

Application No.: A.12-12-013  
Exhibit No.: SCE-06  
Witnesses: Paul Hunt  
David H. Opitz  
Todd Cameron



(U 338-E)

***SUPPLEMENTAL TESTIMONY: SONGS 2 & 3  
EARLY DECOMMISSIONING SCENARIO***

Before the  
**Public Utilities Commission of the State of California**

Rosemead, California  
July 22, 2013

# SCE 06 - SUPPLEMENTAL TESTIMONY: SONGS 2 & 3 EARLY DECOMMISSIONING SCENARIO

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**I.**

**INTRODUCTION**

At the prehearing conference for this proceeding conducted on March 27, 2013, Administrative Law Judge (ALJ) Darling ordered the Southern California Edison Company (SCE) to develop an early decommissioning cost estimate for San Onofre Nuclear Generating Station Units 2 & 3 (SONGS 2 & 3) that would be representative of decommissioning costs if SONGS 2 and/or 3 were not restarted. On June 7, 2013, SCE announced that it will not restart either unit. As discussed in the following chapter, SCE presents a decommissioning cost estimate that reflects the fact that both units will not restart. The decommissioning cost estimates provided here reflect generic cost estimates to derive an annual contribution amount for purposes of this application. SCE has not had sufficient time to reflect all of the implications of the June 7 announcement for the SONGS decommissioning cost estimate presented here. SCE requests that it be permitted to submit, as necessary, additional testimony to reflect the impact of the permanent retirement of SONGS on the decommissioning cost estimate.

SCE anticipates preparing a new decommissioning cost estimate for SONGS 2 & 3 after the development of a site-specific decommissioning plan. This plan will reflect SCE's Post Shutdown Decommissioning Activities Report, which SCE is required to submit to the Nuclear Regulatory Commission (NRC).<sup>1</sup> SCE anticipates submitting a site-specific decommissioning plan and cost estimate to the Commission for approval as soon as it is practical to do so by filing either an application or an Advice Letter.<sup>2</sup>

When SCE submitted its original application in this docket, SCE sought an increase in the SONGS 2 & 3 decommissioning contributions from the levels authorized by the Commission in D.10-07-047, rendered in A.09-04-007 et al., SCE's last nuclear decommissioning

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<sup>1</sup> See 10 C.F.R. § 50.82.

<sup>2</sup> SCE also intends to seek Commission approval to access the SONGS decommissioning trust funds for SONGS 2 & 3 prior to the completion of the site-specific decommissioning plan.

1 contribution application. As discussed in more detail below, the decommissioning contribution  
2 estimate presented in this exhibit also represents an increase from the levels currently authorized.  
3 However, at this time, SCE would ask that the Commission stay its request for an increase from  
4 the currently authorized contribution amounts until such time as SCE has completed its site-  
5 specific decommissioning plan and provided that plan to the Commission. SCE will seek an  
6 increased contribution amount only if the site-specific decommissioning plan, taking into  
7 account appropriate financial assumptions contemporaneous with the site-specific plan, indicates  
8 the need for an increase.<sup>3</sup>

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<sup>3</sup> SCE notes that the completion of a site-specific decommissioning plan may identify decommissioning events that affect projected future decommissioning costs for SONGS 1. In addition, changes in financial assumptions could affect the projected ability of SCE's decommissioning trusts to fund decommissioning of Palo Verde Units 1, 2, and 3.

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## II.

### DECOMMISSIONING COST ESTIMATE FOR SONGS 2 & 3 EARLY SHUTDOWN CASE

#### A. Introduction

At the prehearing conference for this proceeding conducted on March 27, 2013, ALJ Darling ordered SCE to develop an early decommissioning cost estimate for SONGS 2 & 3 that would be representative of decommissioning costs if SONGS 2 and/or 3 were not restarted. On June 7, 2013, SCE announced that it will not restart either unit. Accordingly, in this chapter, SCE presents a decommissioning cost estimate that reflects the fact that both units will not restart (the “Early Shutdown Case”). In addition, this chapter describes the differences between the Early Shutdown Case and the 2022 shutdown scenario (the “Base Case”).<sup>4</sup>

#### B. Assumptions

To develop a decommissioning cost estimate for the Early Shutdown Case that would identify the incremental costs savings and incremental costs that would be anticipated for this scenario, SCE used most of the same major assumptions used in the cost estimate for the Base Case. Examples of the major assumptions include:

