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SONGS Units 2 and 3 Irradiated Fuel Management Plan

I. Background and Introduction

On June 12, 2013, Southern California Edison (SCE) submitted a letter to the U.S. Nuclear Regulatory Commission (NRC) (Reference 1) certifying the permanent cessation of operations at San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 effective June 7, 2013, in accordance with 10 CFR 50.82(a)(1)(i). All fuel was removed from the SONGS Units 2 and 3 reactor vessels and placed in their respective spent fuel pools as certified in accordance with 10 CFR 50.82(a)(1)(ii) (References 2 and 3).

Pursuant to 10 CFR 50.54(bb), licensees are required to submit a plan for the management of irradiated fuel until title and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository. The Irradiated Fuel Management Plan (IFMP) is required to be submitted to the Commission either five years before expiration of the Operating License or within two years following permanent cessation of operations, whichever occurs first. Therefore, the SONGS Units 2 and 3 plans are required to be submitted prior to June 7, 2015, two years following the cessation of operations. This submittal constitutes SCE's IFMP for SONGS Units 2 and 3, submitted on behalf of itself and the other SONGS Participants responsible for the funding of the SONGS decommissioning. The other SONGS Participants are the City of Anaheim, the City of Riverside and San Diego Gas and Electric Company.

EnergySolutions, LLC has prepared a site-specific decommissioning cost estimate (DCE) for SONGS Units 2 and 3. The cost analysis identifies the details, schedules, and costs of spent fuel management activities associated with the IFMP, along with license termination and site restoration activities and costs. This DCE is provided as Attachment 1 to the Post-Shutdown Decommissioning Activities Report (Reference 4). The assumptions regarding the United States Department of Energy (US DOE) acceptance of irradiated fuel is consistent with the *EnergySolutions* DCE. As discussed in the DCE, the SONGS Units 2 and 3 IFMP is based on commencement of acceptance of spent fuel by US DOE in 2024 (Reference 13).

II. Irradiated Fuel Management Strategy

The safe initial interim storage of the irradiated fuel will be "wet storage" in each unit's respective spent fuel pool. The spent fuel pools will be isolated from their normal support systems and those systems replaced by stand-alone cooling and filtration units (also termed a "spent fuel pool island"). Doing so facilitates earlier system abandonment and parallel decommissioning activities.

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Subsequently, all irradiated fuel in the SONGS Units 2 and 3 spent fuel pools will be safely transferred to “dry storage” at the common Independent Spent Fuel Storage Installation (ISFSI) located on the SONGS site. Dry Storage is also considered interim storage pending transfer to the US DOE.

A total of 1,726 irradiated fuel assemblies have been generated in SONGS Unit 2 and 1,734 irradiated fuel assemblies have been generated in SONGS Unit 3, for a total of 3,460 irradiated fuel assemblies. At present, 792 SONGS Units 2 and 3 irradiated fuel assemblies have already been transferred to the common ISFSI. The remaining 2,668 irradiated fuel assemblies will be loaded into Dry Shielded Canisters (DSCs) and transferred to the ISFSI following expansion of the ISFSI capacity.

The current ISFSI is located inside the Owner Controlled Area. It was constructed to accommodate SONGS Unit 1 irradiated fuel and provides additional capacity for a limited amount of SONGS Units 2 and 3 irradiated fuel pending, among other considerations, Units 2 and 3 decommissioning dates and US DOE irradiated fuel acceptance time frames.

The ISFSI currently contains 18 DSCs storing Unit 1 fuel and Greater than Class C (GTCC) waste. The ISFSI also contains 33 DSCs which store Units 2 and 3 fuel. All of the fuel on the ISFSI is stored in Transnuclear NUHOMS Model Number-24PT1 or PT4 DSCs.

The IFMP major periods, including start and end dates and associated costs for each period are identified in Table 1. The identified Spent Nuclear Fuel (SNF) Periods are developed in and align with the site-specific DCE (Reference 4, Attachment 1).

