redacted] | | | | | | |
| | | | | *Rad and Reg. Subtotal* | [redacted] | [redacted] | [redacted] | |
| | | | | **Grand Totals** | [redacted] | [redacted] | [redacted] | |

(1) Costs do not align with the Attachment A line items identified because values in Table 4-4 do not include contingency.

**Table 4-5: Labor Costs and Average Labor Requirements by Decommissioning Period (thousands of 2019 dollars)**

| Periods | 2 - Power Block Mods | | 3 - Wet Storage | | 4 - Building Demo | | 5 - Site Restoration | | 6 - ISFSI Operations | | 7 - ISFSI Restoration | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Labor FTE | Labor Cost | Labor FTE | Labor Cost | Labor FTE | Labor Cost | Labor FTE | Labor Cost | Labor FTE | Labor Cost | Labor FTE | Labor Cost |
| **Decommissioning Crews** | 313 | $185,703 | 333 | $418,825 | 282 | $179,165 | 158 | $138,024 | 8 | $70,014 | 44 | $45,662 |
| **Management/ Support Staff** | 383 | $234,022 | 399 | $510,687 | 160 | $125,2901 | 95 | $100,614 | 34 | $253,311 | 6 | $8,168 |
| **Total** | 696 | $419,725 | 732 | $929,512 | 442 | $304,456 | 254 | $238,638 | 42 | $323,325 | 50 | $53,830 |

FTE – Full-Time Equivalents

## 4.3. Assumptions

As discussed in greater detail in Reference 1, Enclosure 5, the following are major assumptions affecting decommissioning costs (Reference 1, Enclosure 5, Section 1.7):

**Regulatory Approvals and Permits**

PG&E will require many regulatory approvals and permits to decommission DCPP. These are critical items and require close coordination with federal, state, and local agencies. Delays in obtaining – or failure to obtain – approval and/or possible regulatory conditions could significantly impact estimated costs. As an example, PG&E's water management plan is based on two assumptions with major financial implications: (1) PG&E will obtain an extension of its California State Lands Commission (CSLC) lease to continue use of the intake cove and discharge structures for drawing in ocean water and discharging waste water to the ocean; and (2) PG&E will obtain a National Pollutant Discharge Elimination System permit to allow for discharges of waste water to the Pacific Ocean during decommissioning. Failure to obtain either of these approvals would delay decommissioning and result in significant additional costs. (See Reference 1, Enclosure 5, Section 3.1 for additional information.)

**California State Lands Commission Lease Requirements**

PG&E has a CSLC lease that requires PG&E to remove the DCPP intake structure, breakwaters, and discharge structure at the termination of the lease. While PG&E believes that removal of the intake structure and discharge structure is warranted, PG&E, in consultation with the community and relevant agencies, is evaluating repurposing the breakwaters. However, until PG&E has obtained final approvals, the cost of complying with the CSLC lease must be included in the estimated cost for site restoration of DCPP. (See Reference 1, Enclosure 5, Sections 2.4 and 3.2 for additional information.)

**Waste Disposal**

PG&E's current waste disposal plan involves taking several proactive steps to minimize the volumes of waste that must be disposed of and to utilize the most cost-effective waste disposal options. (See Reference 1, Enclosure 5, Section 3.3 for additional information.)

**Security**

PG&E has conducted a comprehensive review involving state-of-the-art software and site walk downs of DCPP security requirements pre- and post-unit shutdown. PG&E's post-shutdown security plan has been independently reviewed by a third-party expert consultant. PG&E also has identified several cost mitigation measures, including (1) plant modifications which will reduce the number of necessary security

personnel; and (2) affirmative steps which PG&E may take prior to the beginning of each phase of decommissioning to reduce the number of security personnel. (See Reference 1, Enclosure 5, Section 3.4 for additional information.)

**Spent Nuclear Fuel**

The SSDCE is based on assumptions that: (1) PG&E will complete transfer of SNF and GTCC waste from the SFPs to the ISFSI seven years after the Unit 2 shutdown; and (2) the DOE will begin collecting SNF in the nuclear industry in 2031 and will specifically begin picking up SNF at DCPP in 2038. (See Reference 1, Enclosure 5, Section 3.5 for additional information.)

**Pre-Planning**

PG&E will conduct significant planning for decommissioning prior to the shutdown of Unit 1. This early planning will permit PG&E to begin decommissioning immediately upon the Unit 2 shutdown and will result in significant cost savings. (See Reference 1, Enclosure 5, Section 4.1.1.1.1 for additional information)

## 4.4. Inflation

The estimates presented in this report were developed in 2017 dollars for the DCE (Reference 1, Enclosure 5) and escalated to 2019 dollars. Escalation of future decommissioning costs over the remaining decommissioning project life-cycle are presented in Table 4-6.

**Table 4-6: Diablo Canyon Power Plant Units 1 and 2 Annual Escalation Rates**

| Line No | Year | PG&E Labor | Materials & Equipment[1] | Contract Labor | Burial Costs | Other |
|---|---|---|---|---|---|---|
| 1 | 2017 | | | | | |
| 2 | 2018 | 0.0330 | 0.0156 | 0.0298 | 0.0670 | 0.0196 |
| 3 | 2019 | 0.0330 | 0.0179 | 0.0331 | 0.0670 | 0.0239 |
| 4 | 2020 | 0.0330 | 0.0186 | 0.0342 | 0.0670 | 0.0267 |
| 5 | 2021 | 0.0330 | 0.0152 | 0.0347 | 0.0670 | 0.0255 |
| 6 | 2022 | 0.0330 | 0.0140 | 0.0343 | 0.0670 | 0.0243 |
| 7 | 2023 | 0.0330 | 0.0147 | 0.0339 | 0.0670 | 0.0233 |
| 8 | 2024 | 0.0330 | 0.0148 | 0.0337 | 0.0670 | 0.0221 |
| 9 | 2025 | 0.0330 | 0.0145 | 0.0335 | 0.0670 | 0.0213 |
| 10 | 2026 | 0.0330 | 0.0141 | 0.0330 | 0.0670 | 0.0210 |
| 11 | 2027 | 0.0330 | 0.0141 | 0.0315 | 0.0670 | 0.0207 |
| 12 | 2028 | 0.0330 | 0.0140 | 0.0312 | 0.0670 | 0.0206 |
| 13 | 2029 | 0.0330 | 0.0136 | 0.0307 | 0.0670 | 0.0204 |
| 14 | 2030 | 0.0330 | 0.0131 | 0.0300 | 0.0670 | 0.0201 |

| Line No | Year | PG&E Labor | Materials & Equipment[1] | Contract Labor | Burial Costs | Other |
|---|---|---|---|---|---|---|
| 15 | 2031 | 0.0330 | 0.0125 | 0.0300 | 0.0670 | 0.0198 |
| 16 | 2032 | 0.0330 | 0.0124 | 0.0301 | 0.0670 | 0.0199 |
| 17 | 2033 | 0.0330 | 0.0128 | 0.0301 | 0.0670 | 0.0202 |
| 18 | 2034 | 0.0330 | 0.0127 | 0.0301 | 0.0670 | 0.0201 |
| 19 | 2035 | 0.0330 | 0.0126 | 0.0301 | 0.0670 | 0.0203 |
| 20 | 2036 | 0.0330 | 0.0128 | 0.0301 | 0.0670 | 0.0204 |
| 21 | 2037 | 0.0330 | 0.0129 | 0.0300 | 0.0670 | 0.0205 |
| 22 | 2038 | 0.0330 | 0.0130 | 0.0298 | 0.0670 | 0.0207 |
| 23 | 2039 | 0.0330 | 0.0131 | 0.0298 | 0.0670 | 0.0208 |
| 24 | 2040 | 0.0330 | 0.0133 | 0.0299 | 0.0670 | 0.0210 |
| 25 | 2041 | 0.0330 | 0.0136 | 0.0300 | 0.0670 | 0.0214 |
| 26 | 2042 | 0.0330 | 0.0138 | 0.0301 | 0.0670 | 0.0215 |
| 27 | 2043 | 0.0330 | 0.0140 | 0.0303 | 0.0670 | 0.0218 |
| 28 | 2044 | 0.0330 | 0.0143 | 0.0305 | 0.0670 | 0.0221 |
| 29 | 2045 | 0.0330 | 0.0145 | 0.0306 | 0.0670 | 0.0223 |
| 30 | 2046 | 0.0330 | 0.0146 | 0.0306 | 0.0670 | 0.0225 |
| 31 | 2047 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0226 |
| 32 | 2048 | 0.0330 | 0.0150 | 0.0308 | 0.0670 | 0.0230 |
| 33 | 2049 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 34 | 2050 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 35 | 2051 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 36 | 2052 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 37 | 2053 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 38 | 2054 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 39 | 2055 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 40 | 2056 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 41 | 2057 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 42 | 2058 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 43 | 2059 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 44 | 2060 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 45 | 2061 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 46 | 2062 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 47 | 2063 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 48 | 2064 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 49 | 2065 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 50 | 2066 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 51 | 2067 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |

| Line No | Year | PG&E Labor | Materials & Equipment[1] | Contract Labor | Burial Costs | Other |
|---|---|---|---|---|---|---|
| 52 | 2068 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 53 | 2069 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 54 | 2070 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 55 | 2071 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 56 | 2072 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 57 | 2073 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 58 | 2074 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 59 | 2075 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 60 | 2076 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |
| 61 | 2077 | 0.0330 | 0.0147 | 0.0306 | 0.0670 | 0.0227 |

Note 1 – Materials: The materials and equipment escalator for DCPP Unit 1 and 2 is based on 41 percent materials weight and 59 percent heavy equipment

## 4.5. Contingency

This section discusses contingency factors as they relate to nuclear decommissioning and PG&E's contingency level used in its DCE, as discussed in Reference 1, Enclosure 5, Section 3.6.

### 4.5.1. Definition of Contingency in Nuclear Decommissioning Context

Contingency in the context of forecasting nuclear decommissioning expenditures has a specific meaning: the contingency factor is meant to account for the difference between the base cost and unforeseen, but anticipated, costs. The base cost estimate defines the project scope and accounts for the known and reasonably anticipated costs of decommissioning in the future. The contingency factor accounts for 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). For example, the mechanical failure of heavy equipment, tool breakage, weather delays, and the flooding of a trench are all known unknown events that increase the cost of decommissioning activities. Such cost increases are deemed to be within the scope of the decommissioning project because they occur during the conduct of an activity that is included in the base estimate. At the same time, they are unforeseeable because no one can predict when equipment will break or when the weather will cause delays (causing rescheduling of activities, inefficiencies in production, loss of productivity, overtime, slippages, etc.).

The events covered under contingency are often characterized as the "known unknowns" that will occur over the duration of a decommissioning project.

Contingency factors in this sense reflect only one type of risk – the specific risks of increased costs resulting from conditions at the project site after the commencement of the decommissioning work. Contingency dollars provide assurance that sufficient funding is available to accomplish the intended project scope and are expected to be fully expended during decommissioning. An estimate without contingency, or an inadequate allowance for contingency, can result in significant schedule delays and increased costs associated with delays if the project is unable to proceed. This definition of contingency does not include scope changes, or "unknown unknowns" such as a change in regulatory criteria, significant natural disasters, and security or terrorist activity.

### 4.5.2. Contingency for DCE

PG&E evaluated current industry and regulatory guidance to determine the appropriate contingency factor to estimate decommissioning costs. The most recent NRC guidance (Reference 9) states that:

> In general, a contingency of 25 percent applied to the sum of all estimated decommissioning costs should be adequate, but in some cases a higher contingency may be appropriate. The 25 percent contingency factor provides reasonable assurance for unforeseen circumstances that could increase decommissioning costs and should not be reduced or eliminated simply because foreseeable costs are low. Proposals to apply the contingency only to selected components of the cost estimate, or to apply a contingency lower than 25 percent, should be approved only in circumstances when a case-specific review has determined there is an extremely low likelihood of unforeseen increases in the decommissioning costs (e.g., if the decommissioning costs are highly predictable and are established by binding contracts.)