- Some fuel assemblies cannot be transferred from the SONGS 2 & 3 spent fuel pools to dry storage until 12 years after they are discharged from the reactor because they require up to 12 years of thermal cooling before they can be placed in dry storage canisters,
- The U.S. Department of Energy (DOE) commences accepting spent nuclear fuel from industry in 2024 and from the SONGS site in 2027 after taking the SONGS 1 fuel from the General Electric facility at Morris, IL, during 2024-2027,
- Because all SONGS 1 fuel stored at the SONGS site has already been placed in dry storage in the Independent Spent Fuel Storage Installation (ISFSI), for each batch of SONGS 1 fuel

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<sup>4</sup> The decommissioning cost estimates provided here reflect generic cost estimates to derive an annual contribution amount for purposes of this application. SCE has not determined all of the implications of the June 7 announcement for the SONGS decommissioning cost estimate presented here.

1 that is in the DOE's fuel acceptance queue during the 12-year cooling period, the DOE would  
2 allow equivalent quantities of SONGS 2 & 3 fuel to be substituted and taken directly from  
3 the SONGS 2 & 3 spent fuel pools,<sup>5</sup> and

- 4 • All other cost factors, such as labor rates, low-level radioactive waste shipping and disposal  
5 rates, and the 25% contingency factor remain unchanged.

6 For purposes of this Early Shutdown Case, SCE used the following new assumptions:

- 7 • SONGS 2 & 3 will not generate additional spent fuel after January 2012,
- 8 • SONGS 2 & 3 would have permanently ceased operations and been placed in a SAFSTOR  
9 configuration by the end of 2014,<sup>6</sup> and
- 10 • SONGS 2 & 3 decommissioning would commence in mid-year 2015.<sup>7</sup>

11 The estimated cost for the Early Shutdown Case is \$4,132 million (100% level, 2011 dollars).

12 This represents a cost increase of approximately \$14 million (100% level, 2011 dollars) from the Base  
13 Case estimate of \$4,119 million (100% level, 2011 dollars). Table II-1 provides a summary-level  
14 reconciliation of the estimated costs to decommission SONGS 2 & 3 under the Early Shutdown Case  
15 versus the Base Case:

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<sup>5</sup> U. S. Department of Energy Contract No. DE-CR01-83NE44418, Contract for Disposal of Spent Nuclear Fuel (SNF) and/or High-Level Radioactive Waste (HLW), executed by U.S. Department of Energy and Southern California Edison Company on June 10, 1983 (DOE Contract), at pp. 12-13.

<sup>6</sup> This assumption is subject to change. If there is a material change in this assumption, SCE will update this testimony.

<sup>7</sup> SCE selected mid-year 2015 for this analysis because SCE believes that a minimum of two years would be required to transition SONGS to a post-shutdown organization, permanently defuel SONGS 2, amend the NRC operating licenses to possession-only licenses, and to place the SONGS 2 & 3 plant systems that are not directly or indirectly required to store spent fuel in the spent fuel pools into a SAFSTOR configuration before major decommissioning activities may commence.

**Table II-1**  
**Reconciliation of San Onofre Nuclear Generating Station Units 2 & 3**  
**Decommissioning Cost Estimates**  
**(2013 Early Shutdown Case to 2022 Base Case)**

Line No.	San Onofre Nuclear Generating Station Units 2 & 3	Estimated Cost (100% level, millions of 2011 dollars)
1.	SONGS 2 & 3 Decommissioning Cost – 2022 (Base Case)	\$4,119
2.	Plus: Early Shutdown Case – Spent Fuel Storage & Transfer Costs	\$61
3.	Plus: Early Shutdown Case – Different Initial Plant Conditions	\$14
4.	Less: Early Shutdown Case – Decommissioning Schedule Revision	(\$29)
5.	Less: Early Shutdown Case – Reduced Separation Payments	(\$25)
6.	Less: Early Shutdown Case – Increased Disposal Volumes for Class B & C Low Level Radioactive Waste	(\$8)
7.	SONGS 2 & 3 Decommissioning Cost – 2013 (Early Shutdown Case)	\$4,132

**C. Early Shutdown Case Cost Changes**

**1. Spent Fuel Storage & Transfer Costs**

SCE’s Base Case decommissioning cost estimate was based on the assumption that SONGS 2 & 3 would continue to operate and generate spent nuclear fuel until their permanent cessation of operations after the expiration of their NRC operating licenses in 2022. SCE’s Early Shutdown Case assumes that SONGS 2 & 3 will not re-start after January 2012 based on the fact that SCE has announced the retirement of both Units at SONGS. The Base Case assumed that up to 972 spent fuel assemblies would be generated during the 2012-2022 period. The Early Shutdown Case does not include the spent fuel storage costs associated with those spent fuel assemblies because spent fuel will not be generated during 2012-2022 period.

In the Base Case, the 12-year spent fuel cooling period runs from 2022 through 2034. Thus, SCE assumed that the DOE would take 1,155 fuel assemblies directly from the SONGS 2 & 3 spent fuel pools during 2027-2034. Accordingly, SCE assumed it would avoid the cost to place these 1,155 fuel assemblies in dry storage. However, SCE assumed it would incur the cost to load the fuel assemblies into Transportation Aging and Disposal (TAD) canisters provided by the DOE, and the cost to transport the canisters to the DOE’s transportation device at the SONGS site. SCE would also incur the cost to transfer the remaining 1,697 fuel assemblies from the SONGS 2 & 3 spent fuel pools to the

1 ISFSI by 2034.<sup>8</sup> The dry storage costs associated with those remaining fuel assemblies—including  
2 additional ISFSI pad space, advanced horizontal storage modules (AHSM), dry storage canisters (DSC),  
3 and canister loading and transfer costs—were included in the Base Case decommissioning cost estimate.

4 In contrast, in the Early Shutdown Case, the 12-year spent fuel cooling period would run  
5 from January 2012 through January 2024. SCE would incur the cost of transferring all of the 2,776 fuel  
6 assemblies that are currently in the spent fuel pools to dry storage because the Early Shutdown Case  
7 decommissioning schedule assumes that: (1) SCE will transfer all spent fuel out of the pools by the end  
8 of the 12-year spent fuel cooling period in January 2024 and (2) the DOE will not commence accepting  
9 spent fuel from the SONGS site until 2027.<sup>9</sup> Of those 2,776 fuel assemblies, 288 will be transferred to  
10 the ISFSI in 2014 in twelve 24-PTH DSCs. Those DSCs, along with their corresponding AHSMs, have  
11 already been acquired with SONGS Capital funds. Given the permanent cessation of operations,  
12 decommissioning funds will be required for the entire cost to transfer the remaining 2,488 fuel  
13 assemblies from the SONGS 2 & 3 spent fuel pools to the ISFSI by the end of the 12-year cooling  
14 period in January 2024.<sup>10</sup>

15 Because decommissioning must bear the cost of placing a greater number of fuel  
16 assemblies in dry storage in the Early Shutdown Case compared to the Base Case, the spent fuel storage

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<sup>8</sup> DOE was assumed to remove 588 SONGS 2 fuel assemblies and 567 SONGS 3 fuel assemblies (1,155 total) directly from spent fuel pools by 2034. Decommissioning was assumed to pay for 54 32PTH2 canisters required to remove the remaining 830 fuel assemblies from SONGS 2 pool and 867 fuel assemblies from SONGS 3 pool (1,697 total), and for the corresponding pad space and AHSMs required to empty SONGS 2 & 3 pools between 2022 shutdown and 2034 end of fuel cooling period.

<sup>9</sup> These 2,776 fuel assemblies include the 217 fuel assemblies that will be permanently offloaded from the SONGS 2 reactor vessel to the SONGS 2 spent fuel pool during July 2013.

<sup>10</sup> As of September 1, 2013, the SONGS 2 pool will contain 1,426 fuel assemblies and the SONGS 3 pool will contain 1,350 fuel assemblies (2,776 total). SONGS Capital paid for 12 24PTH AHSMs and Canisters. Decommissioning funds were assumed to pay for the cost to load, seal, and transport 288 assemblies (144 from each unit) in those 12 24PTH Canisters to the ISFSI, leaving 1,282 assemblies in the SONGS 2 pool and 1,206 assemblies in the SONGS 3 pool (2,488 total). Decommissioning funds were assumed to pay for 79 32PTH2 Canisters required to transfer these 2,488 assemblies to the ISFSI. This represents the minimum number of canisters that would be required to accommodate the fuel assemblies in each unit's spent fuel pool.

1 and transfer costs increase in the Early Shutdown Case. These costs increase by approximately \$61  
2 million (100% level, 2011 dollars).

3 **2. Different Initial Plant Conditions**

4 In the Base Case, SCE assumed that as plant operations wound down prior to a planned  
5 shutdown of the units, SCE would attempt to dispose of as much radioactive waste and hazardous waste  
6 as practicable during plant operations. Thus, such waste would already be removed when  
7 decommissioning commenced. In the Early Shutdown Case, however, SCE does not have that  
8 preparation time. As a result, there are greater quantities of disposable Class A low level radioactive  
9 waste and hazardous materials stored at the SONGS site than were contemplated in the Base Case cost  
10 estimate. The incremental cost to dispose of this additional material is approximately \$14 million  
11 (100% level, 2011 dollars).