The current plans are for the ISFSI to be expanded to accommodate the remaining inventory of the SONGS Units 2 and 3 spent fuel pools. SCE plans to commence the movement of irradiated fuel from the SONGS Unit 2 and Unit 3 pools to the ISFSI in 2017. SCE expects to complete the transfer in 2019. Additional DSCs will be procured from one or more of the available dry storage system suppliers beginning in 2014. An additional 47 DSCs will be required for the SONGS Unit 2 irradiated fuel and an additional 44 DSCs will be required for the SONGS Unit 3 irradiated fuel (depending on the capacity of the selected system and the number of DSCs needed to store GTCC waste and other materials). The spent fuel pool inventory is expected to be completely transferred to the ISFSI no later than 2019.

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The US DOE Standard Contracts for acceptance and disposal of spent nuclear fuel and high level waste contain the basis for the initial ranking of industry-wide spent fuel acceptance obligations based upon the date of permanent removal of the spent nuclear fuel from service (“oldest fuel first allocation”). Those Standard Contracts also contain provisions allowing for “exchanges” of acceptance obligations, and priority for retired units. Given the US DOE’s lack of performance, a common and conservative assumption for purposes of this fuel management plan is to base acceptance projections upon application of an oldest fuel first allocation scheme to a projected start date for repository operations. Therefore, this plan is based upon a 2024 start date (Reference 13) for US DOE acceptance of spent fuel from the industry. As indicated in Table 3, SCE is assuming all fuel will be removed from the SONGS site as of 2049. Based on this assumption, the ISFSI will be subsequently decommissioned by the 2051 final license termination date.

III. Financial Assurance

The regulations (10 CFR 50.54(bb)) also require that funding adequacy be demonstrated to support the irradiated fuel management plan.

The cost of twelve (12) additional DSCs to be stored on the current ISFSI was funded from sources other than the Nuclear Decommissioning Trusts (NDT) as are the costs associated with ongoing storage of Unit 1 spent fuel at the GE-Hitachi Nuclear America LLC’s Morris Operation ISFSI located in Morris, Illinois. Table 1 includes the costs of procurement and construction of the expanded ISFSI capacity and all loading costs. Operation of the spent fuel pools is modeled as being discontinued in 2019 after all of the fuel has been transferred to dry storage. ISFSI operations continue until the US DOE is able to complete the transfer of the SONGS fuel to a repository or interim storage facility, which is currently assumed to occur by 2049.

SCE is committed to providing consistent and up-to-date information to all of its stakeholders and regulators. Aspects of the SONGS Nuclear Decommissioning Trust Fund are regulated by both the California Public Utilities Commission (CPUC) and the NRC. Previous Decommissioning Cost Estimates (DCEs) were updated and submitted to the CPUC as part of the Nuclear Decommissioning Cost Triennial Proceeding (Reference 5). Financial assurance reports including the balances and expenditures for SONGS Unit 1 were supplied to the NRC (as required by 10 CFR 50.82(a)(8)(v)) annually (most recently in Reference 6) and balances for SONGS Units 2 and 3 were submitted on a biennial basis (as required by 10 CFR 50.75(f)(1)) (most recently in Reference 7). Reports regarding ISFSI costs and decommissioning funding assurance for these costs were summarized triennially as required by 10 CFR 72.30(c) (most

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recently in Reference 8). Going forward, balances and expenditures will be supplied annually to the NRC for all three units and the ISFSI.

An updated site-specific DCE will be concurrently submitted to the NRC as Attachment 1 to the PSDAR (Reference 4). As summarized in Table 1, this plan is based on decommissioning and the termination of the license by 2051, approximately 38 years following the permanent cessation of operations. The summary in Table 1 includes the funds for dry storage through 2049 and final release of the ISFSI in 2051. Table 2 reflects key tasks addressed by the NRC staff in a recent safety evaluation.