PG&E has calculated contingency at the line item level. However, PG&E has not adjusted the overall contingency to 25 percent. Table 4-7 identifies the contingency percentage adopted by PG&E for each line item cost category, with an overall contingency level of 20.6 percent. PG&E believes that this contingency level is appropriate given the current stage of decommissioning.

**Table 4-7: Diablo Canyon Power Plant Decommissioning Contingency**

| No. | Cost Category | Contingency Factor |
|---|---|---|
| 1 | Program Management, Oversight, and Fees | 13.8% |
| 2 | Security Operations | 15.0% |

| No. | Cost Category | Contingency Factor |
|---|---|---|
| 3 | Waste/Transportation/Material Management (Excluding: Breakwater, Reactor Vessel/Internal Segmentation, & Large Component Removal) | 29.8% |
| 4 | Power Block Modifications | 15.0% |
| 5 | Site Infrastructure | 15.0% |
| 6 | Large Component Removal | 25.0% |
| 7 | Reactor/Internals Segmentation | 43.2% |
| 8 | Spent Fuel transfer to ISFSI | 15.0% |
| 9 | Turbine Building | 35.9% |
| 10 | Auxiliary Building | 23.5% |
| 11 | Containment | 24.1% |
| 12 | Fuel Handling Building | 24.3% |
| 14 | Balance of Site | 18.8% |
| 15 | Intake Structure | 19.8% |
| 16 | Discharge Structure | 17.7% |
| 17 | Breakwater | 25.0% |
| 18 | Non-ISFSI Site Restoration | 19.1% |
| 19 | Spent Fuel Transfer to DOE | 15.0% |
| 20 | ISFSI Demolition and Site Restoration | 19.6% |
| | **GRAND TOTAL** | **20.6%** |

# 5. Schedule of Planned Decommissioning Activities

## 5.1. Decommissioning Schedule

Together, the studies and PMPs were used to develop the executable project schedule, which is part of the DCE. The project schedule provides not only a road map for systematic project execution but also the means by which to gauge progress, identify and resolve potential cost estimate problems, and promote accountability at all levels of the estimate. A schedule provides a time sequence for the duration of a project's activities and aids in understanding the dates for major milestones and the activities that drive the schedule. A project schedule was used as a vehicle for developing a project cost baseline. (Reference 1, Enclosure 5, Section 2.2.5)

The overall decommissioning project schedule was divided into two areas as shown in Figures 5-1 and 5-2, respectively: (1) DCPP Demolition and Site Restoration, and (2) ISFSI Demolition and ISFSI Site Restoration. The schedules provided herein assume that PG&E completes detailed DCPP decommissioning pre-shutdown planning and that DCPP ceases operation upon expiration of the operating licenses. The schedule ends following DC ISFSI demolition and site restoration.

**DCPP Demolition and Site Restoration** (Reference 1, Enclosure 5, Section 5.2.1) Figure 5-1 (Reference 1, Enclosure 5, Figure 5-1) provides the level 3 schedule for non-ISFSI decommissioning. As shown in Figure 5-1, the total decommissioning time for each unit is minimized by parallel work activities. For example, because each unit has a specific shutdown date (November 2024 for Unit 1 and August 2025 for Unit 2), the Unit 1 activities will begin while Unit 2 is still operating, including transferring the Unit 1 spent fuel from the reactor to the Unit 1 SFP to continue cooling.

The DCPP Demolition and Site Restoration schedule depends heavily on the availability of buildings for demolition and then site restoration. For example, systems are needed to support SFP cooling until the spent fuel and GTCC waste are transferred to the DC ISFSI. The DCPP Demolition and Site Restoration schedule is also based on key considerations such as ensuring safe working conditions and minimizing environmental impacts.

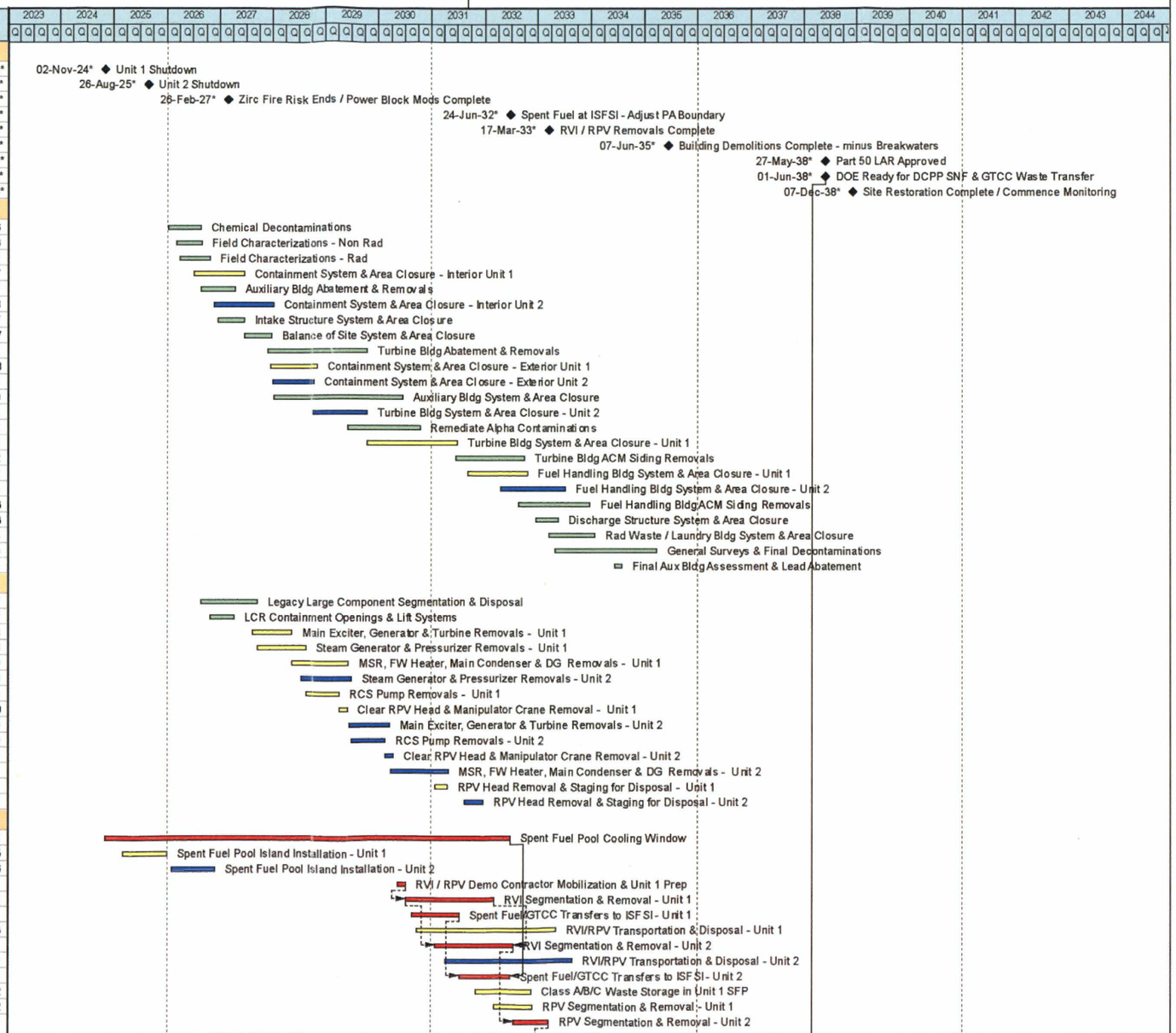
**Independent Spent Fuel Storage Installation Demolition and Independent Spent Fuel Storage Installation Site Restoration** (Reference 1, Enclosure 5, Section 5.2.1)
Figure 5-2 (Reference 1, Enclosure 5, Figure 5-2) provides the level 3 schedule for ISFSI Demolition and ISFSI Site Restoration. It includes the time that the SNF and GTCC waste will be stored at the DC ISFSI (termed ISFSI operations), as well as the period of time that the ISFSI will be demolished (after the DOE has taken possession of all materials stored at the DC ISFSI), and time for the ISFSI site to be restored. The schedule does not show the biological monitoring that ends in 2076. The total duration of this phase is minimized by parallel work activities. This schedule depends heavily on the DOE schedule for taking possession of the DCPP SNF and GTCC waste.

## Figure 5-1: Diablo Canyon Power Plant Demolition and Site Restoration Schedule

**DCPP Decommissioning Summary Schedule**

**Unit 2 Shutdown to License Termination = 12 years, 9 months (approx)**
**Based on Field Work Only and Excludes ISFSI Restoration**