12 **3. Decommissioning Schedule Revision**

13 In the Base Case, the project schedule was based on an assumption that pre-shutdown  
14 decommissioning planning would occur during the two years prior to the expiration of the SONGS 2 &  
15 3 NRC operating licenses in 2022, and the 12-year spent fuel cooling period would not begin until each  
16 of the units permanently ceased operations. Because the 12-year cooling period would have started after  
17 the units retired in 2022, the termination of the decommissioning activities and corresponding staffing  
18 levels—which are required as long as fuel was stored in the spent fuel pools—would not have ended  
19 until twelve years after the shutdown.

20 In the Early Shutdown Case, however, it was not possible to perform pre-shutdown  
21 decommissioning planning. In addition, the 12-year spent fuel pool cooling period commenced  
22 approximately 18 months before SCE announced its decision to close SONGS 2 & 3. Thus, the last fuel  
23 may be removed from the SONGS 2 & 3 spent fuel pools only 10.5 years after the June 2013  
24 announcement to permanently close the units.

25 In both cases, the DOE is still assumed to commence accepting fuel in 2024. In the Base  
26 Case, SONGS was assumed to generate additional spent fuel through 2022, and the DOE is assumed to  
27 remove the last fuel from SONGS in 2051. In contrast, in the Early Shutdown Case, SONGS ceased

1 generating spent fuel in January 2012, and the DOE is assumed to remove the last fuel from SONGS in  
2 2049.

3           The difference in the timing of activities between the Base Case and the Early Shutdown  
4 Case changes the duration of several of the work breakdown structure (WBS) periods within  
5 decommissioning cost estimates for each case. This results in cost changes because each WBS period is  
6 assumed to use staffing levels that are appropriate for the types of work performed therein, and because  
7 the period-driven costs for each WBS period are dependent upon the length of each such period. For  
8 example, the WBS 2 and WBS 3 schedules change from 10 years and 2 years, respectively, in the Base  
9 Case, to 8.5 years and 3.5 years in the Early Shutdown Case. Because the estimated staffing levels and  
10 period costs are more expensive during WBS 2 activities than WBS 3, the project cost decreases (even  
11 though the combined duration of the sum of both periods remains unchanged). The net effect of these  
12 schedule revisions is a \$29 million (100% level, 2011 dollars) decrease in the Early Shutdown Case  
13 relative to the Base Case.

#### 14           **4. Employee Separation Payments**

15           SCE's Base Case decommissioning cost estimate was based on an assumption that  
16 SONGS 2 & 3 would employ 1,675 utility workers until the units were permanently retired. This  
17 staffing level was consistent with SCE's Test Year 2012 General Rate Case (GRC) submittal. The  
18 decommissioning cost estimate for SCE's Base Case, therefore, included the estimated separation  
19 payments for all of these 1,675 utility employees.

20           SCE's Early Shutdown Case, however, assumes that SONGS 2 & 3 have been  
21 permanently retired and will be placed in SAFSTOR by mid-year 2015. On June 7, 2013, SONGS 2 &  
22 3 staffing levels were 1,470 utility employees and 65 contractors.<sup>11</sup> SCE plans to reduce the SONGS 2

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<sup>11</sup> Subsequent to the development of the Base Case decommissioning cost estimate for SONGS 2 & 3 that was submitted in this proceeding—which were based on SCE staffing levels of 1,675 utility employees at the beginning of decommissioning consistent with SCE's Test Year 2012 GRC—SCE implemented the SONGS Business Transformation Initiative (BTI). When completed by June 1, 2013, the SONGS BTI reduced the utility staffing level at SONGS 2 & 3 to 1,470 employees.

1 & 3 staffing level to 400 utility employees and 40 contractors by July 1, 2014. It is anticipated that  
2 separation payments for the 1,070 utility employees who will be severed as a result of the closure of  
3 SONGS 2 & 3, as well as the remaining 400 utility employees who will be severed by the end of the  
4 decommissioning project, will be paid with decommissioning funds.<sup>12</sup> Because the Early Shutdown  
5 Case will pay for the separation payments for 205 fewer utility employees than were assumed in the  
6 Base Case (i.e., 1675 - 1470 = 205), the avoided cost to the Early Shutdown Case is approximately \$25  
7 million (100% level, 2011 dollars).