The total of all Nuclear Decommissioning Trust funds balances for SONGS Units 2 and 3 was \$3,926 million as of December 31, 2013 (Reference 9). Evaluation of the projected cash flows assuming earnings on existing balances as permitted by NRC regulations demonstrates the adequacy of the existing funds to cover all aspects of decommissioning, including the costs of irradiated fuel management. This demonstrates that the balance in the decommissioning trust is adequate to fund all aspects of decommissioning as well as the costs of irradiated fuel management. As decommissioning proceeds the DCE will be updated as appropriate and annual updates of spending and trust fund balances will be docketed as required.

IV. Regulatory Activities

The IFMP assumes that SCE and the other SONGS Participants will make withdrawals from their nuclear decommissioning trusts for spent fuel management purposes. SCE and the other SONGS Participants have collected funds from ratepayers and accumulated funds in the nuclear decommissioning trusts for the purpose of funding three primary categories of costs: (1) License Termination; (2) Spent Fuel Management; and (3) Site Restoration. On November 18, 2013 SCE filed a Tier 3 Advice Letter (Reference 10) with the CPUC to obtain authorization for the use of funds in the near term and to establish processes for further CPUC oversight of withdrawals from the nuclear decommissioning trusts. In addition to authorizing and overseeing the withdrawals, the CPUC is expected to designate the specific amounts from the existing fund balances that are available for License Termination and therefore subject to 10 CFR 50.82(a)(8)(i)(A) and 10 CFR 50.75(h)(2). The fund balances would then be allocated to separate subaccounts and, as such, available for spent fuel management and site restoration, consistent with the requirements of 10 CFR 50.75, 10 CFR 50.82 and 10 CFR 72.30.

To confirm such access, SCE requested (Reference 11) an exemption from 10 CFR 50.75 and 50.82 to authorize the use of trust funds to pay for spent fuel management

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and site restoration including other transitional costs. The regulations limit the use of the nuclear trust fund to decommissioning costs. That exemption is expected to be granted in May 2014 (Reference 12).

SCE and the other SONGS Participants responsible for decommissioning will periodically review the amount of cash contributions required for the decommissioning fund to ensure that withdrawals do not inhibit the ability of the licensee to complete NRC License Termination, Spent Fuel Management and Site Restoration. The SONGS Participants will obtain authorization as necessary through the ratemaking processes to provide for further contributions if required.

In accordance with 10 CFR 50.82(a)(8)(vii), SCE will annually submit to the NRC by March 31st a report on the status of the funding for managing spent fuel. The report will include, current through the end of the previous calendar year, the amount of funds accumulated to cover the cost of managing the spent fuel, the projected cost of managing spent fuel until title to the fuel and possession of the fuel is transferred to the Secretary of Energy, and if the funds accumulated do not cover the projected cost, a plan to provide additional funding assurance using one of the methods allowed by NRC regulations.

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V. References

1. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, Subject: Dockets 50-361 and 50,362, Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station Units 2 and 3, dated June 12, 2013.
2. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, Subject: Dockets 50-361 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2, dated July 22, 2013.
3. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, Subject: Dockets 50-362 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 3, dated June 28, 2013.
4. **[Letter from T. Palmisano, Southern California Edison, to U.S. Nuclear Regulatory Commission, Post-Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station, Units 2 and 3, expected to be submitted in the 3rd quarter of 2014.]**
5. Decommissioning Cost Estimate, 2013 Scenario, dated July 11, 2013, ABZ, Incorporated. Used in support of Nuclear Decommissioning Cost Triennial Proceeding, Exhibit SCE-12.
6. SCE to NRC Subject: 10 CFR 50.75(f)(1) and 10 CFR 50.82(a)(8)(v-vii) Decommissioning Funding Status Report San Onofre Nuclear Generating Station Unit 1 dated March 31, 2014
7. SCE to NRC Subject: 10 CFR 50.75(f)(1) Decommissioning Funding Status Report, San Onofre Nuclear Generating Station Units 2 and 3 dated March 31, 2014
8. SCE to NRC 10 CFR 72.30 ISFSI Decommissioning Funding Plan, San Onofre Nuclear Generating Station Units 1, 2 & 3 dated December 14, 2012
9. SCE to NRC Subject San Onofre Nuclear Generating Station, Units 2 and 3 Access to Nuclear Decommissioning Trust Funds, Supplemental Information Dated March 12, 2014
10. Letter from Megan Scott-Kakures, Southern California Edison, to Public Utilities Commission of the State of California Energy Division Submitting a Tier 3 Advice Letter Requesting (1) Authorization of Disbursements from the Master Trusts for San Onofre Nuclear Generating Station; (2) Approval of Tier 2 Advice Letter to Process for Future Disbursements; (3) Designation of Trust Amounts Set Aside for License Termination; and (4) Approval of Balancing Account, dated November 18, 2013