| # | Activity Name | Dur in Months | Start | Finish |
|---|---|---|---|---|
| 1 | ***1) Milestones*** | | | |
| 2 | Unit 1 Shutdown | 0 | | 02-Nov-24* |
| 3 | Unit 2 Shutdown | 0 | | 26-Aug-25* |
| 4 | Zirc Fire Risk Ends / Power Block Mods Complete | 0 | | 26-Feb-27* |
| 5 | Spent Fuel at ISFSI - Adjust PA Boundary | 0 | | 24-Jun-32* |
| 6 | RVI / RPV Removals Complete | 0 | | 17-Mar-33* |
| 7 | Building Demolitions Complete - minus Breakwaters | 0 | | 07-Jun-35* |
| 8 | Part 50 LAR Approved | 0 | | 27-May-38* |
| 9 | DOE Ready for DCPP SNF & GTCC Waste Transfer | 0 | | 01-Jun-38* |
| 10 | Site Restoration Complete / Commence Monitoring | 0 | | 07-Dec-38* |
| 11 | ***2) Decontamination & System/Area Closures*** | | | |
| 12 | Chemical Decontaminations | 7 | 08-Jan-26 | 19-Aug-26 |
| 13 | Field Characterizations - Non Rad | 6 | 09-Mar-26 | 31-Aug-26 |
| 14 | Field Characterizations - Rad | 7 | 31-Mar-26 | 26-Oct-26 |
| 15 | Containment System & Area Closure - Interior Unit 1 | 12 | 02-Jul-26 | 21-Jun-27 |
| 16 | Auxiliary Bldg Abatement & Removals | 8 | 20-Aug-26 | 15-Apr-27 |
| 17 | Containment System & Area Closure - Interior Unit 2 | 13 | 25-Nov-26 | 05-Jan-28 |
| 18 | Intake Structure System & Area Closure | 6 | 23-Dec-26 | 22-Jun-27 |
| 19 | Balance of Site System & Area Closure | 6 | 17-Jun-27 | 22-Dec-27 |
| 20 | Turbine Bldg Abatement & Removals | 22 | 01-Dec-27 | 11-Oct-29 |
| 21 | Containment System & Area Closure - Exterior Unit 1 | 10 | 20-Dec-27 | 01-Nov-28 |
| 22 | Containment System & Area Closure - Exterior Unit 2 | 10 | 30-Dec-27 | 16-Oct-28 |
| 23 | Auxiliary Bldg System & Area Closure | 29 | 06-Jan-28 | 18-Jun-30 |
| 24 | Turbine Bldg System & Area Closure - Unit 2 | 12 | 11-Oct-28 | 11-Oct-29 |
| 25 | Remediate Alpha Contaminations | 16 | 31-May-29 | 09-Oct-30 |
| 26 | Turbine Bldg System & Area Closure - Unit 1 | 20 | 15-Oct-29 | 30-Jun-31 |
| 27 | Turbine Bldg ACM Siding Removals | 15 | 17-Jun-31 | 30-Sep-32 |
| 28 | Fuel Handling Bldg System & Area Closure - Unit 1 | 13 | 10-Sep-31 | 21-Oct-32 |
| 29 | Fuel Handling Bldg System & Area Closure - Unit 2 | 15 | 20-Apr-32 | 07-Jul-33 |
| 30 | Fuel Handling Bldg ACM Siding Removals | 16 | 24-Aug-32 | 27-Dec-33 |
| 31 | Discharge Structure System & Area Closure | 5 | 20-Dec-32 | 24-May-33 |
| 32 | Rad Waste / Laundry Bldg System & Area Closure | 10 | 21-Mar-33 | 25-Jan-34 |
| 33 | General Surveys & Final Decontaminations | 23 | 28-Apr-33 | 21-Mar-35 |
| 34 | Final Aux Bldg Assessment & Lead Abatement | 1 | 14-Jun-34 | 26-Jul-34 |
| 35 | ***3) Large Component Removals*** | | | |
| 36 | Legacy Large Component Segmentation & Disposal | 13 | 20-Aug-26 | 15-Sep-27 |
| 37 | LCR Containment Openings & Lift Systems | 6 | 26-Oct-26 | 13-Apr-27 |
| 38 | Main Exciter, Generator & Turbine Removals - Unit 1 | 9 | 16-Aug-27 | 11-May-28 |
| 39 | Steam Generator & Pressurizer Removals - Unit 1 | 11 | 20-Sep-27 | 17-Aug-28 |
| 40 | MSR, FW Heater, Main Condenser & DG Removals - Unit 1 | 13 | 16-May-28 | 12-Jun-29 |
| 41 | Steam Generator & Pressurizer Removals - Unit 2 | 12 | 13-Jul-28 | 28-Jun-29 |
| 42 | RCS Pump Removals - Unit 1 | 7 | 21-Aug-28 | 04-Apr-29 |
| 43 | Clear RPV Head & Manipulator Crane Removal - Unit 1 | 2 | 05-Apr-29 | 30-May-29 |
| 44 | Main Exciter, Generator & Turbine Removals - Unit 2 | 9 | 14-Jun-29 | 19-Mar-30 |
| 45 | RCS Pump Removals - Unit 2 | 7 | 02-Jul-29 | 14-Feb-30 |
| 46 | Clear RPV Head & Manipulator Crane Removal - Unit 2 | 2 | 19-Feb-30 | 11-Apr-30 |
| 47 | MSR, FW Heater, Main Condenser & DG Removals - Unit 2 | 13 | 21-Mar-30 | 24-Apr-31 |
| 48 | RPV Head Removal & Staging for Disposal - Unit 1 | 3 | 29-Jan-31 | 17-Apr-31 |
| 49 | RPV Head Removal & Staging for Disposal - Unit 2 | 4 | 19-Aug-31 | 23-Dec-31 |
| 50 | ***4) Spent Fuel Transfers & Reactor Segmentations*** | | | |
| 51 | Spent Fuel Pool Cooling Window | 92 | 02-Nov-24* | 24-Jun-32 |
| 52 | Spent Fuel Pool Island Installation - Unit 1 | 10 | 03-Mar-25 | 31-Dec-25 |
| 53 | Spent Fuel Pool Island Installation - Unit 2 | 10 | 02-Feb-26 | 25-Nov-26 |
| 54 | RVI / RPV Demo Contractor Mobilization & Unit 1 Prep | 2 | 13-May-30 | 07-Jul-30 |
| 55 | RVI Segmentation & Removal - Unit 1 | 20 | 08-Jul-30 | 04-Mar-32 |
| 56 | Spent Fuel/GTCC Transfers to ISFSI - Unit 1 | 11 | 19-Aug-30 | 11-Jul-31 |
| 57 | RVI/RPV Transportation & Disposal - Unit 1 | 31 | 24-Sep-30 | 05-May-33 |
| 58 | RVI Segmentation & Removal - Unit 2 | 18 | 27-Jan-31 | 15-Jul-32 |
| 59 | RVI/RPV Transportation & Disposal - Unit 2 | 29 | 09-Apr-31 | 29-Aug-33 |
| 60 | Spent Fuel/GTCC Transfers to ISFSI - Unit 2 | 11 | 14-Jul-31 | 24-Jun-32 |
| 61 | Class A/B/C Waste Storage in Unit 1 SFP | 13 | 04-Nov-31 | 23-Nov-32 |
| 62 | RPV Segmentation & Removal - Unit 1 | 9 | 08-Mar-32 | 30-Nov-32 |
| 63 | RPV Segmentation & Removal - Unit 2 | 8 | 19-Jul-32 | 17-Mar-33 |




**Legend** — Unit 1 — Unit 2 — Common — Critical — ◆ Milestone

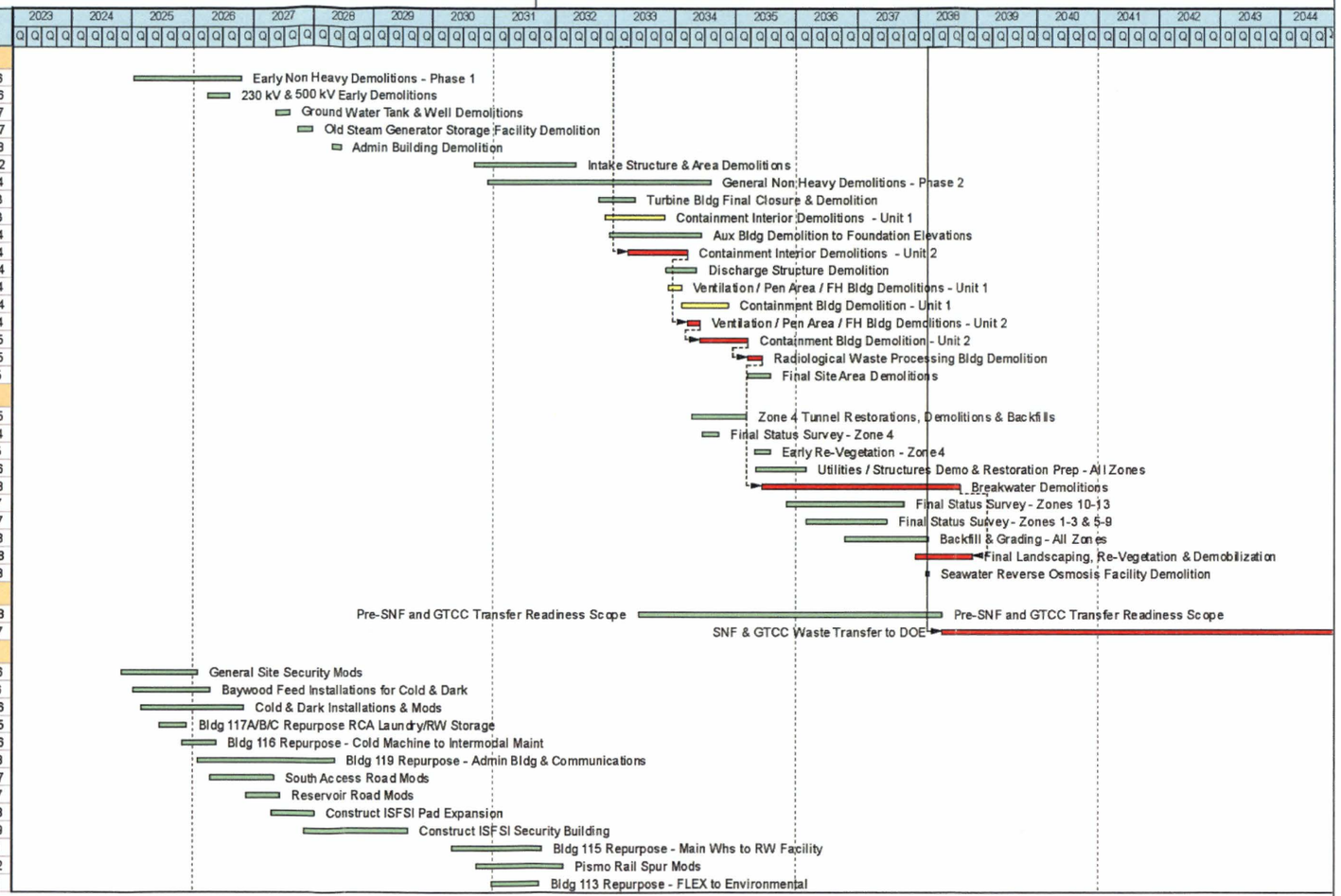
**1 of 2**

# Diablo Canyon Power Plant
## Site-Specific Decommissioning Cost Estimate

### DCPP Decommissioning Summary Schedule

**Unit 2 Shutdown to License Termination = 12 years, 9 months (approx)**
**Based on Field Work Only and Excludes ISFSI Restoration**

| # | Activity Name | Dur in Months | Start | Finish |
|---|---|---|---|---|
| 64 | ***5) Building & Structural Demolitions*** | | | |
| 65 | Early Non Heavy Demolitions - Phase 1 | 21 | 13-Jan-25 | 14-Oct-26 |
| 66 | 230 kV & 500 kV Early Demolitions | 4 | 26-Mar-26 | 05-Aug-26 |
| 67 | Ground Water Tank & Well Demolitions | 3 | 17-May-27 | 10-Aug-27 |
| 68 | Old Steam Generator Storage Facility Demolition | 3 | 23-Sep-27 | 22-Dec-27 |
| 69 | Admin Building Demolition | 2 | 24-Apr-28 | 19-Jun-28 |
| 70 | Intake Structure & Area Demolitions | 20 | 10-Sep-30 | 06-May-32 |
| 71 | General Non Heavy Demolitions - Phase 2 | 45 | 21-Nov-30 | 07-Aug-34 |
| 72 | Turbine Bldg Final Closure & Demolition | 7 | 27-Sep-32 | 27-Apr-33 |
| 73 | Containment Interior Demolitions - Unit 1 | 12 | 01-Nov-32 | 26-Oct-33 |
| 74 | Aux Bldg Demolition to Foundation Elevations | 18 | 29-Nov-32 | 13-Jun-34 |
| 75 | Containment Interior Demolitions - Unit 2 | 12 | 21-Mar-33 | 15-Mar-34 |
| 76 | Discharge Structure Demolition | 6 | 09-Nov-33 | 16-May-34 |
| 77 | Ventilation / Pen Area / FH Bldg Demolitions - Unit 1 | 3 | 17-Nov-33 | 13-Feb-34 |
| 78 | Containment Bldg Demolition - Unit 1 | 9 | 14-Feb-34 | 15-Nov-34 |
| 79 | Ventilation / Pen Area / FH Bldg Demolitions - Unit 2 | 3 | 16-Mar-34 | 06-Jun-34 |
| 80 | Containment Bldg Demolition - Unit 2 | 9 | 07-Jun-34 | 14-Mar-35 |
| 81 | Radiological Waste Processing Bldg Demolition | 3 | 15-Mar-35 | 07-Jun-35 |
| 82 | Final Site Area Demolitions | 5 | 15-Mar-35 | 31-Jul-35 |
| 83 | ***6) Site Surveys & Restorations*** | | | |
| 84 | Zone 4 Tunnel Restorations, Demolitions & Backfills | 11 | 19-Apr-34 | 07-Mar-35 |
| 85 | Final Status Survey - Zone 4 | 3 | 21-Jun-34 | 25-Sep-34 |
| 86 | Early Re-Vegetation - Zone 4 | 3 | 01-May-35 | 30-Jul-35 |
| 87 | Utilities / Structures Demo & Restoration Prep - All Zones | 10 | 09-May-35 | 28-Feb-36 |
| 88 | Breakwater Demolitions | 39 | 11-Jun-35 | 21-Sep-38 |
| 89 | Final Status Survey - Zones 10-13 | 23 | 07-Nov-35 | 13-Oct-37 |
| 90 | Final Status Survey - Zones 1-3 & 5-9 | 16 | 03-Mar-36 | 25-Jun-37 |
| 91 | Backfill & Grading - All Zones | 16 | 20-Oct-36 | 03-Mar-38 |
| 92 | Final Landscaping, Re-Vegetation & Demobilization | 12 | 22-Dec-37 | 07-Dec-38 |
| 93 | Seawater Reverse Osmosis Facility Demolition | 1 | 22-Feb-38 | 11-Mar-38 |
| 94 | ***7) SNF and GTCC Waste Transfer to Off-Site Facility*** | | | |
| 95 | Pre-SNF and GTCC Transfer Readiness Scope | 58 | 01-Jun-33 | 27-May-38 |
| 96 | SNF & GTCC Waste Transfer to DOE | 338 | 01-Jun-38 | 01-Aug-67 |
| 97 | ***8) Infrastructure & Support Projects*** | | | |
| 98 | General Site Security Mods | 15 | 04-Nov-24 | 02-Feb-26 |
| 99 | Baywood Feed Installations for Cold & Dark | 15 | 15-Jan-25 | 16-Apr-26 |
| 100 | Cold & Dark Installations & Mods | 20 | 27-Feb-25 | 05-Nov-26 |
| 101 | Bldg 117A/B/C Repurpose RCA Laundry/RW Storage | 5 | 23-Jun-25 | 26-Nov-25 |
| 102 | Bldg 116 Repurpose - Cold Machine to Intermodal Maint | 7 | 03-Nov-25 | 20-May-26 |
| 103 | Bldg 119 Repurpose - Admin Bldg & Communications | 27 | 02-Feb-26 | 11-May-28 |
| 104 | South Access Road Mods | 12 | 22-Apr-26 | 06-May-27 |
| 105 | Reservoir Road Mods | 7 | 24-Nov-26 | 10-Jun-27 |
| 106 | Construct ISFSI Pad Expansion | 9 | 22-Apr-27 | 06-Jan-28 |
| 107 | Construct ISFSI Security Building | 21 | 04-Nov-27 | 07-Aug-29 |
| 108 | Bldg 115 Repurpose - Main Whs to RW Facility | 18 | 01-May-30 | 15-Oct-31 |
| 109 | Pismo Rail Spur Mods | 17 | 25-Sep-30 | 02-Mar-32 |
| 110 | Bldg 113 Repurpose - FLEX to Environmental | 9 | 23-Dec-30 | 01-Oct-31 |




**Legend** Unit 1 | Unit 2 | Common | Critical | ◆ Milestone

**2 of 2**

## Figure 5-2: Independent Spent Fuel Storage Installation Demolition and Independent Spent Fuel Storage Installation Site Restoration Schedule

**ISFSI Restoration Schedule**

***ISFSI Site Restoration Duration = 3 years, 6 months***
***Excludes Follow-on Monitoring***

| # | Activity Name | Dur in Months | Start | Finish |
|---|---|---|---|---|
| 1 | ***1) GTCC and Spent Nuclear Fuel Waste Transfer to DOE*** | | | |
| 2 | SNF & GTCC Waste Transfer to DOE | 338 | 01-Jun-38 | 01-Aug-67 |
| 3 | ***2) ISFSI Site Restoration*** | | | |
| 4 | Mobilize Contractor - Tower and Line Removals for Utils & Struc Demo - Balance of Site Restoration | 1 | 27-Jun-67 | 01-Aug-67 |
| 5 | Mobilize Demolition Contractor for ISFSI Demolition - ISFSI Decommissioning | 1 | 02-Aug-67 | 06-Sep-67 |
| 6 | Prepare T Lines for Utils & Struc Demo - Balance of Site Restoration | 1 | 02-Aug-67 | 14-Sep-67 |
| 7 | Operate Laydown Yard - T Line and Tower Removals for Utils & Struc Demo - Balance of Site Restoration | 5 | 02-Aug-67 | 29-Dec-67 |
| 8 | Demolish ISFSI Pads- ISFSI Decommissioning | 13 | 07-Sep-67 | 29-Oct-68 |
| 9 | Demolish Utilities and General Demolition for ISFSI Demolition - ISFSI Decommissioning | 13 | 07-Sep-67 | 29-Oct-68 |
| 10 | Remove T Lines for Utils & Struc Demo - Balance of Site Restoration | 2 | 15-Sep-67 | 30-Nov-67 |
| 11 | Remove Towers for Utils & Struc Demo - Balance of Site Restoration | 0 | 01-Dec-67 | 13-Dec-67 |
| 12 | Remove Tower Foundations for Utils & Struc Demo - Balance of Site Restoration | 1 | 14-Dec-67 | 29-Dec-67 |
| 13 | Demobilize T&L Contractor for Utils & Struc Demo - Balance of Site Restoration | 1 | 03-Jan-68 | 07-Feb-68 |
| 14 | Demolish Fences and Barriers for ISFSI Demolition - ISFSI Decommissioning | 9 | 02-Feb-68 | 29-Oct-68 |
| 15 | Demolish ISFSI Ancillary Roads - ISFSI Demolition - ISFSI Decommissioning | 0 | 22-Oct-68 | 29-Oct-68 |
| 16 | Demobilize Demolition Contractor - ISFSI Demolition - ISFSI Decommissioning | 1 | 30-Oct-68 | 05-Dec-68 |
| 17 | Perform a Radiological Soil Remediation for ISFSI Site Restoration | 0 | 13-Dec-68 | 20-Dec-68 |
| 18 | Perform Radiological Soil Remediation Analytical for ISFSI Site Restoration | 1 | 26-Dec-68 | 14-Jan-69 |
| 19 | Perform Chemical Soil Remediation for ISFSI Site Restoration | 1 | 15-Jan-69 | 20-Feb-69 |
| 20 | Demobilize Soil Remediation Contractor for ISFSI Site Restoration | 0 | 21-Feb-69 | 21-Feb-69 |
| 21 | Mobilization for Grading & Landscaping - ISFSI Site Restoration | 0 | 25-Feb-69 | 04-Mar-69 |
| 22 | Site Preparation for Grading & Landscaping - ISFSI Site Restoration | 1 | 05-Mar-69 | 20-Mar-69 |
| 23 | Backfill and grading at Shooting Range for Grading & Landscaping - ISFSI Site Restoration | 4 | 21-Mar-69 | 01-Aug-69 |
| 24 | Mass Excavation of North slope of ISFSI for Grading & Landscaping - ISFSI Site Restoration | 10 | 21-Mar-69 | 04-Feb-70 |
| 25 | Backfilling and grading ISFSI for Grading & Landscaping - ISFSI Site Restoration | 7 | 05-Aug-69 | 11-Mar-70 |
| 26 | Restoration of Dirt roads for Grading & Landscaping - ISFSI Site Restoration | 4 | 12-Mar-70 | 14-Jul-70 |
| 27 | Work Implementation Final Site Survey - ISFSI Site Restoration | 2 | 18-Jun-70 | 05-Aug-70 |
| 28 | Erosion Control Stabilization ISFSI area for Grading & Landscaping - ISFSI Site Restoration | 1 | 15-Jul-70 | 31-Jul-70 |
| 29 | Revegetation Construction for Grading & Landscaping - ISFSI Site Restoration | 6 | 04-Aug-70 | 28-Jan-71 |
| 30 | Demobilization contractor for Final Site Survey - ISFIS Site Restoration | 0 | 06-Aug-70 | 06-Aug-70 |
| 31 | Revegetation Demobilization for Grading & Landscaping - ISFSI Site Restoration | 0 | 29-Jan-71 | 29-Jan-71 |
| 32 | ISFSI Site Restoration Complete | 0 | | 02-Feb-71* |


**Legend** Common Critical ◆ Milestone

**1 of 1**

## 5.2. Decommissioning Funds

10 CFR 50.82(a)(6)(iii) states that, "Licensees shall not perform any decommissioning activities," as defined in 10 CFR 50.2 that, "Result in there no longer being reasonable assurance that adequate funds will be available for decommissioning." PG&E does not intend to perform any decommissioning activities that would jeopardize the availability of adequate funds for the completion of radiological decommissioning.

Tables 5-1 and 5-2 show the amount of decommissioning funds currently available, the cumulative cost estimate, and the expenditure of the funds for Units 1 and 2, respectively. (Reference 1, Enclosure 4)

Under NRC regulations (10 CFR 50.82(a)(8)), a licensee must provide reasonable assurance that funds will be available (or "financial assurance") for decommissioning (i.e., license termination) costs. The regulations also describe the acceptable methods a licensee can use to demonstrate financial assurance. Most licensees do this by funding a nuclear decommissioning trust (NDT) fund. To assure that sufficient funds will be available for decommissioning, PG&E has established separate external sinking NDT fund accounts for DCPP Units 1 and 2. PG&E currently has more funds in the NDT for DCPP Units 1 and 2 than required to meet the minimum NRC decommissioning amount for each unit that was calculated pursuant to the requirements of 10 CFR 50.75(c).

In addition, on September 10, 2019 (Reference 11), NRC granted exemptions from 10 CFR 50.82(a)(8)(ii) and 10 CFR 50.82(a)(8)(i)(A) to allow PG&E to withdraw $187.8 million (2017 dollars) from the DC NDT for decommissioning planning between now and permanent cessation of operations, instead of three percent of the generic amount specified in 10 CFR 50.75. A portion of the funds will be used for pre-planning activities associated with spent fuel management and site restoration.

In accordance with 10 CFR 50.82(a)(8)(v), decommissioning funding assurance will be reviewed and reported to the NRC annually until residual radioactivity has been reduced to a level that permits termination of the 10 CFR 50 licenses. The latest SSDCE adjusted for inflation, in accordance with applicable regulatory requirements, will be used to demonstrate funding assurance. In addition, actual radiological and spent fuel management expenses will be included in the annual report in accordance with applicable regulatory requirements. If the funding assurance demonstration shows the NDT is not sufficient, then an alternate funding mechanism allowed by 10 CFR 50.75(e) and the guidance provided in Regulatory Guide 1.159 (Reference 10) will be put in place.

As shown in Reference 1, PG&E is projected to be adequately funded to perform radiological decommissioning as outlined in the SSDCE.

**Table 5-1: Diablo Canyon Power Plant Unit 1 Decommissioning Cash Flow[1]**
**(2010 – 2018 in Nominal Dollars. 2019 – 2076 in 2019 Dollars)**

| Year | NRC Scope (Radiological) | Non-NRC Scope (Non-Radiological) | Spent Fuel Management | Total | Cumulative Decommissioning Estimate | Trust Account Funding |
|---|---|---|---|---|---|---|
| 2010 | $7,445 | | | $7,445 | $7,445 | |
| 2011 | $55,564 | | | $55,564 | $63,009 | |
| 2016 | $245,827 | | | $245,827 | $308,836 | |
| 2017 | $3,375,033 | | | $3,375,033 | $3,683,869 | |
| 2018 | $8,175,432 | $1,034,409 | $1,144,722 | $10,354,563 | $14,038,432 | $14,038,432 (Actual) |
| 2019 | $6,720,203 | $1,757,492 | $303,689 | $8,781,383 | $22,819,815 | |
| 2020 | $9,949,153 | $1,423,071 | $219,621 | $11,591,845 | $34,411,660 | |
| 2021 | $12,453,978 | $1,836,522 | $377,283 | $14,667,783 | $49,079,443 | |
| 2022 | $9,970,573 | $1,834,362 | $380,654 | $12,185,590 | $61,265,033 | |
| 2023 | $13,392,081 | $2,339,165 | $389,783 | $16,121,029 | $77,386,062 | |
| 2024 | $30,201,082 | $4,481,649 | $1,886,873 | $36,569,604 | $113,955,666 | |
| 2025 | $121,354,420 | $5,503,451 | $14,811,716 | $141,669,587 | $255,625,253 | |
| 2026 | $106,469,508 | $4,649,720 | $31,263,628 | $142,382,856 | $398,008,109 | |
| 2027 | $101,182,296 | $5,390,600 | $25,424,465 | $131,997,361 | $530,005,470 | |
| 2028 | $89,991,711 | $4,023,264 | $24,907,377 | $118,922,352 | $648,927,821 | |
| 2029 | $96,182,249 | $4,654,686 | $39,509,327 | $140,346,263 | $789,274,084 | |
| 2030 | $102,226,552 | $5,222,164 | $128,691,416 | $236,140,132 | $1,025,414,216 | |
| 2031 | $132,720,306 | $6,613,615 | $55,011,838 | $194,345,759 | $1,219,759,975 | |
| 2032 | $189,160,159 | $6,487,936 | $12,807,834 | $208,455,928 | $1,428,215,903 | $1,306,314,401 (Market Value) |
| 2033 | $190,381,565 | $5,867,782 | $5,423,200 | $201,672,547 | $1,629,888,449 | |
| 2034 | $160,379,360 | $5,764,923 | $6,011,214 | $172,155,497 | $1,802,043,946 | |
| 2035 | $99,866,224 | $20,316,534 | $7,303,084 | $127,485,843 | $1,929,529,789 | |
| 2036 | $34,350,918 | $36,071,759 | $5,744,575 | $76,167,252 | $2,005,697,041 | |
| 2037 | $34,377,928 | $35,708,937 | $5,377,014 | $75,463,879 | $2,081,160,920 | |
| 2038 | $28,133,442 | $35,525,806 | $6,399,371 | $70,058,619 | $2,151,219,539 | |
| 2039 | | $33,534 | $6,265,973 | $6,299,507 | $2,157,519,046 | |
| 2040 | | $33,626 | $7,980,485 | $8,014,112 | $2,165,533,158 | |
| 2041 | | $33,534 | $6,265,904 | $6,299,439 | $2,171,832,596 | |
| 2042 | | $33,534 | $6,792,024 | $6,825,558 | $2,178,658,155 | |
| 2043 | | $33,534 | $6,265,904 | $6,299,439 | $2,184,957,593 | |
| 2044 | | $33,626 | $6,809,191 | $6,842,817 | $2,191,800,410 | |
| 2045 | | $33,534 | $7,437,176 | $7,470,711 | $2,199,271,121 | |
| 2046 | | $33,534 | $6,792,024 | $6,825,558 | $2,206,096,679 | |
| 2047 | | $33,534 | $6,265,904 | $6,299,439 | $2,212,396,118 | |
| 2048 | | $33,626 | $6,809,191 | $6,842,817 | $2,219,238,935 | |