8 **5. Increased Disposal Volumes for Class B & C Low Level Radioactive Waste**

9 While developing the Early Shutdown Case, SCE re-evaluated the amount of Class B and  
10 C Low Level Radioactive Waste (LLRW) that could be placed in shipping containers for transport to the  
11 licensed disposal facility without exceeding container weight limitations. SCE determined that reducing  
12 the packaging density from 100 pounds per cubic foot assumed in the Base Case to 60 pounds per cubic  
13 foot would result in more efficient utilization of shipping containers. This would result in a need to ship  
14 fewer containers, and therefore, in reduced shipping and disposal costs. This change yielded a reduction  
15 of approximately \$8 million (100% level, 2011 dollars), compared to the Base Case.

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<sup>12</sup> See California Public Utilities Code 8322(g).

1 **III.**

2 **CONTRIBUTION LEVELS FOR SONGS 2 & 3 EARLY SHUTDOWN CASE**

3 This section will present the Early Shutdown Case contribution scenario.

4 **A. Amount of Decommissioning Trust Fund Contributions**

5 In this scenario, SCE estimates the annual contributions necessary to achieve full funding  
6 of the Trust by 2022 based upon the Early Shutdown Case cost studies described in the above  
7 section. The updated contribution reflects a new project cost and timeline, new asset allocations,  
8 and an updated trust balance. Based upon these parameters, the contribution analysis shows that  
9 SONGS 2 requires \$21.5 million and SONGS 3 requires \$22.1 million in annual contributions  
10 through 2022 in order to meet the future liabilities under the Early Shutdown Case scenario.

11 The cost and funding assumptions and total annual decommissioning fund contribution  
12 requirements under the Base Case and the Early Shutdown Case can be found below in Table II-  
13 2. Table II-3 below shows the currently authorized contribution amount and revenue  
14 requirement, as well as the contribution amounts and revenue requirements for both the Base  
15 Case and Early Shutdown Case, for SONGS 2 & 3 starting on January 1, 2014.<sup>13</sup>

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<sup>13</sup> As discussed previously, SCE is withdrawing its request for an increase from the current authorization until SCE completes its site-specific decommissioning plan.

**Table III-2**  
**Early Shutdown Case - Estimated Costs and Contribution Requirements SONGS 2&3**  
**(SCE Share)**  
**(\$000)**

SONGS 2&3	2012 NDCTP - 2012 Base Case (\$,000)	2012 NDCTP – Early Shutdown Case (\$,000)
Estimated Costs (SCE share \$2011)	\$3,143,534	\$3,154,057
Fund Liquidation Value	\$2,607,921	\$2,777,208
Date of Fund Value	9/30/2012	5/31/2013
Annual Contribution	\$39,221	\$43,584
Annual Revenue Requirement	\$39,662	\$44,074
Contribution Period	2014 - 2022	2014 - 2022
Qualified Trust Returns		
Pre Tax (Fixed Income - Equities)	4.2% - 7.7%	4.2% - 7.7%
After Tax Return (Min, Max, Average)	3.3%, 5.0%, 3.7%	3.3%, 4.9%, 4.1%
Escalation Rates (Min, Max, Average)	1.9%, 7.3%, 3.3%	1.9%, 7.3%, 3.3%

**Table III-3**  
**Early Shutdown Case - Proposed Nuclear Decommissioning Contribution**  
**Amounts by Unit (SCE Share)**  
**(Nominal \$000)**

Contribution Scenario	SONGS 2	SONGS 3	Total
	Qualified	Qualified	
Authorized			
Edisons Authorized Contribution Amount	\$ 17,593	\$ 5,133	\$ 22,726
Edisons Authorized Revenue Requirement	\$ 17,801	\$ 5,194	\$ 22,995
Proposed 2012 Base Case			
Edisons Proposed Contribution Amount	\$ 20,260	\$ 18,961	\$ 39,221
Edisons Proposed Revenue Requirement	\$ 20,488	\$ 19,174	\$ 39,662
Proposed Early Shutdown			
Edisons Proposed Contribution Amount	\$ 21,484	\$ 22,100	\$ 43,584
Edisons Proposed Revenue Requirement	\$ 21,725	\$ 22,348	\$ 44,074

**B. Asset Allocation Study**

Callan Associates was hired by the Nuclear Decommissioning Trust (NDT) Committee in December 2012 to conduct an asset allocation study. The equity allocation (i.e., “glide path”) used by SCE in the Early Shutdown Case contribution analysis is extracted from

1 Callan's asset allocation study. SCE supplied the Early Shutdown Case project costs and  
2 associated assumptions for Callan to utilize in its asset allocation analysis.