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11. Letter from Tom Palmisano, Southern California Edison, to U. S. Nuclear Regulatory Commission, Access to Nuclear Decommissioning Trust Funds , dated February 13, 2014
12. **[Letter from NRC to SCE granting the exemption, expected to be received in May, 2014]**
13. Testimony on Nuclear Decommissioning of SONGS 2 & 3 and Palo Verde, exhibit No. SCE-2, dated December 21, 2012

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Table 1

Irradiated Fuel Management Plan – Summary Schedule

| Cost and Schedule Summary (2014 Dollars in thousands) | | | | | | | |
|--|---|------------|------------|--------------|------------------|------------------|--------------------|
| Spent Fuel (50.54(bb)) | | | | | | | |
| Period No. | Period Description | Start | End | Years | Unit 2 Cost | Unit 3 Cost | Total Cost |
| SNF Pd 1 | Spent Fuel Management Transition | 6/7/2013 | 12/31/2013 | 0.56 | \$63,891 | \$66,105 | \$129,997 |
| SNF Pd 2 | Spent Fuel Transfer to Dry Storage | 1/1/2014 | 6/1/2019 | 5.41 | \$343,320 | \$370,884 | \$714,204 |
| SNF Pd 3 | Dry Storage During Decommissioning – Units 1, 2 and 3 | 6/1/2019 | 12/5/2031 | 12.51 | \$61,020 | \$61,020 | \$122,041 |
| SNF Pd 4 | Dry Storage Only – Units 1, 2 and 3 | 12/5/2031 | 12/31/2035 | 4.07 | \$29,251 | \$29,251 | \$58,502 |
| SNF Pd 5 | Dry Storage Only – Units 2 and 3 | 12/31/2035 | 12/31/2049 | 14.00 | \$106,824 | \$106,824 | \$213,647 |
| SNF D&D Pd 1 | ISFSI License Termination | 12/31/2049 | 5/6/2050 | 0.34 | \$1,221 | \$1,221 | \$2,442 |
| SNF D&D Pd 2 | ISFSI Demolition | 5/6/2050 | 9/8/2051 | 1.34 | \$15,186 | \$15,186 | \$30,371 |
| | Category Total | | | 38.23 | \$620,712 | \$650,491 | \$1,271,204 |

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Table 2
SONGS Units 2 and 3 Major Fuel Management Tasks
[Tasks from NRC Safety Evaluation (SE) on Kewaunee Integrated Fuel
Management Plan
dated September 28, 2009]

| Major Fuel Management Task Direct Costs | Explanatory or Additional Details | Estimate in DCE (in Thousands) | Schedule in DCE |
|--|--|-----------------------------------|-----------------|
| Estimated Costs to isolate spent fuel pools and fuel handling systems | <ul style="list-style-type: none"> • Decision on isolation (islanding) has not yet been made. • No additional costs are required for fuel handling systems. Cranes are single-failure proof. | \$ 18,270 | 6/2015 |
| Estimated cost to construct an ISFSI or a combination of wet/dry storage | <ul style="list-style-type: none"> • ISFSI in operation; so, current costs are for wet/dry combination. • Costs are associated with capacity expansion (pad and associated facility costs, DSCs and HSMs). | \$ 400,221 | 6/2019 |
| Estimated annual cost for the operation of the selected option | <ul style="list-style-type: none"> • Operational and maintenance costs are NOT readily separable (fuel storage support vice other demands); but, are included in Table 4 cash flows. | N/A | Ongoing |
| Estimated cost for preparation, packaging and shipping of fuel to DOE | <ul style="list-style-type: none"> • Off-site transportation costs are part of contract with US DOE. | \$ 6,742 | Thru 12/2049 |
| Estimated cost to decommission the ISFSI | <ul style="list-style-type: none"> • Funded from both Unit 1 and Units 2&3 Decommissioning Trust Funds. | \$ 32,813 | 2049-2051 |
| Brief discussion of selected storage method or methods and estimated time frame for these activities | <ul style="list-style-type: none"> • See Section II for selected methods. • See Table 1 for time frames. | N/A | N/A |