## Diablo Canyon Power Plant
## Site-Specific Decommissioning Cost Estimate

| Year | NRC Scope (Radiological) | Non-NRC Scope (Non-Radiological) | Spent Fuel Management | Total | Cumulative Decommissioning Estimate | Trust Account Funding |
|---|---|---|---|---|---|---|
| 2049 | | $33,534 | $6,265,904 | $6,299,439 | $2,225,538,374 | |
| 2050 | | $33,534 | $8,002,066 | $8,035,601 | $2,233,573,974 | |
| 2051 | | $33,534 | $6,265,904 | $6,299,439 | $2,239,873,413 | |
| 2052 | | $33,626 | $6,809,191 | $6,842,817 | $2,246,716,230 | |
| 2053 | | $33,534 | $6,265,904 | $6,299,439 | $2,253,015,669 | |
| 2054 | | $33,534 | $6,792,024 | $6,825,558 | $2,259,841,227 | |
| 2055 | | $33,534 | $7,437,176 | $7,470,711 | $2,267,311,938 | |
| 2056 | | $33,626 | $6,809,191 | $6,842,817 | $2,274,154,755 | |
| 2057 | | $33,534 | $6,265,904 | $6,299,439 | $2,280,454,193 | |
| 2058 | | $33,534 | $6,792,024 | $6,825,558 | $2,287,279,752 | |
| 2059 | | $33,534 | $6,265,904 | $6,299,439 | $2,293,579,190 | |
| 2060 | | $227,658 | $8,927,718 | $9,155,377 | $2,302,734,567 | |
| 2061 | | $629,487 | $7,918,327 | $8,547,814 | $2,311,282,381 | |
| 2062 | | $452,453 | $9,646,994 | $10,099,448 | $2,321,381,829 | |
| 2063 | | $570,998 | $9,368,324 | $9,939,322 | $2,331,321,151 | |
| 2064 | | $361,646 | $7,615,742 | $7,977,388 | $2,339,298,539 | |
| 2065 | | $346,148 | $8,558,457 | $8,904,604 | $2,348,203,143 | |
| 2066 | | $243,534 | $30,878,988 | $31,122,522 | $2,379,325,665 | |
| 2067 | | $298,050 | $14,731,299 | $15,029,349 | $2,394,355,014 | |
| 2068 | | $366,228 | $9,252,693 | $9,618,921 | $2,403,973,935 | |
| 2069 | | $220,103 | $6,509,215 | $6,729,318 | $2,410,703,253 | |
| 2070 | | $289,652 | $3,485,221 | $3,774,874 | $2,414,478,126 | |
| 2071 | | $6,533 | $1,359,144 | $1,365,677 | $2,415,843,803 | |
| 2072 | | | $1,836,551 | $1,836,551 | $2,417,680,354 | |
| 2073 | | | $876,886 | $876,886 | $2,418,557,239 | |
| 2074 | | | $876,886 | $876,886 | $2,419,434,125 | |
| 2075 | | | $876,886 | $876,886 | $2,420,311,011 | |
| 2076 | | | $36,036 | $36,036 | $2,420,347,047 | |
| | | | | | | |
| **Grand Total** | $1,581,323,007 | $201,225,020 | $637,799,020 | $2,420,347,047 | | |

NOTES:

1. Cash Flow is based on construction of ISFSI and assumes DOE Used Fuel Repository opens in 2031.
2. Trust Account Value of $1,459.3 million Market Value as of 06/30/19.

## Table 5-2: Diablo Canyon Power Plant Unit 2 Decommissioning Cash Flow[1] (2010 – 2018 in Nominal Dollars. 2019 – 2076 in 2019 Dollars)

| Year | NRC Scope (Radiological) | Non-NRC Scope (Non-Radiological) | Spent Fuel Management | Total | Cumulative Decommissioning Estimate | Trust Account Funding |
|---|---|---|---|---|---|---|
| 2010 | $7,445 | | | $7,445 | $7,445 | |
| 2011 | $55,564 | | | $55,564 | $63,009 | |
| 2016 | $245,827 | | | $245,827 | $308,836 | |
| 2017 | $3,375,033 | | | $3,375,033 | $3,683,869 | |
| 2018 | $8,175,432 | $1,034,409 | $1,144,722 | $10,354,563 | $14,038,432 | $14,038,432 (Actual) |
| 2019 | $6,720,203 | $1,757,492 | $303,689 | $8,781,383 | $22,819,815 | |
| 2020 | $9,949,153 | $1,423,071 | $219,621 | $11,591,845 | $34,411,660 | |
| 2021 | $11,058,242 | $1,836,522 | $377,283 | $13,272,046 | $47,683,707 | |
| 2022 | $9,970,573 | $1,834,362 | $380,654 | $12,185,590 | $59,869,296 | |
| 2023 | $12,994,773 | $4,487,181 | $389,783 | $17,871,737 | $77,741,034 | |
| 2024 | $14,343,403 | $6,262,379 | $1,489,343 | $22,095,125 | $99,836,159 | |
| 2025 | $126,517,334 | $17,082,734 | $14,915,239 | $158,515,307 | $258,351,466 | |
| 2026 | $87,659,232 | $15,261,915 | $31,249,794 | $134,170,941 | $392,522,407 | |
| 2027 | $117,071,544 | $12,175,547 | $25,410,630 | $154,657,721 | $547,180,128 | |
| 2028 | $81,960,866 | $8,026,493 | $24,342,270 | $114,329,629 | $661,509,757 | |
| 2029 | $107,599,959 | $7,075,394 | $24,434,186 | $139,109,539 | $800,619,296 | |
| 2030 | $79,636,854 | $21,332,865 | $25,611,403 | $126,581,122 | $927,200,419 | |
| 2031 | $97,666,934 | $19,208,798 | $78,958,510 | $195,834,241 | $1,123,034,660 | |
| 2032 | $203,140,735 | $14,148,409 | $20,270,194 | $237,559,338 | $1,360,593,998 | |
| 2033 | $259,787,426 | $2,573,934 | $5,564,077 | $267,925,437 | $1,628,519,435 | |
| 2034 | $187,973,910 | $17,826,475 | $6,144,718 | $211,945,102 | $1,840,464,538 | $1,708,513,862 (Market Value) |
| 2035 | $104,244,843 | $66,493,366 | $7,436,588 | $178,174,797 | $2,018,639,335 | |
| 2036 | $17,786,338 | $105,019,964 | $5,879,532 | $128,685,833 | $2,147,325,168 | |
| 2037 | $17,834,539 | $108,489,650 | $5,510,518 | $131,834,707 | $2,279,159,875 | |
| 2038 | $12,586,313 | $79,154,273 | $5,870,469 | $97,611,055 | $2,376,770,930 | |
| 2039 | | $1,195,791 | $6,752,337 | $7,948,128 | $2,384,719,058 | |
| 2040 | | $735,191 | $7,454,383 | $8,189,574 | $2,392,908,632 | |
| 2041 | | $570,725 | $6,792,041 | $7,362,766 | $2,400,271,398 | |
| 2042 | | $570,725 | $6,265,921 | $6,836,647 | $2,407,108,045 | |
| 2043 | | $585,768 | $6,792,041 | $7,377,809 | $2,414,485,854 | |
| 2044 | | $33,626 | $6,283,088 | $6,316,715 | $2,420,802,569 | |
| 2045 | | $33,534 | $7,963,313 | $7,996,848 | $2,428,799,416 | |
| 2046 | | $33,534 | $6,265,921 | $6,299,456 | $2,435,098,872 | |
| 2047 | | $33,534 | $6,792,041 | $6,825,576 | $2,441,924,448 | |
| 2048 | | $33,626 | $6,283,088 | $6,316,715 | $2,448,241,162 | |

## Diablo Canyon Power Plant
## Site-Specific Decommissioning Cost Estimate

| Year | NRC Scope (Radiological) | Non-NRC Scope (Non-Radiological) | Spent Fuel Management | Total | Cumulative Decommissioning Estimate | Trust Account Funding |
|---|---|---|---|---|---|---|
| 2049 | | $33,534 | $6,792,041 | $6,825,576 | $2,455,066,738 | |
| 2050 | | $33,534 | $7,475,964 | $7,509,498 | $2,462,576,236 | |
| 2051 | | $33,534 | $6,792,041 | $6,825,576 | $2,469,401,812 | |
| 2052 | | $33,626 | $6,283,088 | $6,316,715 | $2,475,718,526 | |
| 2053 | | $33,534 | $6,792,041 | $6,825,576 | $2,482,544,102 | |
| 2054 | | $33,534 | $6,265,921 | $6,299,456 | $2,488,843,558 | |
| 2055 | | $33,534 | $7,840,756 | $7,874,290 | $2,496,717,848 | |
| 2056 | | $33,626 | $6,283,088 | $6,316,715 | $2,503,034,563 | |
| 2057 | | $33,534 | $6,914,598 | $6,948,133 | $2,509,982,696 | |
| 2058 | | $33,534 | $6,265,921 | $6,299,456 | $2,516,282,152 | |
| 2059 | | $33,534 | $6,792,041 | $6,825,576 | $2,523,107,727 | |
| 2060 | | $227,658 | $8,401,616 | $8,629,274 | $2,531,737,002 | |
| 2061 | | $629,487 | $8,444,463 | $9,073,951 | $2,540,810,952 | |
| 2062 | | $452,453 | $9,120,892 | $9,573,345 | $2,550,384,298 | |
| 2063 | | $570,998 | $9,894,461 | $10,465,459 | $2,560,849,756 | |
| 2064 | | $361,646 | $8,291,863 | $8,653,508 | $2,569,503,265 | |
| 2065 | | $346,148 | $10,180,840 | $10,526,988 | $2,580,030,253 | |
| 2066 | | $521,242 | $10,466,177 | $10,987,419 | $2,591,017,671 | |
| 2067 | | $15,750,295 | $43,223,193 | $58,973,488 | $2,649,991,159 | |
| 2068 | | $749,528 | $28,394,987 | $29,144,515 | $2,679,135,674 | |
| 2069 | | $440,723 | $18,555,526 | $18,996,250 | $2,698,131,924 | |
| 2070 | | $332,567 | $14,628,893 | $14,961,460 | $2,713,093,384 | |
| 2071 | | $6,533 | $3,515,938 | $3,522,470 | $2,716,615,854 | |
| 2072 | | | $2,651,183 | $2,651,183 | $2,719,267,038 | |
| 2073 | | | $1,368,883 | $1,368,883 | $2,720,635,920 | |
| 2074 | | | $1,368,883 | $1,368,883 | $2,722,004,803 | |
| 2075 | | | $1,473,143 | $1,473,143 | $2,723,477,945 | |
| 2076 | | | $42,479 | $42,479 | $2,723,520,425 | |
| | | | | | | |
| **Grand Total** | $1,578,362,475 | $537,089,629 | $608,068,321 | $2,723,520,425 | | |

NOTES:

1. Cash Flow is based on construction of ISFSI and assumes DOE Used Fuel Repository opens in 2031.
2. Trust Account Value of $1,908.7 million Market Value as of 06/30/19.

# 6. Conclusion

The DCPP SSDCE complies with NRC requirements set forth in 10 CFR 50.82, "Termination of license," paragraphs (a)(4)(i), (a)(8)(iii), and 10 CFR 50.75(f)(3). PG&E prepared this cost estimate and schedule using several sources, including the DCE included in the DCPP Decommissioning Funding Report submitted to the NRC on March 26, 2019 (Reference 1, Enclosure 5) which utilized expertise from PG&E's full-scale decommissioning at HBPP Unit 3, industry experts, and benchmarking.

The SSDCE is based on regulatory requirements, site conditions, baseline assumptions, low-level radioactive waste disposal standards, high-level radioactive waste management options, and site restoration requirements. The cost to decommission the DCPP site, safeguard the SNF and GTCC waste until it can be transferred to the DOE, and restore the affected area of the site is estimated to be $5.144 billion (2019 dollars). The majority of this cost is associated with license termination. A significant amount of the remaining cost is associated with SNF management since the fuel and GTCC waste will be removed from the SFP and remain in storage at the ISFSI until possession is transferred to DOE. A relatively small amount of the decommissioning cost is for the demolition of uncontaminated structures and restoration of the site. The summary of the costs estimated for license termination, spent fuel management, and site restoration activities are presented in Table ES-1.

The largest contributors to the overall decommissioning costs are removal of contaminated components and buildings, disposal costs, and program management costs. 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. The disposal of low-level radioactive waste that is generated from dismantling activities makes up the bulk of the disposal cost category. The magnitude of the program management costs is a function of both the size of the organization needed to manage the decommissioning, as well as the duration.

In accordance with 10 CFR 50.82(a)(8)(v), decommissioning funding assurance will be reviewed and reported to the NRC annually until residual radioactivity has been reduced to a level that permits termination of the licenses. The SSDCE adjusted for inflation, in accordance with applicable regulatory requirements, will be used to demonstrate funding assurance. In addition, actual radiological and spent fuel management expenses will be included in the annual report in accordance with applicable regulatory requirements.

If the funding assurance demonstration shows that the NDT is not sufficient, then an alternate funding mechanism allowed by 10 CFR 50.75(e) and the guidance provided in Regulatory Guide 1.159 (Reference 10) will be put in place.

# 7. References

1. PG&E Letter DCL-19-020, "Decommissioning Funding Report for Diablo Canyon Power Plant, Units 1 and 2," dated March 26, 2019 (ADAMS Accession No. ML19094B782).

2. PG&E Letter DCL-18-096, "Certification of Permanent Cessation of Power Operations," dated November 27, 2018 (ADAMS Accession No. ML18331A553).

3. Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Plants," dated February 2005 (ADAMS Accession No. ML050230008).

4. NUREG-1713, "Standard Review Plan for Decommissioning Cost Estimates for Nuclear Power Reactors," dated December 2004 (ADAMS Accession No. ML043510113).

5. NUREG-0586, Supplement 1, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," dated November 2002 (ADAMS Accession No. ML023470304 (Vol 1) and ML023470323 (Vol 2)).

6. EPRI Report No. 1011734, "Maine Yankee Decommissioning Experience Report (1997 – 2004)," 2005. Publicly accessible at: www.epri.com

7. EPRI Report No. 1003025, "Decommissioning Pre-Planning Manual," 2001. Publicly accessible at: www.epri.com

8. NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," Revision 1, dated August 2000 (ADAMS Accession No. ML003761445).

9. NUREG-1757, "Consolidated Decommissioning Guidance Financial Assurance, Recordkeeping, and Timeliness," Vol. 3, Revision 1, dated February 2012 (ADAMS Accession No. ML12048A683).

10. Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Revision 2, dated October 2011 (ADAMS Accession No. ML112160012).

11. NRC Letter, "Diablo Canyon Nuclear Power Plant, Units 1 and 2 – Exemptions from the Requirements of 10 CFR Part 50, Sections 50.82(a)(8)(i)(A) and 50.82(a)(8)(ii) (EPID L-2018-LLE-0023)," dated September 10, 2019 (ADAMS Accession No. ML19163A104).

(in thousands)

| ID | Scope Description | A<br>Total Estimate Nominal / 2019$ | B<br>1-Pre Shutdown Planning<br>12/2010 - 10/2024 | C<br>2-Power Block Modifications<br>11/2024 - 4/2027 | D<br>3-Wet Storage<br>5/2027 - 6/2032 | E<br>4-Building Demolition<br>7/2032 - 4/2035 | F<br>5-Site Restoration<br>5/2035 - 12/2038 | G<br>6-ISFSI Operations<br>1/2039 - 8/2067 | H<br>7-ISFSI Restoration<br>9/2067 - 1/2076 | I<br>License Termination | J<br>Spent Fuel Management | K<br>Site Restoration | L<br>Utility Hours | M<br>Contractor Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unassigned Costs** | | | | | | | | | | | | | | |
| **1** | **Program Management, Oversight, and Fees** | $ 1,547,114 | $ 162,718 | $ 345,608 | $ 433,485 | $ 214,782 | $ 161,091 | $ 198,817 | $ 30,613 | $ 1,139,092 | $ 292,320 | $ 115,701 | 5,053,210 | 1,035,578 |
| 1.01 | Staffing | $ 770,002 | $ 118,699 | $ 132,914 | $ 279,951 | $ 106,398 | $ 75,713 | $ 48,053 | $ 8,274 | $ 610,907 | $ 87,464 | $ 71,631 | 5,033,370 | 46,617 |
| 1.02 | Severance | $ 165,856 | $ - | $ 121,205 | $ - | $ 22,549 | $ 13,865 | $ 6,648 | $ 1,589 | $ 157,619 | $ 8,237 | $ - | - | - |
| 1.03 | Energy | $ 71,554 | $ - | $ 7,372 | $ 35,478 | $ 8,505 | $ 9,462 | $ 10,737 | $ - | $ 60,592 | $ 10,763 | $ 200 | - | - |
| 1.04 | Insurance | $ 29,160 | $ - | $ 14,575 | $ 2,077 | $ 813 | $ 1,055 | $ 8,235 | $ 2,406 | $ 18,348 | $ 10,660 | $ 153 | - | - |
| 1.05 | Property Tax | $ 41,979 | $ - | $ 1,398 | $ 4,306 | $ 2,358 | $ 3,061 | $ 23,880 | $ 6,977 | $ 10,623 | $ 30,914 | $ 443 | - | - |
| 1.06 | NRC Fees / Reviews | $ 71,696 | $ 14,344 | $ 6,222 | $ 12,137 | $ 3,081 | $ 3,798 | $ 27,605 | $ 4,507 | $ 32,666 | $ 38,868 | $ 162 | - | 118,114 |
| 1.07 | Association/Industry Fees | $ 8,409 | $ - | $ 1,433 | $ 3,414 | $ 1,708 | $ 1,855 | $ - | $ - | $ 8,409 | $ - | $ - | - | - |
| 1.08 | Facility Maintenance | $ 22,917 | $ - | $ 6,280 | $ 7,700 | $ 3,465 | $ 2,419 | $ 2,919 | $ 135 | $ 19,270 | $ 3,483 | $ 164 | - | 174,477 |
| 1.09 | Water Management | $ 76,018 | $ - | $ 8,133 | $ 18,144 | $ 27,999 | $ 11,825 | $ 9,133 | $ 783 | $ 66,102 | $ 9,916 | $ - | - | 111,580 |
| 1.10 | Permits | $ 60,891 | $ 20,410 | $ 1,752 | $ 15,651 | $ 8,239 | $ 1,257 | $ 10,492 | $ 3,090 | $ 21,289 | $ 12,201 | $ 27,401 | - | 172,735 |
| 1.11 | Future Land Use | $ 13,149 | $ 7,690 | $ 4,921 | $ 538 | $ - | $ - | $ - | $ - | $ - | $ - | $ 13,149 | - | 101,837 |
| 1.12 | Spent Fuel Management Plan | $ 63,295 | $ 61 | $ 1,694 | $ 6,135 | $ 5,799 | $ 10,446 | $ 38,912 | $ 248 | $ 893 | $ 62,402 | $ - | - | 182,663 |
| 1.13 | License Termination Plan | $ 15,094 | $ - | $ - | $ 2,043 | $ 4,380 | $ 4,493 | $ 2,032 | $ 2,146 | $ 10,917 | $ 4,177 | $ - | - | 65,437 |
| 1.14 | Site Characterization | $ 15,811 | $ - | $ 15,795 | $ 16 | $ - | $ - | $ - | $ - | $ 15,811 | $ - | $ - | - | 57,805 |
| 1.15 | Emergency Planning - Senate Bill 1090 | $ 46,423 | $ - | $ 756 | $ 21,636 | $ 11,519 | $ 12,511 | $ - | $ - | $ 46,423 | $ - | $ - | - | - |
| 1.16 | Emergency Planning | $ 28,792 | $ - | $ 15,922 | $ 9,157 | $ 1,214 | $ 2,498 | $ - | $ - | $ 27,612 | $ - | $ 1,180 | 19,840 | - |
| 1.17 | Consumables | $ 39,668 | $ - | $ 4,340 | $ 13,239 | $ 5,733 | $ 5,726 | $ 10,172 | $ 458 | $ 25,213 | $ 13,235 | $ 1,220 | - | 4,313 |
| 1.18 | Public Outreach & Stakeholder Engagement | $ 6,400 | $ 1,514 | $ 896 | $ 1,863 | $ 1,020 | $ 1,108 | $ - | $ - | $ 6,400 | $ - | $ - | - | - |
| **2** | **Security Operations** | $ 597,882 | $ - | $ 102,337 | $ 229,602 | $ 23,104 | $ 29,924 | $ 212,341 | $ 573 | $ 15,367 | $ 581,402 | $ 1,112 | 5,035,669 | 64,765 |
| 2.01 | Security Staffing | $ 578,430 | $ - | $ 100,955 | $ 225,168 | $ 20,296 | $ 26,322 | $ 205,512 | $ 177 | $ 4,311 | $ 574,119 | $ - | 5,035,669 | - |
| 2.02 | Other Security Related Costs | $ 19,452 | $ - | $ 1,382 | $ 4,434 | $ 2,808 | $ 3,602 | $ 6,829 | $ 397 | $ 11,056 | $ 7,283 | $ 1,112 | - | 64,765 |
| **3** | **Waste/Transportation/Material Management (Excluding: Breakwater, Reactor Vessel/Internal Segmentation, & Large Component Removal)** | $ 953,944 | $ 949 | $ 20,474 | $ 48,804 | $ 632,366 | $ 181,497 | $ 45,154 | $ 24,700 | $ 800,419 | $ 69,267 | $ 84,258 | - | 1,355,821 |
| 3.01 | Waste & Transportation Management | $ 133,020 | $ - | $ 3,598 | $ 16,391 | $ 40,710 | $ 59,640 | $ 1,486 | $ 11,195 | $ 63,921 | $ 12,126 | $ 56,973 | - | 1,042,349 |
| 3.02 | Transportation | $ 113,029 | $ - | $ 760 | $ 17,931 | $ 66,309 | $ 24,139 | $ - | $ 3,889 | $ 71,136 | $ 3,856 | $ 38,037 | - | - |
| 3.03 | Disposal | $ 666,560 | $ - | $ 571 | $ 13,476 | $ 543,348 | $ 103,011 | $ - | $ 6,154 | $ 654,341 | $ 6,154 | $ 6,064 | - | - |
| 3.04 | Material Management | $ 54,651 | $ 949 | $ 23,381 | $ 13,862 | $ 9,288 | $ 2,731 | $ 978 | $ 3,462 | $ 20,365 | $ 4,440 | $ 29,846 | - | 313,472 |
| 3.05 | Asset Recovery | $ (56,006) | $ - | $ (7,835) | $ (12,857) | $ (27,290) | $ (8,023) | $ - | $ - | $ (9,343) | $ - | $ (46,662) | - | - |
| 3.06 | GTCC Disposal | $ 42,690 | $ - | $ - | $ - | $ - | $ - | $ 42,690 | $ - | $ - | $ 42,690 | $ - | - | - |
| **Discrete Costs** | | | | | | | | | | | | | | |
| **4** | **Power Block Modifications** | $ 85,116 | $ 20,759 | $ 63,852 | $ 385 | $ 120 | $ - | $ - | $ - | $ 85,116 | $ - | $ - | - | 482,193 |
| 4.01 | U1 Spent Fuel Pool Island | $ 7,061 | $ 1,988 | $ 4,867 | $ 157 | $ 49 | $ - | $ - | $ - | $ 7,061 | $ - | $ - | - | 41,714 |
| 4.02 | U2 Spent Fuel Pool Island | $ 6,426 | $ 1,097 | $ 5,029 | $ 228 | $ 72 | $ - | $ - | $ - | $ 6,426 | $ - | $ - | - | 37,633 |
| 4.03 | Install 230kV Baywood Feed | $ 18,299 | $ 4,849 | $ 13,449 | $ - | $ - | $ - | $ - | $ - | $ 18,299 | $ - | $ - | - | 106,701 |
| 4.04 | U1 Cold and Dark | $ 19,669 | $ 3,415 | $ 16,255 | $ - | $ - | $ - | $ - | $ - | $ 19,669 | $ - | $ - | - | 101,561 |
| 4.05 | U2 Cold and Dark | $ 19,669 | $ 3,415 | $ 16,255 | $ - | $ - | $ - | $ - | $ - | $ 19,669 | $ - | $ - | - | 101,561 |
| 4.06 | Security Modifications | $ 13,991 | $ 5,995 | $ 7,997 | $ - | $ - | $ - | $ - | $ - | $ 13,991 | $ - | $ - | - | 93,024 |
| **5** | **Site Infrastructure** | $ 148,417 | $ 7,441 | $ 46,961 | $ 84,766 | $ 5,625 | $ 2,349 | $ 1,171 | $ 103 | $ 147,143 | $ 1,274 | $ - | - | 839,339 |
| 5.01 | Offsite Infrastructure | $ 30,799 | $ - | $ 160 | $ 30,638 | $ - | $ - | $ - | $ - | $ 30,799 | $ - | $ - | - | 133,448 |
| 5.02 | Road Improvements | $ 17,353 | $ - | $ 11,884 | $ 2,221 | $ 948 | $ 1,028 | $ 1,169 | $ 103 | $ 16,080 | $ 1,272 | $ - | - | 88,996 |
| 5.03 | Facility Construction | $ 30,223 | $ 190 | $ 17,718 | $ 12,315 | $ - | $ - | $ - | $ - | $ 30,223 | $ - | $ - | - | 166,239 |
| 5.04 | Existing Building and Structure Modifications | $ 21,539 | $ - | $ 8,756 | $ 12,193 | $ 496 | $ 92 | $ 1 | $ 0 | $ 21,537 | $ 2 | $ - | - | 112,291 |
| 5.05 | ISFSI Security Building Construction | $ 14,875 | $ - | $ 2,736 | $ 12,139 | $ - | $ - | $ - | $ - | $ 14,875 | $ - | $ - | - | 77,090 |
| 5.06 | ISFSI Pad Expansion for GTCC Storage | $ 15,107 | $ 6,699 | $ 1,436 | $ 6,972 | $ - | $ - | $ - | $ - | $ 15,107 | $ - | $ - | - | 102,342 |
| 5.07 | Project Oversight and Support | $ 18,522 | $ 552 | $ 4,272 | $ 8,287 | $ 4,181 | $ 1,229 | $ - | $ - | $ 18,522 | $ - | $ - | - | 158,934 |
| **6** | **Large Component Removal** | $ 182,004 | $ - | $ 44,716 | $ 137,288 | $ - | $ - | $ - | $ - | $ 182,004 | $ - | $ - | - | 352,279 |
| 6.01 | Legacy Steam Generators | $ 51,270 | $ - | $ 28,644 | $ 22,626 | $ - | $ - | $ - | $ - | $ 51,270 | $ - | $ - | - | 46,260 |
| 6.02 | Legacy Rx Heads | $ 3,979 | $ - | $ 312 | $ 3,667 | $ - | $ - | $ - | $ - | $ 3,979 | $ - | $ - | - | 10,096 |
| 6.03 | Steam Generators | $ 85,475 | $ - | $ 9,668 | $ 75,807 | $ - | $ - | $ - | $ - | $ 85,475 | $ - | $ - | - | 169,010 |
| 6.04 | Reactor Heads | $ 5,022 | $ - | $ 238 | $ 4,784 | $ - | $ - | $ - | $ - | $ 5,022 | $ - | $ - | - | 4,921 |
| 6.05 | Reactor Coolant Pumps | $ 10,331 | $ - | $ 659 | $ 9,672 | $ - | $ - | $ - | $ - | $ 10,331 | $ - | $ - | - | 21,014 |
| 6.06 | Pressurizers | $ 4,640 | $ - | $ 299 | $ 4,341 | $ - | $ - | $ - | $ - | $ 4,640 | $ - | $ - | - | 5,181 |
| 6.07 | Manipulators | $ 1,067 | $ - | $ 211 | $ 856 | $ - | $ - | $ - | $ - | $ 1,067 | $ - | $ - | - | 2,318 |
| 6.08 | Generators and Exciters | $ 625 | $ - | $ - | $ 625 | $ - | $ - | $ - | $ - | $ 625 | $ - | $ - | - | 3,654 |

(in thousands)

| ID | Scope Description | A<br>Total Estimate Nominal / 2019$ | B<br>1-Pre Shutdown Planning | C<br>2-Power Block Modifications | D<br>3-Wet Storage | E<br>4-Building Demolition | F<br>5-Site Restoration | G<br>6-ISFSI Operations | H<br>7-ISFSI Restoration | I<br>License Termination | J<br>Spent Fuel Management | K<br>Site Restoration | L<br>Utility Hours | M<br>Contractor Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.09 | Main Turbines | $ 1,725 | $ - | $ - | $ 1,725 | $ - | $ - | $ - | $ - | $ 1,725 | $ - | $ - | - | 10,420 |
| 6.10 | Diesel Generators | $ 763 | $ - | $ - | $ 763 | $ - | $ - | $ - | $ - | $ 763 | $ - | $ - | - | 3,086 |
| 6.11 | Other Turbine Building Components | $ 5,665 | $ - | $ - | $ 5,665 | $ - | $ - | $ - | $ - | $ 5,665 | $ - | $ - | - | 26,472 |
| 6.12 | Large Access Penetrations | $ 344 | $ - | $ 344 | $ - | $ - | $ - | $ - | $ - | $ 344 | $ - | $ - | - | 1,025 |
| 6.13 | Project Oversight and Support | $ 11,096 | $ - | $ 4,341 | $ 6,755 | $ - | $ - | $ - | $ - | $ 11,096 | $ - | $ - | - | 48,821 |
| **7** | **Reactor/Internals Segmentation** | **$ 363,271** | **$ 1,396** | **$ -** | **$ 186,359** | **$ 175,517** | **$ -** | **$ -** | **$ -** | **$ 363,271** | **$ -** | **$ -** | **-** | **532,765** |
| 7.01 | U1 Internals Segmentation | $ 18,226 | $ - | $ - | $ 18,226 | $ - | $ - | $ - | $ - | $ 18,226 | $ - | $ - | - | 74,760 |
| 7.02 | U1 Reactor Segmentation | $ 10,691 | $ - | $ - | $ 4,864 | $ 5,827 | $ - | $ - | $ - | $ 10,691 | $ - | $ - | - | 40,810 |
| 7.03 | U2 Internals Segmentation | $ 17,998 | $ - | $ - | $ 15,420 | $ 2,578 | $ - | $ - | $ - | $ 17,998 | $ - | $ - | - | 63,490 |
| 7.04 | U2 Reactor Segmentation | $ 8,790 | $ - | $ - | $ 8 | $ 8,782 | $ - | $ - | $ - | $ 8,790 | $ - | $ - | - | 33,850 |
| 7.05 | Waste & Transportation | $ 214,825 | $ - | $ - | $ 67,372 | $ 147,453 | $ - | $ - | $ - | $ 214,825 | $ - | $ - | - | 3,430 |
| 7.06 | Project Oversight and Support | $ 38,458 | $ 1,396 | $ - | $ 27,739 | $ 9,324 | $ - | $ - | $ - | $ 38,458 | $ - | $ - | - | 182,551 |
| 7.07 | Specialty Equipment | $ 54,282 | $ - | $ - | $ 52,730 | $ 1,553 | $ - | $ - | $ - | $ 54,282 | $ - | $ - | - | 133,874 |
| **8** | **Spent Fuel Transfer to ISFSI** | **$ 246,588** | **$ -** | **$ 141** | **$ 245,389** | **$ 412** | **$ 364** | **$ 282** | **$ -** | **$ 29,217** | **$ 217,371** | **$ -** | **52,988** | **327,906** |
| 8.01 | SNF and GTCC Cask Procurement | $ 188,998 | $ - | $ - | $ 188,998 | $ - | $ - | $ - | $ - | $ 21,058 | $ 167,940 | $ - | - | 9,940 |
| 8.02 | U1 Spent Fuel transfer to ISFSI | $ 29,106 | $ - | $ 117 | $ 28,959 | $ 30 | $ - | $ - | $ - | $ 2,177 | $ 26,929 | $ - | 26,494 | 162,261 |
| 8.03 | U2 Spent Fuel transfer to ISFSI | $ 22,220 | $ - | $ 24 | $ 22,166 | $ 30 | $ - | $ - | $ - | $ - | $ 22,220 | $ - | 26,494 | 123,121 |
| 8.04 | U1 GTCC Transfer to ISFSI | $ 3,760 | $ - | $ - | $ 2,762 | $ 352 | $ 364 | $ 282 | $ - | $ 3,478 | $ 282 | $ - | - | 17,535 |
| 8.05 | U2 GTCC Transfer to ISFSI | $ 2,504 | $ - | $ - | $ 2,504 | $ - | $ - | $ - | $ - | $ 2,504 | $ - | $ - | - | 15,049 |
| **9** | **Turbine Bldg** | **$ 72,557** | **$ -** | **$ 3,598** | **$ 51,255** | **$ 17,701** | **$ 3** | **$ -** | **$ -** | **$ 72,557** | **$ -** | **$ -** | **-** | **406,964** |
| 9.01 | U1 Decontamination | $ 21,736 | $ - | $ 2,691 | $ 18,146 | $ 900 | $ - | $ - | $ - | $ 21,736 | $ - | $ - | - | 131,306 |
| 9.02 | U1 System & Area Closure | $ 7,090 | $ - | $ 154 | $ 6,255 | $ 681 | $ - | $ - | $ - | $ 7,090 | $ - | $ - | - | 35,348 |
| 9.03 | U1 Demolition | $ 5,914 | $ - | $ - | $ 1,072 | $ 4,841 | $ 1 | $ - | $ - | $ 5,914 | $ - | $ - | - | 27,661 |
| 9.04 | U2 Decontamination | $ 19,747 | $ - | $ 479 | $ 14,147 | $ 5,121 | $ - | $ - | $ - | $ 19,747 | $ - | $ - | - | 119,335 |
| 9.05 | U2 System & Area Closure | $ 11,475 | $ - | $ 274 | $ 10,424 | $ 777 | $ - | $ - | $ - | $ 11,475 | $ - | $ - | - | 64,015 |
| 9.06 | U2 Demolition | $ 6,595 | $ - | $ - | $ 1,212 | $ 5,381 | $ 1 | $ - | $ - | $ 6,595 | $ - | $ - | - | 29,300 |
| **10** | **Aux Building** | **$ 97,219** | **$ -** | **$ 9,631** | **$ 63,937** | **$ 23,646** | **$ 5** | **$ -** | **$ -** | **$ 97,219** | **$ -** | **$ -** | **-** | **598,758** |
| 10.01 | U1 Decontamination | $ 3,150 | $ - | $ 1,213 | $ 519 | $ 1,417 | $ - | $ - | $ - | $ 3,150 | $ - | $ - | - | 20,566 |
| 10.02 | U1 System & Area Closure | $ 35,944 | $ - | $ 3,744 | $ 30,937 | $ 1,263 | $ - | $ - | $ - | $ 35,944 | $ - | $ - | - | 240,451 |
| 10.03 | U1 Demolition | $ 11,773 | $ - | $ - | $ 2,161 | $ 9,610 | $ 3 | $ - | $ - | $ 11,773 | $ - | $ - | - | 50,901 |
| 10.04 | U2 Decontamination | $ 2,035 | $ - | $ 1,202 | $ 519 | $ 314 | $ - | $ - | $ - | $ 2,035 | $ - | $ - | - | 12,530 |
| 10.05 | U2 System & Area Closure | $ 32,708 | $ - | $ 3,472 | $ 27,658 | $ 1,578 | $ - | $ - | $ - | $ 32,708 | $ - | $ - | - | 217,713 |
| 10.06 | U2 Demolition | $ 11,609 | $ - | $ - | $ 2,143 | $ 9,464 | $ 2 | $ - | $ - | $ 11,609 | $ - | $ - | - | 56,597 |
| **11** | **Containment** | **$ 127,656** | **$ -** | **$ 38,101** | **$ 52,420** | **$ 37,126** | **$ 9** | **$ -** | **$ -** | **$ 127,656** | **$ -** | **$ -** | **-** | **739,321** |
| 11.01 | U1 Decontamination | $ 8,862 | $ - | $ 5,429 | $ 2,628 | $ 805 | $ - | $ - | $ - | $ 8,862 | $ - | $ - | - | 50,887 |
| 11.02 | U1 System & Area Closure | $ 35,332 | $ - | $ 19,211 | $ 15,092 | $ 1,029 | $ - | $ - | $ - | $ 35,332 | $ - | $ - | - | 231,803 |
| 11.03 | U1 Demolition | $ 20,232 | $ - | $ - | $ 3,691 | $ 16,537 | $ 4 | $ - | $ - | $ 20,232 | $ - | $ - | - | 90,094 |
| 11.04 | U2 Decontamination | $ 6,909 | $ - | $ 4,140 | $ 1,808 | $ 961 | $ - | $ - | $ - | $ 6,909 | $ - | $ - | - | 37,891 |
| 11.05 | U2 System & Area Closure | $ 35,840 | $ - | $ 9,320 | $ 25,437 | $ 1,082 | $ - | $ - | $ - | $ 35,840 | $ - | $ - | - | 237,014 |
| 11.06 | U2 Demolition | $ 20,481 | $ - | $ - | $ 3,763 | $ 16,713 | $ 4 | $ - | $ - | $ 20,481 | $ - | $ - | - | 91,631 |
| **12** | **Fuel Handling Building** | **$ 51,262** | **$ -** | **$ 964** | **$ 17,185** | **$ 33,111** | **$ 2** | **$ -** | **$ -** | **$ 51,262** | **$ -** | **$ -** | **-** | **298,259** |
| 12.01 | U1 Decontamination | $ 2,127 | $ - | $ - | $ 230 | $ 1,897 | $ - | $ - | $ - | $ 2,127 | $ - | $ - | - | 11,900 |
| 12.02 | U1 System & Area Closure | $ 15,731 | $ - | $ 419 | $ 11,817 | $ 3,495 | $ - | $ - | $ - | $ 15,731 | $ - | $ - | - | 102,621 |
| 12.03 | U1 Demolition | $ 7,305 | $ - | $ - | $ 1,349 | $ 5,954 | $ 2 | $ - | $ - | $ 7,305 | $ - | $ - | - | 25,448 |
| 12.04 | U2 Decontamination | $ 2,063 | $ - | $ - | $ 230 | $ 1,833 | $ - | $ - | $ - | $ 2,063 | $ - | $ - | - | 11,475 |
| 12.05 | U2 System & Area Closure | $ 20,123 | $ - | $ 545 | $ 2,819 | $ 16,759 | $ - | $ - | $ - | $ 20,123 | $ - | $ - | - | 130,906 |
| 12.06 | U2 Demolition | $ 3,914 | $ - | $ - | $ 740 | $ 3,173 | $ 1 | $ - | $ - | $ 3,914 | $ - | $ - | - | 15,909 |
| **14** | **Balance of Site** | **$ 85,021** | **$ 4,385** | **$ 21,527** | **$ 27,205** | **$ 26,955** | **$ 4,948** | **$ -** | **$ -** | **$ 26,644** | **$ -** | **$ 58,377** | **-** | **502,627** |
| 14.01 | Decontamination | $ 11,705 | $ - | $ 1,305 | $ 6,280 | $ 3,816 | $ 305 | $ - | $ - | $ 11,705 | $ - | $ - | - | 77,563 |
| 14.02 | System & Area Closure | $ 14,938 | $ - | $ 3,583 | $ 5,425 | $ 5,930 | $ - | $ - | $ - | $ 14,938 | $ - | $ - | - | 89,477 |
| 14.03 | Demolition | $ 58,377 | $ 4,385 | $ 16,639 | $ 15,500 | $ 17,209 | $ 4,644 | $ - | $ - | $ - | $ - | $ 58,377 | - | 335,587 |
| **15** | **Intake Structure** | **$ 43,664** | **$ -** | **$ 4,481** | **$ 34,823** | **$ 4,338** | **$ 22** | **$ -** | **$ -** | **$ 6,851** | **$ -** | **$ 36,813** | **-** | **174,459** |
| 15.01 | System Area Closure | $ 6,851 | $ - | $ 4,481 | $ 2,059 | $ 311 | $ - | $ - | $ - | $ 6,851 | $ - | $ - | - | 43,407 |
| 15.02 | Coffer Dam | $ 14,974 | $ - | $ - | $ 14,974 | $ - | $ - | $ - | $ - | $ - | $ - | $ 14,974 | - | 35,818 |
| 15.03 | Demolition | $ 21,839 | $ - | $ - | $ 17,790 | $ 4,028 | $ 22 | $ - | $ - | $ - | $ - | $ 21,839 | - | 95,234 |
| **16** | **Discharge Structure** | **$ 15,867** | **$ -** | **$ -** | **$ 505** | **$ 15,362** | **$ 1** | **$ -** | **$ -** | **$ 15,867** | **$ -** | **$ -** | **-** | **69,467** |

Decommissioning Cost Estimate by Phase and Cost Category
(in thousands)

| ID | Scope Description | A<br>Total Estimate Nominal / 2019$ | B<br>1-Pre Shutdown Planning | C<br>2-Power Block Modifications | D<br>3-Wet Storage | E<br>4-Building Demolition | F<br>5-Site Restoration | G<br>6-ISFSI Operations | H<br>7-ISFSI Restoration | I<br>License Termination | J<br>Spent Fuel Management | K<br>Site Restoration | L<br>Utility Hours | M<br>Contractor Hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16.01 | Discharge Piping Decon | $ 602 | $ - | $ - | $ - | $ 602 | $ - | $ - | $ - | $ 602 | $ - | $ - | - | 3,710 |
| 16.02 | Coffer Dam | $ 7,589 | $ - | $ - | $ - | $ 7,589 | $ - | $ - | $ - | $ 7,589 | $ - | $ - | - | 24,492 |
| 16.03 | Demolition | $ 2,828 | $ - | $ - | $ 505 | $ 2,323 | $ 1 | $ - | $ - | $ 2,828 | $ - | $ - | - | 11,852 |
| 16.04 | System Area Closure | $ 4,848 | $ - | $ - | $ - | $ 4,848 | $ - | $ - | $ - | $ 4,848 | $ - | $ - | - | 29,412 |
| **17** | **Breakwater** | **$ 299,821** | **$ -** | **$ -** | **$ -** | **$ 1,092** | **$ 298,729** | **$ -** | **$ -** | **$ -** | **$ -** | **$ 299,821** | **-** | **131,304** |
| 17.01 | Demolition | $ 144,210 | $ - | $ - | $ - | $ 1,092 | $ 143,118 | $ - | $ - | $ - | $ - | $ 144,210 | - | 131,304 |
| 17.02 | Transportation | $ 134,931 | $ - | $ - | $ - | $ - | $ 134,931 | $ - | $ - | $ - | $ - | $ 134,931 | - | - |
| 17.03 | Disposal Cost | $ 20,680 | $ - | $ - | $ - | $ - | $ 20,680 | $ - | $ - | $ - | $ - | $ 20,680 | - | - |
| **18** | **Non-ISFSI Site Restoration** | **$ 142,232** | **$ -** | **$ 5,681** | **$ 11,186** | **$ 22,858** | **$ 83,194** | **$ 14,308** | **$ 5,005** | **$ -** | **$ -** | **$ 142,232** | **-** | **650,452** |
| 18.01 | Utilities and Structures Demo | $ 33,059 | $ - | $ 3,359 | $ - | $ 1,419 | $ 12,460 | $ 10,817 | $ 5,005 | $ - | $ - | $ 33,059 | - | 85,543 |
| 18.02 | Soil Remediation | $ 4,368 | $ - | $ - | $ - | $ 1,477 | $ 2,757 | $ 134 | $ - | $ - | $ - | $ 4,368 | - | 21,781 |
| 18.03 | Final Site Survey | $ 42,682 | $ - | $ - | $ 4,908 | $ 3,977 | $ 33,797 | $ - | $ - | $ - | $ - | $ 42,682 | - | 247,056 |
| 18.04 | Grading and Landscaping | $ 62,123 | $ - | $ 2,322 | $ 6,278 | $ 15,985 | $ 34,181 | $ 3,357 | $ - | $ - | $ - | $ 62,123 | - | 296,072 |
| **19** | **Spent Fuel Transfer to DOE** | **$ 26,382** | **$ -** | **$ -** | **$ 3** | **$ 429** | **$ 992** | **$ 21,262** | **$ 3,697** | **$ -** | **$ 26,382** | **$ -** | **-** | **117,160** |
| 19.01 | U1 Spent Fuel Transfer to DOE | $ 7,296 | $ - | $ - | $ - | $ - | $ 526 | $ 6,770 | $ - | $ - | $ 7,296 | $ - | - | 51,795 |
| 19.02 | U2 Spent Fuel Transfer to DOE | $ 18,034 | $ - | $ - | $ 3 | $ 429 | $ 466 | $ 13,440 | $ 3,697 | $ - | $ 18,034 | $ - | - | 57,895 |
| 19.03 | GTCC Transfer to Offsite Facility | $ 1,052 | $ - | $ - | $ - | $ - | $ - | $ 1,052 | $ - | $ - | $ 1,052 | $ - | - | 7,470 |
| **20** | **ISFSI Demolition and Site Restoration** | **$ 57,850** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ 5,191** | **$ 52,659** | **$ -** | **$ 57,850** | **$ -** | **-** | **287,967** |
| 20.01 | Utilities and Structures Demo | $ 24,962 | $ - | $ - | $ - | $ - | $ - | $ 2,663 | $ 22,300 | $ - | $ 24,962 | $ - | - | 133,651 |
| 20.02 | Soil Remediation | $ 2,165 | $ - | $ - | $ - | $ - | $ - | $ - | $ 2,165 | $ - | $ 2,165 | $ - | - | 12,324 |
| 20.03 | Final Site Survey | $ 2,027 | $ - | $ - | $ - | $ - | $ - | $ - | $ 2,027 | $ - | $ 2,027 | $ - | - | 9,040 |
| 20.04 | Grading and Landscaping | $ 28,696 | $ - | $ - | $ - | $ - | $ - | $ 2,529 | $ 26,167 | $ - | $ 28,696 | $ - | - | 132,951 |
| | GRAND TOTAL | $ 5,143,867 | $ 197,648 | $ 708,071 | $ 1,624,597 | $ 1,234,544 | $ 763,129 | $ 498,526 | $ 117,351 | $ 3,159,685 | $ 1,245,867 | $ 738,315 | 10,141,866 | 8,967,383 |

Note: 2010-2018 in Nominal Dollars. 2019-2076 in 2019 dollars.