Notes: Kewaunee SE is publically available under ADAMS Accession No. ML092321079

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Table 3

SONGS Unit 2 & Unit 3 Spent Fuel Shipping Schedule 2024 DOE Acceptance

| Year | On-Site Inventory (Beginning of the Year) | | | | On-Site Transfers (During Year) | | Off-Site Transfers (During Year) | | | |
|------|---|--|--|--------------------------------|---|---|--------------------------------------|--------------------------------------|--|---|
| | Unit 2 & 3 Fuel Assemblies in Wet Storage | Units 2 & 3 Fuel Assemblies in Dry Storage | Units 2 & 3 Fuel Assemblies in On-Site Storage | Units 2 & 3 Canisters in ISFSI | Unit 2 & 3 Fuel Assemblies Transferred to ISFSI | Unit 2 & 3 Canisters Transferred to ISFSI | Unit 2 Assemblies Transferred to DOE | Unit 3 Assemblies Transferred to DOE | Unit 2 & 3 Assemblies Transferred to DOE | Unit 2 & 3 Canisters Transferred to DOE |
| 2014 | 2668 | 792 | 3460 | 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 2668 | 792 | 3460 | 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 2668 | 792 | 3460 | 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 2668 | 792 | 3460 | 33 | 768 | 24 | 0 | 0 | 0 | 0 |
| 2018 | 1900 | 1560 | 3460 | 57 | 1536 | 48 | 0 | 0 | 0 | 0 |
| 2019 | 364 | 3096 | 3460 | 105 | 364 | 13 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 3460 | 3460 | 118 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 3460 | 3460 | 118 | 0 | 0 | 48 | 48 | 96 | 4 |
| 2031 | 0 | 3364 | 3364 | 114 | 0 | 0 | 192 | 96 | 288 | 12 |
| 2032 | 0 | 3076 | 3076 | 102 | 0 | 0 | 120 | 120 | 240 | 10 |
| 2033 | 0 | 2836 | 2836 | 92 | 0 | 0 | 0 | 96 | 96 | 4 |
| 2034 | 0 | 2740 | 2740 | 88 | 0 | 0 | 112 | 120 | 232 | 8 |
| 2035 | 0 | 2508 | 2508 | 80 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2036 | 0 | 2316 | 2316 | 74 | 0 | 0 | 128 | 96 | 224 | 7 |
| 2037 | 0 | 2092 | 2092 | 67 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2038 | 0 | 2092 | 2092 | 67 | 0 | 0 | 96 | 128 | 224 | 7 |
| 2039 | 0 | 1868 | 1868 | 60 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2040 | 0 | 1676 | 1676 | 54 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2041 | 0 | 1484 | 1484 | 48 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2042 | 0 | 1484 | 1484 | 48 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2043 | 0 | 1292 | 1292 | 42 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2044 | 0 | 1100 | 1100 | 36 | 0 | 0 | 96 | 96 | 192 | 6 |
| 2045 | 0 | 908 | 908 | 30 | 0 | 0 | 128 | 96 | 224 | 7 |
| 2046 | 0 | 684 | 684 | 23 | 0 | 0 | 96 | 128 | 224 | 7 |
| 2047 | 0 | 460 | 460 | 16 | 0 | 0 | 96 | 230 | 326 | 11 |
| 2048 | 0 | 134 | 134 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2049 | 0 | 134 | 134 | 5 | 0 | 0 | 134 | 0 | 134 | 5 |
| 2050 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |