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10 CFR 50.82
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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Subject: **Docket Nos. 50-361 and 50-362**
Updated Post-Shutdown Decommissioning Activities
Report and Irradiated Fuel Management Plan
San Onofre Nuclear Generating Station (SONGS) Units 2 and 3

References: 1) Letter from T. J. Palmisano (SCE) to Document Control Desk (NRC) dated September 23, 2014; Subject: San Onofre Nuclear Generating Station, Units 2 and 3, Post-Shutdown Decommissioning Activities Report (ADAMS Accession No. ML14269A033)

2) Letter from T. J. Palmisano (SCE) to Document Control Desk (NRC) dated September 23, 2014; Subject: San Onofre Nuclear Generating Station, Units 2 and 3, Irradiated Fuel Management Plan (ADAMS Accession No. ML14269A032)

Dear Sir or Madam:

The purpose of this letter is to provide updates to the Post-Shutdown Decommissioning Activities Report (PSDAR) and Irradiated Fuel Management Plan (IFMP) for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 in accordance with 10 CFR 50.82(a)(7).

Southern California Edison (SCE) announced permanent cessation of operations at SONGS Units 2 and 3 on June 12, 2013. As required by 10 CFR 50.82(a)(4)(i) and 10 CFR 50.54(bb), SCE submitted the initial PSDAR and IFMP on September 23, 2014 (References 1 and 2). Since the initial submittal of these documents, SCE has selected vendors to implement the decommissioning of SONGS Units 2 and 3 and expand the SONGS ISFSI. Based on these and other decisions that have been made in the decommissioning process, and to reflect events since submittal of References 1 and 2, updates to the SONGS Units 2 and 3 PSDAR and IFMP are provided as Enclosures 1 and 2 to this letter.

There are no commitments contained in this letter or its attachments.

ADD
NRR

If you have any questions, please contact myself or Mr. Al Bates at (949) 368-6945.

Sincerely,

A handwritten signature in black ink, appearing to be 'MR' followed by a stylized flourish.

Enclosures: 1. Post-Shutdown Decommissioning Activities Report, Revision 1
2. Irradiated Fuel Management Plan, Revision 1

cc: S. A. Morris, Regional Administrator, NRC Region IV
A. M. Snyder, NRC Project Manager, SONGS Units 1, 2 and 3
S. Y. Hsu, California Department of Health Services, Radiologic Health Branch

Enclosure 1

Post-Shutdown Decommissioning Activities Report, Revision 1

San Onofre Nuclear Generating Station Units 2 and 3
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List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
ALARA	As Low As Reasonably Achievable
BMP	Best Management Practices
CCC	California Coastal Commission
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CSLC	California State Lands Commission
D&D	Decontamination and Dismantlement
DBA	Design Basis Accident
DCE	Decommissioning Cost Estimate
DGC	Decommissioning General Contractor
DOE	United States Department of Energy
DOT	United States Department of Transportation
DSC	Dry Storage Canister
FES	Final Environmental Statement, SONGS Units 2 and 3 (NUREG-0490)
GEIS	Generic Environmental Impact Statement (NUREG-0586)
GTCC	Greater than Class C
IFMP	Irradiated Fuel Management Plan
ISFSI	Independent Spent Fuel Storage Installation
LTP	License Termination Plan
LLRW	Low Level Radioactive waste
MWDOC	Municipal Water District of Orange County
MWt	Megawatt-thermal
NEI	Nuclear Energy Institute
NPDES	National Pollutant Discharge Elimination System
NRC	United States Nuclear Regulatory Commission
PSDAR	Post-Shutdown Decommissioning Activities Report
PWR	Pressurized Water Reactor
REMP	Radiological Environmental Monitoring Program
RV	Reactor Vessel
SONGS	San Onofre Nuclear Generating Station
SCE	Southern California Edison
SDAPCD	San Diego Air Pollution Control District
SDS	SONGS Decommissioning Solutions
SFSM	Spent Fuel Storage Modules
SPCC	Spill Prevention Control and Countermeasures
SSC	Structures, Systems, and Components
USCB	United States Census Bureau

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I. INTRODUCTION AND SUMMARY

A. Introduction

Southern California Edison (SCE, the Owner-Operator and agent for the participants), San Diego Gas & Electric (SDG&E), the City of Anaheim, and the City of Riverside are responsible for the decommissioning of San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. The term "SONGS participants" is used in this report to represent the four entities that have continuing decommissioning obligations. The relative financial obligations of each for decommissioning are as follows:

	Decommissioning Obligation	
	SONGS 2	SONGS 3
SCE	75.7363%	75.7475%
SDG&E	20.0000%	20.0000%
Anaheim	2.4737%	2.4625%
Riverside	1.7900%	1.7900%
	100.00%	100.00%

SONGS Unit 1 was shut down in 1992 and largely dismantled by 2009. Since the decision to permanently shut down SONGS Units 2 and 3 in 2013, the focus of SONGS staff and other personnel has been to plan and begin execution of the necessary steps to achieve timely, cost-effective, and safe decommissioning and restoration of the SONGS site.

1. Benchmarking and Community Engagement

In developing its plans, SONGS has benchmarked the experiences of commercial decommissioning projects in the 1990s and 2000s and has sought input from experienced individuals and groups. SONGS maintains close communications with those facilities currently undergoing decommissioning and with many of the organizations supporting those efforts. This includes plants that have recently completed decommissioning activities, are currently in active decommissioning, are moving towards SAFSTOR, or are just entering the permanently shutdown phase of operations.

Earlier decommissioning projects faced a number of first-time technical challenges, such as cutting reactor vessel (RV) internals in a high radiation environment. Many of these technical challenges confronting SONGS decommissioning now have mature solutions. These earlier projects provide a wealth of knowledge to minimize worker radiation exposure, efficiently plan, and sequence a decommissioning project and safely manage and transport waste.

The SONGS participants also have the responsibility to restore the site in accordance with applicable regulations and agreements. The SONGS participants have a responsibility to their stakeholders and the communities they serve to do so in a transparent and effective manner while striving to attain high

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standards of safety and environmental protection. Further, the SONGS participants will have a limited, if any, role in the future use of the site. The ultimate use for the site is for the land-owner (U.S. Navy) to determine.

A key lesson-learned in our review of other decommissioning projects is the continued importance of community engagement during the decommissioning process. The SONGS participants are committed to engaging the local community and its leaders in an open, transparent, and proactive manner. SONGS is actively engaged with external stakeholders to understand their priorities, inform them of SONGS plans, and seek their input on the safe, timely, and cost-effective decommissioning of SONGS.

SONGS is actively engaging with the community through outreach including briefings for community groups and routine educational updates for local, state, and federal officials. The participants have formed the Community Engagement Panel (CEP) with members representing a broad range of stakeholders to advise SONGS on decommissioning matters. The panel meets on a regular basis to facilitate two-way dialogue and includes several representatives of government, members from academia, labor, business, and environmental organizations. Members of the CEP were provided with the opportunity to review and provide input on the initial revision of this document along with the included Decommissioning Cost Estimate (DCE) and the Irradiated Fuel Management Plan (IFMP). As a precursor to review of these submittals, SONGS hosted two workshops with external technical experts to provide the CEP members with a depth of knowledge in these areas. Feedback from the panel was addressed prior to finalization and SCE senior management authorization of the submittals.

SONGS also has established a website, www.SONGScommunity.com, as a dedicated online source for information on the plant and the decommissioning process. The website includes background information on decommissioning, links to other websites including the NRC, and an opt-in feature that allows members of the community to register for automatic updates on decommissioning matters.

2. Regulatory Basis

In accordance with the requirements of 10 CFR 50.82, "Termination of License," paragraph (a)(4)(i), Revision 0 of this report (Reference 2) constituted the Post-Shutdown Decommissioning Activities Report (PSDAR) for SONGS Units 2 and 3. Revision 0 of the PSDAR contained the following:

1. A description of the planned decommissioning activities along with a schedule for their accomplishment.
2. A site-specific DCE including the projected cost of managing irradiated fuel and site restoration (being submitted concurrently).
3. A discussion that provided the basis for concluding that the environmental impacts associated with the site-specific decommissioning activities will be bounded by the appropriate previously issued generic and plant specific environmental impact statements.

Revision 1 of the PSDAR has been developed consistent with Regulatory Guide 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report." Revision 0 of

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this report was based on information available at that time; however, as stated in Revision 0, the plans discussed may be modified as additional information becomes available or as circumstances change. As required by 10 CFR 50.82(a)(7), SCE will notify the Nuclear Regulatory Commission (NRC) in writing before performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules described in the PSDAR, including changes that significantly increase the decommissioning cost. This revised PSDAR (Revision 1) is being submitted to reflect additional information that has become available since the submittal of Revision 0 of the PSDAR.

Revision 0 of the PSDAR was submitted with an Integrated Fuel Management Plan (IFMP) (Reference 7) and the 2014 Decommissioning Cost Estimate (DCE) (Reference B). The DCE was updated in 2017 (Reference D) and provided to the California Public Utilities Commission (CPUC). Revision 1 of the PSDAR is based upon the schedule information and description of activities provided in the 2017 DCE and is being submitted concurrently with Revision 1 of the IFMP (also based on the 2017 DCE). Note that some schedule dates have been modified from those described in the 2017 DCE to reflect performance since completion of the 2017 DCE. The 2017 DCE is available for inspection onsite.

B. Background

The SONGS site is located on the coast of southern California in San Diego County, approximately 62 miles southeast of Los Angeles and 51 miles northwest of San Diego. The onshore site is located entirely within the boundaries of the United States Marine Corps Base Camp Pendleton. The site is approximately 4,500 feet long and 800 feet wide, comprising 84 acres. For purposes of the radiological aspects of this decommissioning plan, the site does not include office buildings and related facilities located east of Interstate 5 (I-5) referred to as "the Mesa" or adjacent parcels.

The property on which the station is built is subject to an easement from the United States Government through the U. S. Navy. The nearest privately owned land is approximately 2.5 miles from the site.

SONGS Units 2 and 3 are dual units with supporting facilities. The reactors were previously licensed to produce 3,438 MWt each. Prior to permanent cessation of operations at Units 2 and 3, an on-site Independent Spent Fuel Storage Installation (ISFSI) has been used to store Units 1, 2 and 3 spent fuel and is located on the portion of the site previously occupied by SONGS Unit 1 (AREVA Trans-Nuclear [TN] ISFSI). Storage in this AREVA TN ISFSI was initiated in 2003 and was expanded to currently include 63 Horizontal Storage Modules in which 51 Dry Storage Containers (DSCs) have been installed to-date; 50 containing irradiated fuel and one containing Greater-Than-Class-C (GTCC) materials. The most recent loading campaign for the AREVA TN ISFSI was conducted in 2012. As discussed in the Revision 0 Spent Fuel Management Period details and the concurrently submitted IFMP (Revision 0), it has been necessary to further expand the current ISFSI capacity to store the complete inventory of Units 2 and 3 spent fuel. A Holtec UMAX system was constructed during 2016 and 2017, with 75 Vertical Ventilated Modules. SCE will ultimately install 73 Multi-Purpose Canisters (MPCs) in the Holtec UMAX system. Fuel transfer operations commenced in January of 2018 and are currently scheduled to complete in 2020. Additional ISFSI capacity may be made use of to store GTCC waste.

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A brief history of the major milestones related to plant construction and operation is as follows:

	<u>UNIT 2</u>	<u>UNIT 3</u>
• Construction Permit Issued	October 18, 1973	October 18, 1973
• Operating License Issued	February 16, 1982	November 15, 1982
• Full Power Operation	June 15, 1983	November 18, 1983
• Final Reactor Operation	January 9, 2012	January 30, 2012

On June 7, 2013, SCE announced its decision to permanently cease power operations and decommission SONGS Units 2 and 3. By letter dated June 12, 2013 (Reference 3), SCE notified the NRC of its decision to permanently cease power operations. SCE has submitted two letters dated July 22, 2013 (Reference 5) and June 28, 2013 (Reference 4) certifying that fuel has been permanently removed from the Unit 2 and 3 reactors, respectively.

Pursuant to 10 CFR 50.51(b), "Continuation of License," the license for a facility that has permanently ceased operations continues in effect beyond the expiration date to authorize ownership and possession of the facility until the NRC notifies the licensee in writing that the license has been terminated. During the period that the license remains in effect, 10 CFR 50.51 (b) requires the licensee to:

- (1) Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition, and
- (2) Conduct activities in accordance with all other restrictions applicable to the facility in accordance with the NRC regulations and the provisions of the specific 10 CFR part 50 licenses for the facility.

C. Summary of Decommissioning Alternatives

The NRC has evaluated the environmental impacts of three general methods for decommissioning power reactor facilities in NUREG-0856, "Final Generic Environmental Impact Statement (GEIS) on Decommissioning Nuclear Facilities," Supplement 1 (Reference 6). The three general methods are:

- **DECON:** The equipment, structures, and portions of the facility and site that contain radioactive contaminants are removed or decontaminated to a level that permits termination of the license after cessation of operations.

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- **SAFSTOR:** The facility is placed in a safe stable condition and maintained in that state (safe storage) until it is subsequently decontaminated and dismantled to levels that permit license termination. During SAFSTOR, a facility is left intact or may be partially dismantled, but the fuel has been removed from the RV and radioactive liquids have been drained from the systems and components and then processed. Radioactive decay occurs during the SAFSTOR period, thus reducing the levels of radioactivity in and on the material and potentially the quantity of material that must be disposed of during the decontamination and dismantlement.
- **ENTOMB:** Radioactive structures, systems, and components 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 license.

The SONGS participants have chosen the DECON method. SONGS has recently completed the planning period and is moving into active decommissioning. During the planning period the site has been prepared for safe and orderly transition to dismantlement. More specifically:

- Permanent cessation of operations was announced on June 7, 2013.
- DECON methodology was selected (prompt decontamination and dismantlement after initial planning period).
- Additional ISFSI capacity has been added to meet the site's needs for spent fuel storage.
- Initial site characterization activities are complete.
- Isolation of the Spent Fuel Pools (referred to as "islanding") is complete.
- Other necessary actions to facilitate safe system abandonment and removal (referred to as "cold and dark") are complete, other than systems necessary for operation of the spent fuel pools.
- State permitting activities necessary to allow dismantlement to begin are complete

The SONGS facility will be decontaminated and dismantled to levels that permit termination of the NRC licenses. In support of this and 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 license.

The decommissioning approach for SONGS is described in more detail in the following sections.

- Section II summarizes the planned decommissioning activities and general timing of their implementation.
- Section III summarizes the cost estimating methodology employed by Kenrich Group.
- Section IV describes the basis for concluding that the environmental impacts associated with decommissioning SONGS Units 2 and 3 are bounded by the most recent site-specific environmental impact statement and NRC GEIS related to decommissioning.

II. DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES

The SONGS Units 2 and 3 decommissioning project has recently completed the planning period and is currently moving into active decommissioning.

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The description that follows provides a summary of the current decommissioning plan and schedule for SONGS Units 2 and 3. The major decommissioning periods and general sequencing of the activities that will occur during each period are discussed.

The planning required for each decommissioning activity, including the selection of the process to perform the work, will be performed in accordance with appropriate governance and oversight processes. Based on current plans, no activities or environmental impacts outside the bounds considered in the GEIS have been identified. Appropriate radiological and environmental programs will be maintained throughout the decommissioning process to ensure radiological safety of the workforce and the public and environmental compliance is maintained.

A. Detailed Breakdown of Decommissioning Periods

The Decommissioning periods reflect the planning and implementation of dismantlement activities associated with radioactive materials and non-radioactive materials. The DCE and descriptions below conservatively include some activities that SONGS participants may or may not have to perform, including the complete removal of the SONGS Units 2 and 3 intake and discharge conduits located offshore which is currently required by the California State Lands Commission (CSLC) lease. This uncertainty also applies to the SONGS Unit 1 conduits, where the horizontal portion of offshore conduits have been allowed to remain below the seafloor but with the understanding that CSLC can require their removal at any time if the conduits become a public safety hazard. Another example is the complete removal of all subsurface structures that may be required by the CCC pursuant to a Coastal Development Permit and/or the US Navy pursuant to the terms of the SONGS easement. Typical practice at other decommissioning plants is to remove structures to the depth necessary to achieve radiological cleanup standards, which may or may not satisfy the CCC and/or the US Navy at SONGS. These activities are costly both from a funding and environmental impact perspective. Thus, there are reasons to consider a range of removal options for both the offshore conduits and onshore subsurface structures. SONGS will work closely with CSLC, CCC and the US Navy to select the option that best addresses stakeholder needs.

Also note that some periods below have dates that are modified from the 2017 DCE to reflect performance since completion of the 2017 DCE.

Period 1 – Initial Activities (June 2013 – December 2016)

Period 1 began on June 7, 2013 immediately following SCE's decision to permanently retire SONGS 2&3. As the decision was made approximately nine years before the Units' Part 50 operating licenses would have expired, the retirement was unexpected. SCE spent the following six months reducing its workforce and beginning to formulate plans for decommissioning. This period included preliminary decommissioning planning, obtaining necessary approvals of NRC license amendments and exemptions, commencing the expansion of its on-site ISFSI facility, and procuring a Decommissioning General Contractor (DGC). The end of this period aligns with the selection and award of the DGC contract to SONGS Decommissioning Solutions (SDS) in December 2016.

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Period 2 – Transition and Pool Storage (January 2017 – December 2019)

Period 2 began with the mobilization of SDS in January 2017 and extended through December 2019, during which time SCE transitioned responsibility of D&D-related site management and support functions at SONGS to SDS. In addition, SCE has completed the CEQA process with CSLC and obtained a CDP from the CCC. The CEQA process and CDP were required for SDS to begin major decontamination and dismantlement work. Other activities during Period 2 included the ongoing expansion of the on-site ISFSI facilities, and various other smaller projects. In addition, Holtec began transferring spent fuel from the wet storage pools adjacent to the reactors into dry storage at the expanded on-site ISFSI in 2018. The fuel transfer operations will continue into Period 3.

Period 3 – D&D and Pool Storage (January 2020 – December 2020)

Period 3 begins with SDS's mobilization to commence the major physical work to decontaminate and dismantle SONGS 2&3. SDS's initial work during this period will primarily focus on abating friable asbestos in the containments and planning for the segmentation and packaging of the RV and reactor internals. The completion of the transfer of all fuel from the operating spent fuel pools into dry storage at the on-site ISFSI marks the end of Period 3. After the SONGS spent fuel pools are empty, related systems needed for the spent fuel pools will be retired, and otherwise applicable plant programs associated with spent fuel management will be modified, allowing SCE to further reduce SONGS staffing.

Period 4 – D&D and Dry Storage (January 2021 – December 2028)

Period 4 begins with the completion of fuel transfer operations and extends through the completion of the D&D work. This period includes the decontamination, dismantlement, demolition, removal, and waste disposal of the entire SONGS plant to approximately 3 feet below grade, with the exception of the on-site ISFSI and its associated security facilities and the switchyard area. At the end of this period, SDS is expected to have completed all D&D work necessary to obtain NRC approval to reduce the Part 50 license site footprint to the ISFSI area only and to allow partial release of the SONGS site for unrestricted future use.

Period 5 – Dry Storage (January 2029 – December 2045)

During Period 5, the primary activity at SONGS will be the ongoing maintenance and security of the on-site ISFSI and the transfer of all SONGS spent fuel to the DOE. In the 2017 DCE, SCE assumed that the DOE will begin accepting spent fuel nationally in 2028, which means that the DOE would begin removing the SONGS 2&3 spent nuclear fuel from the on-site ISFSI in 2034 under the pick-up rates published in the DOE's July 2004 "Acceptance Priority Ranking & Annual Capacity Report." In addition, Period 5 includes the Navy's National Environmental Policy Act (NEPA) environmental review process, associated with amending the SONGS real estate authorization to establish the site restoration or "end state" requirements for SCE to return the property to the Navy. SCE will also initiate a Request For Proposal (RFP) process for substructure removal work during this period (depending on the appropriate removal option determined by SONGS and the relevant stakeholders).

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Period 6 – Civil Works Project (January 2046 – December 2049)

Period 6 begins with a contractor mobilizing in order to perform the remaining work to restore the SONGS site for its return to the Navy. This work includes removing all onshore below-grade man-made structures, with the exception of the North Industrial Area where the onsite ISFSI is located. This work is currently expected to span approximately four years and is scheduled to be completed in December 2049. Dewatering of the site to support substructure removal will begin during Period 6 and continue into Period 7. During Period 6, the DOE will continue to remove the remaining SONGS spent fuel from the ISFSI. SCE assumes all fuel is removed by the DOE by December 2049, marking the end of this period and the commencement of Period 7, the demolition and removal of the ISFSI facilities and the final site restoration of the SONGS site.

Period 7 – ISFSI Demolition and Final Site Restoration (January 2050 – December 2051)

After all of the spent fuel is removed from SONGS, SCE can begin the final decommissioning and site restoration activities. These activities include dismantling and disposing of the ISFSI, completing the final site restoration work, obtaining NRC approval to terminate the remaining licenses covering the ISFSI, and returning the property to the Navy (The Units 2&3 ISFSI Demolition and Final Site Restoration scope excludes the removal of the remaining Unit 1 foundations. The scope of the removal of the Unit 1 foundations is included in the Unit 1 planning documents). SCE projects that all decommissioning activities will be completed by 2051, approximately two years after the removal of the last spent fuel from the SONGS ISFSI.

In addition, for conservatism in cost-estimation, SCE has assumed that if the offshore intake and outfall conduits will be excavated and removed, those activities will take place during this period. Using this conservative assumption and also assuming that substructure removal takes place during Period 5, at the end of decommissioning in 2051 all above and below ground man-made improvements, including the seawall and the offshore intake and outfall conduits, will be removed. The site will be re-graded, re-vegetated, and returned to the Navy.

B. General Decommissioning Considerations

1. Major Decommissioning Activities

As defined in 10 CFR 50.2, "Definitions," a "major decommissioning activity" is "any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than Class C waste in accordance with 10 CFR 61.55." The following discussion provides a general summary of the major decommissioning activities currently planned for SONGS Units 2 and 3. These activities may be modified as conditions dictate.

Prior to starting a major decommissioning activity, the plant components will be surveyed and decontaminated, as required, in order to minimize worker exposure. A plan will be developed for the

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activity. Shipping casks and other equipment necessary to conduct decommissioning activities will be designed and procured.

The initial major decommissioning activities will focus on removal, packaging and disposal of selected piping and components. Following RV and cavity reflood and RV head removal and disposal, the RV internals will be removed from the RV and segmented as necessary to separate the GTCC waste which will be placed in storage canisters and modules on the ISFSI set aside for that purpose. Using this approach, the internals will be packaged and disposed of independent of the RV. When the internals segmentation effort is completed, the RV and cavity will be drained and any remaining debris will be removed.

Removal of the RV follows the removal of the reactor internals. The components will be removed by sectioning or segmenting performed remotely in air using a contamination control envelope.

Additional major decommissioning activities that would be conducted include removal and disposal of the steam generators, pressurizer, polar crane, spent fuel storage racks, and spent fuel bridge crane. The dismantling of the containment structure would be undertaken as part of the reactor building demolition. As detailed in Section 3 (below) appropriate radiation protection and contamination control measures will be employed to manage these activities.

2. Other Decommissioning Activities

In addition to the major decommissioning activities discussed above, plant components will be removed from the Turbine Building including the turbine generator, condenser, feedwater heaters, moisture separator/reheaters, and miscellaneous system and support equipment. As detailed in Section 3 (below) appropriate radiation protection and contamination control measures will be employed to manage these activities (on an as needed basis).

3. Decontamination and Dismantlement Activities

The objectives of the decontamination effort are two-fold. The first objective is to reduce radiation levels throughout the facility in order to minimize personnel exposure during dismantlement. The second objective is to clean as much material as possible to unrestricted use levels, thereby permitting non-radiological demolition and disposal and minimizing the quantities of material that must be disposed of by burial as radioactive waste. The second objective will be achieved by decontaminating structural components (e.g., steel framing). The methods to accomplish this are typically mechanical, requiring the removal of the surface or surface coating and are used regularly in industrial and contaminated sites.

The decontamination and/or dismantlement of contaminated SSCs may be accomplished by: decontamination in place; decontamination and dismantlement; or dismantlement and disposal. A combination of these methods may be utilized to reduce contamination levels, worker radiation exposures, and project costs. The methods chosen will be those deemed most appropriate for the

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particular circumstances. Material below the applicable radiological limits may be released for unrestricted disposition (e.g., scrap, recycle, or general disposal). Radioactive contaminated or activated materials will be removed from the site as necessary to allow the site to be released for unrestricted use.

LLRW will be processed in accordance with plant procedures and existing commercial options. Contaminated material will be characterized and segregated for additional onsite decontamination or processing, off-site processing (e.g., disassembly, chemical cleaning, volume reduction, waste treatment), and/or packaged for controlled disposal at a low-level waste disposal facility.

Contaminated concrete and structural steel components will be decontaminated and removed as required to gain access to contaminated and uncontaminated SSCs. After the SSCs are removed and processed as described above, the remaining contaminated concrete and structural steel components will be decontaminated and/or removed. Contaminated concrete will be packaged and shipped to a low-level waste disposal facility. Contaminated structural steel components may be removed to a processing area for decontamination, volume reduction, and packaging for shipment to a processing facility or to a low-level waste disposal facility, as necessary.

Buried and embedded contaminated components (e.g., piping, drains) will be decontaminated in place, or excavated and decontaminated. Appropriate contamination controls will be employed to minimize the spread of contamination and protect personnel.

4. Radioactive Waste Management

A major component of the total cost of decommissioning SONGS Units 2 and 3 is the cost of safely packaging and disposing of contaminated SSCs, contaminated soil, resins, water, and other plant process liquids. A waste management plan has been developed consistent with regulatory requirements for each waste type. Currently, LLRW Classes B and C may be disposed of at the Waste Control Services (WCS) waste disposal site in Andrews County, Texas. The waste management plan is based on the evaluation of available methods and strategies for processing, packaging, and transporting radioactive waste in conjunction with the available disposal facility and associated waste acceptance criteria. If other licensed Class B and C LLRW facilities become available in the future, SONGS may choose to use them as well.

Class A LLRW will be disposed at a licensed disposal site. (SDS has contracted with EnergySolutions to use the facility located in Clive, Utah as well as WCS).

5. Removal of Mixed Wastes

Mixed wastes (hazardous and radioactive) generated during decommissioning, if any, will be managed in accordance with applicable Federal and State regulations. If technology, resources, and approved processes are available, the processes will be evaluated to render the mixed waste non-hazardous.

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Otherwise, mixed wastes from SONGS will be transported by authorized and licensed transporters and shipped to authorized and licensed facilities.

6. Site Characterization

During the decommissioning process, a site characterization will be performed in which radiological, regulated, and hazardous wastes will be identified, categorized, and quantified. Surveys will be conducted to establish the contamination and radiation levels throughout the plant. The information will be used in developing procedures to ensure the contaminated areas are removed and that worker exposure is controlled. Surveys of the selected outdoor areas will also be performed including surveys of soil and groundwater near the site. As decontamination and dismantlement work proceeds, surveys will be conducted to maintain the site characterization current and ensure that decommissioning activities are adjusted accordingly.

7. Groundwater Protection

A groundwater protection program was initiated at SONGS in accordance with NEI 07-07, "Industry Groundwater Protection Initiative, Final Guidance Document," in August 2007. A site hydrology study was initially completed as part of this initiative and was updated in 2012. Monitoring wells were installed around the plant to monitor for radionuclides. Acceptable levels, as defined by the program, have been observed throughout the sampling program implemented as part of this initiative. Appropriate program elements will be maintained during decommissioning.

8. Change to Management and Staffing

With the plant shut down and defueled, plant management and staffing levels have been and continue to be adjusted to reflect the transition from an operating plant to a plant in decommissioning status. Details are addressed as part of the DCE inputs.

III. ESTIMATE OF EXPECTED DECOMMISSIONING AND SPENT FUEL MANAGEMENT COSTS

10 CFR 50.82(a)(8)(iii) requires that a site-specific decommissioning cost estimate be prepared and submitted within two years following permanent cessation of operations. 10 CFR 50.82 (a)(4)(i) requires that the PSDAR contain a site-specific decommissioning cost estimate including the projected costs of managing irradiated fuel.

EnergySolutions prepared the 2014 site-specific DCE (Reference B) for SONGS, which also provided projected costs of managing irradiated fuel, as well as non-radiological decommissioning and other site restoration costs, accounted for appropriately. The 2014 DCE was submitted concurrently with Revision 0 of the PSDAR and fulfilled the requirements of 10 CFR 50.82(a)(4)(i) and 10 CFR 50.82(a)(8)(iii). A summary of the annual costs associated with decommissioning, irradiated fuel management and site restoration was provided in Revision 0 of the Irradiated Fuel Management Plan which was also concurrently submitted with Revision 0 of the PSDAR in accordance with 10 CFR 50.54(bb).

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Kenrich Group (KRG) was contracted in 2017 to complete an update to the 2014 DCE. The 2017 DCE (Reference D) utilized the Work Breakdown Structure that was established in the 2014 DCE, and was estimated in 2017 dollars. For the 2017 DCE, Kenrich updated the project periods from the 2014 DCE and established common periods that included all cost categories to better align the estimated costs with SCE's current project schedule and to simplify cost and schedule recording. The 2017 DCE was independently reviewed by ABZ, Incorporated, a management consulting and engineering firm specializing in providing services related to decommissioning costs, scheduling, and spent fuel storage.

The decommissioning of the SONGS site will be funded from Nuclear Decommissioning Trusts established by each participant for each unit. Relative liabilities of each participant are defined in the Decommissioning Agreement approved by all participants. These shared costs or liabilities between participants are modeled in the project cost systems. Sufficient funds (based on balances and earnings) are projected to be available to complete the planned decommissioning activities.

To ensure the availability of funds from the Nuclear Decommissioning Trusts to support activities other than radiological decommissioning, SCE filed a request on February 13, 2014 (Reference 1) seeking NRC approval to use the Nuclear Decommissioning Trust Funds for radiological decommissioning, irradiated fuel management, and site restoration activities. This request was approved by the NRC on September 5, 2014 (Reference 12).

As discussed in Section IV of the IFMP, the CPUC has established processes for oversight of withdrawals from the Nuclear Decommissioning Trusts. The annual level of funds available for withdrawal affects only the investor-owned utilities (SCE and SDG&E) and is submitted individually by each utility. As entities not subject to CPUC jurisdiction, Anaheim and Riverside are not required to obtain CPUC authorization with respect to withdrawals from their respective Nuclear Decommissioning Trusts.

IV. ENVIRONMENTAL IMPACTS

As shown in this section, SCE has evaluated the environmental impacts of decommissioning SONGS Units 2 and 3 to determine if anticipated impacts are bounded by existing environmental impact statements, primarily the NRC's generic decommissioning EIS (GEIS, Reference 6) and the SONGS Final Environmental Statement (FES, Reference 8). As noted in Regulatory Guide 1.185, C.4 "the PSDAR does not need to include the analysis of the specific environmental impacts associated with decommissioning activities....the licensee must ensure that supporting documentation and analyses are available at the reactor site for inspection by the NRC Staff." Such detailed documentation and analyses are contained in the Environmental Impact Evaluation (EIE) (Reference C) and its supporting references. They are available on-site for NRC review and are summarized below. For preparation of Revision 0 of the PSDAR, both the detailed documentation and analyses and the following summary were reviewed by internal and external subject matter experts, independent third-party reviewers and our Community Engagement Panel (discussed in the Introduction to this report).

In the GEIS, the NRC reviewed the environmental impacts resulting from decommissioning on a generic basis, but it identified a need for site-specific analyses for: (1) threatened and endangered species and

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(2) environmental justice. In addition, site-specific analyses are called for whenever decommissioning plans indicate that activities will impact areas beyond the operational portions of a facility. The SONGS FES addresses decommissioning, but does not establish bounding environmental impacts specific to decommissioning. However, the FES' discussion of impacts for construction does describe bounding impacts as it related to potential dewatering during decommissioning.

The NRC considered additional activities that are performed in conjunction with decommissioning. These activities are regulated by the NRC but any associated environmental impacts are more appropriately addressed directly in conjunction with those regulated activities, rather than in the PSDAR. These activities include those related to the decision to permanently cease operations, irradiated fuel management in wet or dry storage, irradiated fuel transport and disposal, and the treatment, and/or disposal of LLRW. SCE similarly excluded consideration of such activities in this PSDAR to remain consistent with the NRC's approach.

A. Environmental Impacts of Decommissioning SONGS

SCE assessed the potential for environmental impacts to each resource area from decommissioning activities using the evaluations in the GEIS as a guide. Like the GEIS, the analysis assumed that operational mitigation measures would be continued and did not rely on the implementation of new mitigation measures unless specified. Releases to the environment, waste volumes, and other environmental interfaces were estimated in the DCE or other sources referenced in the EIE. This information was then assessed against the potential for impact and the existing environmental conditions at SONGS to identify impacts and determine whether the GEIS and FES remain bounding. The GEIS categorizes significance levels as SMALL (impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource or do not exceed permissible levels in the NRC's regulations), MODERATE (impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource), or LARGE (impacts are clearly noticeable, and are sufficient to destabilize important attributes of the resource).

To support the evaluation, SCE established the baseline environmental and societal conditions through site-specific information as well as vicinity and regional data available from local, state, and federal agencies. In addition, the evaluation considered the existing permit conditions and limitations for water and air permits and NRC regulatory requirements, including those focused on occupational dose, public dose, radiological effluents, and LLRW shipping. Federal, state, and local requirements for non-radiological interfaces with the environment were considered. These include regulatory limits on water withdrawal and discharges, air emissions including fugitive dust, noise levels, and protection of avian, terrestrial and aquatic species, protection of cultural resources, disposal of non-radiological waste, and worker health protection.

SCE reviewed the planned decommissioning activities for SONGS Units 2 and 3 and compared these to the decommissioning activities that NRC evaluated in the GEIS. The planned activities fall within the activities that NRC evaluated. While each site poses a unique set of circumstances to be dealt with, no unusual site-specific features or aspects of the planned SONGS Units 2 and 3 decommissioning that are

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outside of the activities evaluated in the GEIS have been identified. Furthermore, the practices used to accomplish the individual decommissioning tasks will employ conventional methods.

SCE's review confirmed that, based on current assumptions, the anticipated or potential impacts are within the bounds of the generic impacts that the NRC described in the GEIS. There are no applicable bounding impacts for threatened and endangered species and environmental justice. The site-specific analyses determined that the planned SONGS Units 2 and 3 decommissioning activities are not likely to result in significant impacts to threatened and endangered species nor have disproportionate impacts on minority or low-income populations. The following discussions summarize the full Environmental Impact Evaluation (Reference C) focusing on the reasons for reaching this conclusion.

1. Onsite/Offsite Land Use

SCE's decommissioning plans include building demolition and removal within the 84-acre easement hosting the SONGS Units 2 and 3 reactor units and infrastructure. SCE has received a lease modification from the CSLC allowing for the partial removal of the SONGS Units 2 and 3 intake and discharge conduits' vertical risers, but not the horizontal conduits, which will remain, for the time being, buried below the seabed. As part of its environmental review for the lease modification, the CSLC analyzed the potential environmental impacts of the onshore and offshore decommissioning activities and disclosed these potential impacts in an Environmental Impact Report (EIR) that was certified by CSLC in March 2019. (Reference 11).

The SONGS site is currently used for utility-related industrial land uses, with the majority of the property within the easement having been previously disturbed during construction and operation of the plant. The coastal bluff areas located in the northwest and southeast portions of the 84-acre easement have remained undeveloped in compliance with the California Coastal Commission (CCC) Guarantee Agreement, in which SCE provided assurance that they will be protected and that they will remain in their natural state. It is anticipated that there will be no changes in onsite land use patterns during decommissioning.

The GEIS assessment for land use concluded that the impact would be SMALL for sites that did not require additional land for decommissioning activities. If additional land was needed the impact should be determined on a site-specific basis. Because no additional lands are needed SONGS onsite land use impacts during decommissioning are bounded by the GEIS and are categorized as SMALL.

2. Water Use

SONGS Units 2 and 3 acquire potable water through the South Coast Water District, a member agency of the Municipal Water District of Orange County (MWDOC). The site uses water from the Pacific Ocean for effluent dilution functions. The operational demand for cooling and makeup water has been eliminated since SONGS Units 2 and 3 permanently ceased operation and implemented an independent spent fuel cooling system. The normal operation demand was previously over 830,000 gpm per unit and is currently approximately 15,000 gpm total for both Units 2 and 3. During the decommissioning period,

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SONGS intends to continue to reduce water demands with the ultimate intent to eliminate such demands on the Pacific Ocean as soon as possible.

The GEIS assessment of water use concluded the impact on water use would be SMALL if the decommissioning did not significantly increase water use. Water uses for decommissioning include staff usage, fuel storage (replacement of evaporative losses, etc.), fuel transfer (washing down transport casks), large component segmentation generally performed underwater, decontamination and dismantlement (if water-jet or similar techniques are employed), effluent dilution and dust suppression. Water uses are anticipated to be significantly less than during operation (for example, fuel-related water uses will be eliminated following the completion of fuel transfer operations, currently forecast for 2020). Thus water use impacts during decommissioning are bounded by the GEIS.

3. Water Quality – Non-Radiological

Major activities that could impact surface and groundwater quality during decommissioning include site excavation, stabilization, decontamination, dismantlement, and dewatering. These activities present the potential of spills, migration of low concentrations of radioactivity or hazardous substances not previously identified, and leaching from subsurface structures.

As discussed in Section 2 above, the site uses water from the Pacific Ocean for its effluent dilution functions. Water used for dilution is discharged through the ocean outfalls for Unit 2, and is currently regulated under individual National Pollutant Discharge Elimination System (NPDES) Permits from the San Diego Regional Water Quality Control Board (SDRWQCB). The individual unit permits have been merged into a single NPDES Permit which addressed groundwater dewatering discharges, and multiple minor waste stream discharges from within SONGS Units 2 and 3.

Storm water discharge is regulated and controlled through an industrial storm water general permit issued by the SDRWQCB. This permit requires SONGS to develop, maintain, and implement a storm water pollution prevention plan (SWPPP) for the facility. Storm water-related monitoring plans and reporting protocols will be updated as necessary to address permit requirements and decommissioning activities.

An SCE review concluded that no drinking water pathway exists for exposure from SONGS operations. Furthermore, the nearest drinking water well is more than one mile inland. Previous studies indicate that even under extreme pumping conditions, a seaward gradient will exist. Therefore, any dewatering is not expected to result in saltwater intrusion.

The GEIS assessment of water quality impacts concluded the impacts would be SMALL based on compliance with regulatory requirements including the appropriate application of best management practices (BMPs) and controls. SCE will follow standard storm water BMPs as documented in the current Industrial SWPPP and implement the current Spill Prevention Control and Countermeasures (SPCC) plan to minimize the chance of both groundwater and surface water contamination. In the event an unknown area of hazardous substances is identified during sub-grade soil excavation and structures

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removal, the area will be assessed and controlled. Due to the implementation of BMPs and compliance with permits, the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater are bounded by those addressed in the GEIS.

4. Air Quality

Emission sources in San Diego County are primarily mobile sources (vehicular traffic) and ambient air quality standards are frequently exceeded for ozone and particulate matter due to routine vehicular traffic. During decommissioning, air emissions will be generated by truck and rail traffic to and from the site for waste disposal. Mitigation measures described in the state EIR will minimize these emissions. Relatively minor stationary sources, such as will be used at SONGS, are projected to be a fraction of the average daily emissions permitted by the San Diego Air Pollution Control District (SDAPCD).

The most likely onsite impact of decommissioning on air quality will be due to dust. SCE will include standard dust control measures during decommissioning in accordance with SDAPCD dust abatement and visible emissions requirements. Air emissions due to commuting workers will actually be less since the work force during all phases of decommissioning is expected to be smaller than the peak number of workers used for construction, normal operations or refueling outages.

The NRC's GEIS determined air quality impacts associated with decommissioning to be SMALL due to the sufficiency of current and commonly used control and mitigation measures. SCE will implement standard mitigating measures to reduce emissions during decommissioning per the requirements of the SDAPCD. Therefore, air quality impacts related to decommissioning of SONGS Units 2 and 3 are bounded by the GEIS.

5. Aquatic Ecology

SCE has characterized the aquatic environment in the vicinity of the SONGS Units 2 and 3 intake and discharge conduits prior to construction of and during the operation of SONGS. There are a variety of habitat types surrounding the SONGS Units 2 and 3 conduits. The marine habitat offshore of SONGS consists of a mixture of sand, cobble, and isolated areas of exposed rock. The area of high marine productivity in the immediate vicinity of the plant site is the shallow sub-tidal zone, approximately 1,300 feet north of SONGS. This area supports a biological community dominated by surfgrass and feather boa kelp. The San Onofre kelp bed is approximately 650 feet south of SONGS Unit 2 diffusers at a water depth of about 40 to 50 feet. The benthic fish community is generally dominated by queenfish; northern anchovy; white croaker and speckled sanddab.

Since ceasing permanent operations at SONGS Units 2 and 3, SCE has reduced ocean water withdrawals and discharge by approximately 98 percent from normal operating flows. The remaining flow is primarily associated with dilution of liquid effluent pathways. Effluent releases comprise an existing operational activity and are not re-addressed as part of this environmental review. Therefore, the impacts are out-of-scope for assessing impacts from decommissioning. SONGS will continue to comply

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with its applicable regulatory and permit requirements associated with reduction of impingement and entrainment impacts due to water withdrawals.

On March 21, 2019, CSLC and SCE entered into a new lease to allow for the use, maintenance and decommissioning of the existing SONGS 2&3 offshore improvements consisting of two offshore intake and discharge conduits and associated appurtenances; three environmental monitoring buoys; a fish return conduit; four large organism exclusion devices (LOEDs), and a portion of riprap along the shore seaward of the ordinary high-water mark. The lease provided for the partial removal of some of these facilities, including the LOEDs and associated risers, manhole access port structures and associated riser, six diffuser ports, the fish return conduit and some of the monitoring and navigational buoys. The horizontal portions of the conduits are not being removed at this time. The EIR that accompanied the approval of the lease evaluated the potential environmental impacts of the partial removal of the vertical structures. The impacts from the approved decommissioning activities were found to be less than significant with proper mitigation. CSLC will determine later whether the offshore facilities that remain after the current decommissioning work is completed can be permanently abandoned in place or will need to be removed.

There are no surface water bodies on the SONGS site, but the Pacific Ocean borders the site and vernal pools are found northwest of SONGS Parking Lot 4. Decommissioning activities for SONGS Units 2 and 3 would include the application of common BMPs, compliance with the SONGS storm water permit, and implementation of the SWPPP, which would be updated as necessary to address decommissioning activities. These measures would ensure that any changes in surface water quality will be non-detectable and non-destabilizing.

The NRC determined aquatic ecology impacts to be SMALL when only aquatic resources within a plant's operational areas are disturbed. The potential impacts to aquatic ecology are anticipated to be minimal and additional mitigation measures beyond those anticipated as conditions of the CSLC lease amendment are unlikely to be warranted. Therefore, the aquatic ecology impacts during the decommissioning of SONGS Units 2 and 3 are bounded by the GEIS.

6. Terrestrial Ecology

The SONGS site is almost entirely paved and developed. However, there are small strips of intact scrub-shrub habitat and ornamental vegetation surrounding the parking lots and between developed areas of the plant. The SONGS site also has undeveloped coastal bluffs that are explicitly protected from development under the CCC coastal Guarantee Agreement. The onsite coastal bluff in the northwest area of SONGS is sparsely vegetated, California desert-thorn scrub habitat. The larger onsite coastal bluff in the southeast area of SONGS is approximately 5 acres and is dominated by California sagebrush scrub vegetation. This bluff is contiguous with the San Onofre bluffs of the San Onofre State Beach, which supports two native vegetation associations (Diegan coastal sage scrub and southern foredune) and small areas of disturbed coastal sage scrub habitat. The coastal bluff areas provide opportunity to support wildlife; however, the light, noise, and frequent human presence due to the proximity of SONGS

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and the state beach result in a more disturbed habitat than optimal for many species. Avian species are highly mobile and not subject to barriers such as roads and developed areas and may utilize scrub habitat or open surfaces for nesting and temporary perching.

The decommissioning activities would include noise and dust from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and the potential for bird collisions with crane booms or other construction equipment. These activities will be conducted in compliance with air quality and noise regulations, and SCE will use avoidance and minimization measures to address potential impacts. Compliance with applicable regulations, air permits, noise restrictions along with the temporary nature of the various decommissioning tasks (e.g., use of cranes) will minimize the impacts to terrestrial species as well as the human community. Decommissioning plans do not currently include the use of explosives, which could disturb terrestrial resources. Should those plans change the environmental impacts will be reevaluated.

SONGS is located within the coastal zone and in order to support active dismantlement, SCE has filed and received approval of a coastal development permit application with the CCC based on a CSLC EIR. As part of the CSLC and CCC's environmental review and permitting, decommissioning activities within the coastal sage habitat areas, coastal bluff, and beach areas were analyzed for potential environmental impacts, including for protected species and species of concern. Mitigation measures are conditions of the CSLC final EIR and Mitigation and Monitoring Plan and the CCC permit. The removal of various current SONGS features along the perimeter of the developed plant adjacent to and within the natural area could potentially require ground disturbance in unpaved areas. Appropriate avoidance and minimization measures will be used to minimize the impact of any ground disturbance.

With the implementation of appropriate avoidance and minimization measures and compliance with permit conditions as discussed above, decommissioning of SONGS Units 2 and 3 is not anticipated to adversely impact any terrestrial resources and the impacts would be bounded by the GEIS which determined them to be SMALL.

7. Threatened and Endangered Species

Seventeen federally or state protected species utilize habitat within the vicinity (a 6-mile radius) of the SONGS site. Other species of concern are also addressed in the detailed Environmental Impact Evaluation (Reference C) including both the critically imperiled and imperiled species listed in the California Natural Diversity Data Base and located within one mile of the site but are not otherwise addressed here.

The list includes four federally listed marine turtles. However, none is considered a full-time resident in the vicinity of SONGS and they only migrate through the vicinity. Another federally listed marine reptile, the Hawksbill turtle, sporadically nests in the southern part of the Baja peninsula and foraging sub-adults and juveniles have been sighted along the California coast. Given the SMALL impacts on water use and water quality during decommissioning and the ability of these species to migrate away from the site, these species should not be adversely impacted by decommissioning.

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The decommissioning activities would indirectly impact protected species through dust generation from structure demolition, noise from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and potential bird interactions with crane booms or other construction equipment. The decommissioning activities will be conducted in compliance with air quality and noise regulations and SCE will use appropriate avoidance and minimization measures. Compliance with applicable regulations, air permits, and noise restrictions related to work hours along with the temporary nature of the various decommissioning tasks will minimize any such impacts. Decommissioning plans do not currently include the use of explosives, which could disturb protected species. These measures will minimize impacts to protected terrestrial species that inhabit or visit the SONGS site.

Historically there has been only one protected plant species in the vicinity of SONGS (thread-leaved brodiaea). However, it was not identified during a 2019 survey of the site. Decommissioning activities will generally be confined to previously disturbed (e.g., paved, high traffic) areas. Otherwise, the SCE or DGC environmental staff will conduct an environmental assessment per established procedures. The procedure requires an assessment prior to any land disturbance, soil addition, digging, grading, or trenching outside the paved and concreted areas; maintenance activities near surface water, and wetlands and trimming or removal of native plants other than landscape maintenance. Therefore, adverse impacts on protected plant species are not anticipated.

Decommissioning of SONGS Units 2 and 3 is not anticipated to adversely impact any federally or state-listed species. As discussed above, decommissioning activities would generally be limited to previously disturbed areas on-site, near-shore and off-shore. SCE will employ mitigation measures as required by the regulatory agencies to minimize impacts to the environment and protect listed species. In addition, SCE will implement BMPs and conduct assessments as called for in its environmental protection procedure(s), as well as comply with permit and regulatory requirements to minimize indirect impacts from noise, air emission, dust, and runoff. Therefore, impacts to threatened or endangered species from decommissioning should be SMALL.

8. Radiological

Decommissioning activities have the potential to contribute to radiological impacts. SONGS Units 2 and 3 may continue to have limited gaseous and liquid effluents until most of the decommissioning activities are complete and the irradiated fuel is transferred to dry storage.

Occupational Dose

The GEIS estimates for the reference pressurized water reactor (PWR) dose is 1,215 person-rem for DECON. In the GEIS, the NRC reviewed data available from decommissioning experience subsequent to their initial review (in 1988). Because the range of cumulative occupational doses reported by reactors undergoing decommissioning was similar to the range of estimates for reference plants presented in the 1988 revision of the GEIS, the NRC did not update its estimates for occupational dose.

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SCE would expect the SONGS dose to be bounded by the referenced PWR dose since a number of major components which often contribute to area dose rates are relatively new (steam generators and RV head) and as a result of SONGS operational dose reduction efforts (i.e., zinc injection). A more detailed estimate will be developed to support evaluation of decontamination scope.

The regulatory standard for worker exposure is a dose limit per worker rather than a cumulative dose. Detailed occupational dose estimates will be performed as part of the work planning process. Such planning will address means to reduce occupational dose where appropriate. SCE remains committed to keeping dose to plant personnel 'As Low as Reasonably Achievable' (ALARA). The activities that have potential radiological impacts will be conducted in a manner to keep doses ALARA and well within regulatory limits.

Public Dose

The NRC generically concluded that reactors undergoing decommissioning could reasonably be expected to have emissions and public doses comparable to or substantially less than the levels experienced during normal operation of those facilities. The Radiological Environmental Monitoring Program (REMP) results demonstrate that the radiological environmental impact of the operation of SONGS Units 2 and 3, and the resulting dose to a member of the general public, is negligible.

SCE will continue to monitor effluents, comply with all applicable regulatory limits, and continue its REMP to assess the impacts to the environment from these effluents.

In summary, SCE estimates that SONGS Units 2 and 3 decommissioning activities would result in occupational and public doses within NRC estimates. Therefore, SONGS' radiological impacts during decommissioning are bounded by the GEIS which determined the radiological impacts to be SMALL.

9. Radiological Accidents

Many activities that occur during decommissioning are similar to activities that commonly take place during maintenance outages at operating plants such as decontamination and equipment removal. Accidents that could occur during these activities may result in injury and local contamination. However, they are not likely to result in contamination off-site.

The only design basis accidents (DBAs) applicable to a decommissioning plant are those involving the spent fuel pool. All DBAs and severe accidents involving the reactor are precluded as a result of transfer of spent fuel from the RVs to the pools and ultimately the ISFSI. The environmental impacts of DBAs, including those associated with the spent fuel pool, were evaluated during the initial licensing process and documented in the FES. Furthermore, the impacts of these events are less than previously evaluated due to the time since the fuel was most recently irradiated.

The NRC's GEIS analysis relied on the waste confidence rule regarding spent nuclear fuel related severe accidents. The waste confidence GEIS (Reference 9) continues to consider severe accidents involving the spent fuel pool to be a SMALL risk.

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Thus, SONGS' radiological accident impacts during decommissioning are bounded by NRC's GEIS which determined such risks to be SMALL.

10. Occupational Issues

SONGS currently has an industrial safety program and safety personnel to promote safe work practices and respond to occupational injuries and illnesses. Equivalent safety programs will continue to be in effect during decommissioning activities.

SONGS has an average occupational injury rate well below that of the heavy construction industry sector and consistent with the power generation and nuclear power industry. Decommissioning activities will be conducted in a manner reflecting personnel safety as a critical element. Therefore, SONGS occupational safety impacts are considered to be bounded by the GEIS which generically determined occupational safety impacts to be SMALL.

11. Cost

Decommissioning costs for SONGS are discussed in the 2017 DCE [Reference D]. The DCEs are updated periodically through submittals to the CPUC. In addition, annual Decommissioning Funding Status Reports are submitted annually to the NRC to demonstrate that sufficient funds remain to cover the remaining decommissioning costs.

12. Socioeconomics

The primary socioeconomic impacts of decommissioning are related to staffing changes and decreasing tax revenues. Impacts related to the decision to permanently cease operations are outside the scope of this evaluation. SCE determined the staff reduction impacts from the decision to be minimal. The staff reductions represent 0.04 percent and 0.03 percent of San Diego County's and Orange County's workforces, respectively. Any impacts will be deferred somewhat due to the employment of temporary staff necessary to accomplish the various decommissioning activities.

Similarly, SONGS is located in San Diego County and its property assessment is a relatively small portion of San Diego County's total tax collections. Historically, SONGS' contribution to the county property tax collections has been consistently less than 1 percent. SONGS' tax obligations will be reduced due to decommissioning, but SCE and SONGS will continue to contribute to county tax revenues.

It is anticipated that there will be limited or no changes or impacts to the local community and socioeconomic conditions and less impact than would be expected generically where other nuclear facilities have a higher relative impact on the job market or tax base. Thus, SONGS' impacts are bounded by those considered in the GEIS in which the NRC generically determined socioeconomic impacts to be SMALL.

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13. Environmental Justice

Decommissioning activities that may potentially affect identified minority and low-income populations include those related to staffing changes and offsite transportation. However, the assessment of environmental justice also considered other specific issues (e.g., water use, air quality). SCE has determined that no significant offsite impacts will be created by SONGS Units 2 and 3 decommissioning activities. As generic NRC guidance recognizes, if no significant offsite impacts occur in connection with the proposed action, then no member of the public would be substantially affected. Therefore, there can be no disproportionately high and adverse impacts on members of the public, including minority and low-income populations. In addition, staffing is not anticipated to be an impact due to the large population and robust job market in the area (see Section 12 above).

The environmental justice evaluations utilize a 50-mile radius around the plant as the potentially impacted area. To complete this evaluation, the 2006–2010 low-income data and 2010 minority population data for California were obtained from the United States Census Bureau (USCB) and processed using ESRI ArcGIS 10.1 software. All census data were downloaded in USCB block group level geography so that the environmental justice evaluations were consistent between the minority and low-income analyses. The evaluations and results are detailed in the EIE which concluded there were no disproportionate impacts.

In its GEIS, the NRC concluded that adverse environmental justice impacts and associated significance of the impacts must be determined on a site-specific basis. Unlike many nuclear sites, SONGS is located in and near relatively large communities with significant other commercial and industrial activities. Thus, the impact of SONGS shutdown is less severe than may otherwise be the case. Further, SCE has determined that no significant offsite environmental justice impacts will be created by SONGS Units 2 and 3 decommissioning activities. Since no significant offsite impacts occur in connection with the proposed action, no member of the public would be substantially affected. Therefore, it is unlikely for there to be a disproportionately high and adverse impact or effects on specific groups or members of the public, including minority and low-income populations, resulting from the decommissioning of SONGS Units 2 and 3.

14. Cultural Historic and Archeological Resources

No prehistoric or historic archaeological sites or historic sites eligible for listing or listed on the National Register of Historic Places, California Register of Historical Resources, or San Diego County Local Register of Historical Resources are located within the SONGS site lease easement and no traditional cultural properties are known to be present. Two prehistoric archaeological sites and three historic archaeological sites were identified within 0.5 miles of SONGS Units 2 and 3.

All of these areas are outside the operational/decommissioned site. In its GEIS, the NRC concluded that for plants where the disturbance of lands beyond the operational areas is not anticipated, the impacts on cultural, historic, and archeological resources would be SMALL. Since decommissioning activities are confined to the SONGS site, no adverse impacts are anticipated. SONGS' impacts on cultural, historical,

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and archeological resources during decommissioning fall well within the bounds established by the NRC in the GEIS.

15. Aesthetic Issues

In its GEIS, the NRC stated that removal of structures is generally considered to be a beneficial aesthetic impact and drew the generic conclusion that for all plants, the potential impacts from decommissioning on aesthetics are SMALL and that any mitigation measures are not likely to be beneficial enough to be warranted. Similarly, the aesthetic impact of final result of decommissioning SONGS Units 2 and 3 would be less than that of the current aesthetic impact of the plant. During dismantlement, any adverse visual intrusion would be temporary and would ultimately serve to reduce the aesthetic impact of the site. Therefore, the impacts of SONGS on aesthetic resources during decommissioning are bounded by the GEIS and are therefore SMALL.

16. Noise

Offsite noise sources that affect the ambient noise environment in the vicinity of SONGS include Interstate-5, the San Diego Northern Railroad, military operations, and the ocean. During the decommissioning process, the sounds that might be heard at offsite locations include noise from construction vehicles and tools. The timing of noise impacts and the duration or intensity will vary. The nearest sensitive receptors to SONGS are recreational users of San Onofre State Beach where the ambient noise environment can exceed 70 dBA due to ocean sounds. The more intense decommissioning activities would occur 400 ft or more from the beach access public walkway in front of the SONGS sea wall.

Due to the relatively high ambient noise levels surrounding SONGS, decommissioning activities are not expected to produce noise levels that could impact the activities of humans or threatened and endangered species. In addition, SCE will comply with the local noise regulations for construction sites, which restrict the average sound level at the property boundary to 75 dBA between 7 a.m. and 7 p.m., and any additional agency permit requirements including any lower allowed limits during evenings and overnight. Therefore, noise impacts during decommissioning of SONGS Units 2 and 3 are bounded by the previously issued GEIS, which generically determined the noise impacts associated with decommissioning to be SMALL.

17. Transportation

Transportation impacts are dependent on the number of shipments to and from the facility, the type of shipments, the distance that material is shipped, and the number of workers commuting to and from the site.

Transportation infrastructure within the vicinity of SONGS includes one major north- and south-bound freeway, I-5, an assortment of local and county roads, passenger and cargo rail service (part of the Los

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Angeles–San Diego corridor), and an existing rail spur serving the SONGS site. The 2011 average annual daily traffic (AADT) count for this portion of I-5 was 132,000 vehicles.

SCE compared the assumptions and analysis inputs used for NRC's analysis with waste volumes estimated for SONGS Units 2 and 3 decommissioning, transport mode, and disposal facility options. Due to the availability of the rail line, a substantial portion of the shipments will use that mode of transportation. The NRC indicates use of rail reduces radiological impacts by more than a factor of 10 over truck shipments. Furthermore, disposal facilities available for SONGS Units 2 and 3 radiological wastes are within the distance assumed by NRC in its analysis. Therefore the generic impacts bound those associated with SONGS Units 2 and 3.

Furthermore, SCE will comply with all applicable NRC and U.S. Department of Transportation (DOT) regulations, including Federal Railroad Administration regulations and requirements, and will use approved packaging and shipping containers for waste shipment. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol. The NRC has generically concluded that the radiological impacts of transporting radiological waste from decommissioning would be SMALL and those for SONGS Units 2 and 3 are bounded by the GEIS.

SCE estimated a peak of approximately 700 workers during decommissioning and the vehicular traffic due to commuting would likely exceed the 200 per peak hour threshold, prompting review for potential to impact traffic congestion as required under the local congestion management plan. The decommissioning traffic associated with SONGS is considered negligible compared to existing traffic volumes and would not be expected to significantly alter congestion on roadways. In addition, this amount of traffic is not expected to significantly deteriorate roadways; therefore the GEIS is bounding and the non-radiological transportation impacts of decommissioning are SMALL.

Offshore activities to remove vertical risers on the intake and discharge conduits would increase marine vessel traffic in the area. It is expected that these activities would not cause either a navigational safety hazard or a substantial delay in the normal movements of commercial or recreational vessels. The environmental impacts reviews for the Unit 1 conduit disposition and for Units 2 and 3 decommissioning activities indicated that impacts to recreational and commercial transportation would be insignificant.

18. Irreversible and Irretrievable Commitment of Resources

SONGS Units 2 and 3 decommissioning will involve dismantlement and removal of structures and restoration of the property to a state for unrestricted release per NRC regulations in accordance with the criteria for license termination in 10 CFR 20, Subpart E. Furthermore, the onshore property would be returned to the U.S. Navy under negotiated terms of the easement and the offshore property would be returned to CSLC under negotiated terms of the lease. The activities necessary to decommission SONGS Units 2 and 3 involve a minor irretrievable commitment of consumable materials (including materials for decontamination, solvents, industrial gases, tools, fuel, etc.). The irreversible commitment of such resources is not unique and is bounded by those considered by the NRC in the GEIS which concluded consumption to be minor.

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Waste from decommissioning of SONGS Units 2 and 3 will consume space at waste facilities. California has multiple facilities permitted for the storage, treatment, and disposal of hazardous and universal waste. The non-radioactive waste is assumed to be shipped to an out-of-state landfill.

The decommissioning of SONGS Units 2 and 3 would result in minor irretrievable or irreversible commitment of resources bounded by the GEIS in which the NRC determined would be SMALL impacts.

B. Environmental Impacts of License Termination – NUREG-1496

The License Termination Plan (LTP) has not yet been developed. As noted earlier, it is required to be submitted at least two years prior to the proposed termination date. In general, the LTP outlines the basis for an administrative/legal activity. No physical work beyond that already addressed is anticipated. Thus, there are no environmental impacts beyond those already addressed that need to be addressed at this point in the process.

C. Discussion of Decommissioning in the FES

Applicable portions of the FES were addressed as noted in each of the topics previously summarized.

D. Additional Considerations

SCE has not identified any unique considerations that would trigger a site-specific analysis beyond the GEIS. The previous topic summaries address a sufficiently wide range of issues.

E. Conclusion

SCE has performed an environmental review to evaluate potential environmental impacts associated with decommissioning activities, confirming that the anticipated or potential impacts are within the bounds of the generic impacts that NRC described in the GEIS. Further, while there are no applicable bounding impacts for threatened and endangered species and environmental justice discussed in the GEIS, the CSLC provided an EIR that did review environmental justice considerations. CSLC concluded that the project would not have inordinate impacts on the populations residing near the plant. In addition, the CDP for decommissioning imposed mitigation measures for threatened and endangered species that would minimize impacts. As a result, the SONGS Units 2 and 3 decommissioning activities are not anticipated to result in significant impacts to threatened and endangered species or disproportionate impacts on minority or low-income populations.

The conclusion that the environmental impacts of the project are acceptable is principally due to the following:

- Planned activities fall within the activities that the NRC evaluated. There are no unique aspects of the plant or decommissioning techniques that would invalidate previously reached conclusions.
- Methods to be employed to dismantle and decontaminate the site are standard construction-based techniques fully considered in the GEIS.

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- SCE will continue to comply with NRC dose limits and conduct activities in accordance with ALARA principles.
- SCE will continue to comply with the SONGS Offsite Dose Calculation Manual, REMP, and the Ground Water Protection Initiative Program during decommissioning. Each will likely be modified somewhat to reflect changes in site configuration, etc.
- SCE will comply with all applicable NRC and DOT regulations, including Federal Railroad Administration regulations and requirements, and use approved packaging and shipping containers for the shipping of radiological waste. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol.
- SCE will continue to comply with federal, state, and local requirements for non-radiological interfaces with the environment including limitations on water withdrawal and discharges, air emissions including criteria pollutants and fugitive dust, noise levels, protection of avian, terrestrial and aquatic species, cultural resources, disposal of non-radiological waste, and worker health protection.
- As part of the CSLC and CCC's environmental review and permitting for SONGS decommissioning, the respective agencies have imposed mitigation measures to avoid or minimize environmental impacts determined to be significant, with which SCE will comply.
- SCE has submitted a lease modification application with the CSLC and will comply with CSLC lease requirements for disposition of the offshore conduits and termination of the lease.
- SCE has received and will comply with a coastal development permit from the CCC for decommissioning.

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V. REFERENCES

A. GENERAL DEVELOPMENTAL REFERENCES

- NRC Regulatory Guide 1.185, Revision 1, June 2013, Standard Format and Content Guide for Post-Shutdown Decommissioning Activities Report
- EnergySolutions Document No. 164001, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2 and 3"
- Enercon Technical Data Record No. SONGS002, "SONGS Units 2 and 3 Environmental Impact Evaluation," June 2014
- San Onofre Nuclear Generating Station Units 2 and 3 2017 Decommissioning Cost Estimate

B. SPECIFIC REFERENCES IN TEXT

1. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission dated February 13, 2014; Subject: Access to Nuclear Decommissioning Trust Funds, San Onofre Nuclear Station, Units 2 and 3 (ADAMS Accession No. ML14051A632)
2. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission dated September 23, 2014; Subject: San Onofre Nuclear Generating Station, Units 2 and 3, Post-Shutdown Decommissioning Activities Report (ADAMS Accession No. ML14269A033)
3. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations San Onofre Nuclear Generating Station, Units 2 and 3 (ADAMS Accession No. ML131640201)
4. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated June 28, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 3 (ADAMS Accession No. ML13183A391)
5. Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission dated July 22, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 2 (ADAMS Accession No. ML13204A304)
6. U. S. Nuclear Regulatory Commission; NUREG-0586, "Final Generic Environmental Impact Statement (GEIS) on Decommissioning Nuclear Facilities" (November 2002)
7. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission dated September 23, 2014; Subject: San Onofre Nuclear Generating Station, Units 2 and 3, Irradiated Fuel Management Plan (ADAMS Accession No. ML14269A032)
8. U.S. Nuclear Regulatory Commission, NUREG-0490, "Final Environmental Statement related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3" (April 1981)
9. U. S. Nuclear Regulatory Commission, NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, Final Report" (September 2014)
10. U. S. Nuclear Regulatory Commission, NUREG-1496, Volume 1, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities" (July 1997)

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11. California State Lands Commission, "Final Environmental Impact Report for the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 Decommissioning Project," February 2019
12. Letter from Thomas J. Wengert (NRC) to Thomas J. Palmisano (SCE) dated September 5, 2014;
Subject: San Onofre Nuclear Generating Station, Units 2 and 3 – Exemptions from the Requirements of 10 CFR Part 50, Sections 50.82(a)(8)(i)(A) and Section 50.75(h)(2) (ADAMS Accession No. ML14101A132)

Enclosure 2

Irradiated Fuel Management Plan, Revision 1

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. An 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 were required to be submitted prior to June 7, 2015, two years following the cessation of operations. On September 23, 2014, SCE submitted Revision 0 of the IFMP for SONGS Units 2 and 3, 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 & Electric Company (SDG&E). This submittal constitutes Revision 1 to the IFMP, to reflect changes and new information gathered since the submittal of the initial IFMP.

EnergySolutions, LLC prepared the initial site-specific decommissioning cost estimate (DCE) for SONGS Units 2 and 3. The initial DCE identified the details, schedules, and costs of spent fuel management activities associated with the initial IFMP, along with license termination and site restoration activities and costs. The initial IFMP and DCE were provided concurrent with Revision 0 of the Post-Shutdown Decommissioning Activities Report (PSDAR, Reference 4). Revision 1 of the PSDAR is being submitted concurrently with this Revision 1 of the IFMP. Revision 1 of the PSDAR and the IFMP are based on a 2017 DCE that was prepared by the Kenrich Group (Kenrich) and is available on site for review. The assumptions regarding the United States Department of Energy (US DOE) acceptance of irradiated fuel are consistent with the 2017 DCE and are based on SCE's testimony filed with the California Public Utilities Commission (Reference 13). The SONGS Units 2 and 3 2017 DCE and updated IFMP are based on commencement of industry-wide acceptance of spent fuel by US DOE in 2028.

The revised PSDAR and IFMP focus on the decommissioning of SONGS Units 2 and 3 only. SONGS Unit 1 was addressed in its PSDAR (Reference 15) and other adjacent

parcels are not licensed under 10 CFR Part 50 and thus are not subject to 10 CFR Part 50 license termination.

II. Irradiated Fuel Management Strategy

The safe initial interim storage of SONGS Units 2 and 3 irradiated fuel has been “wet storage” in each unit’s respective spent fuel pool. The spent fuel pools have been isolated from their normal support systems and those systems have been replaced by stand-alone cooling and filtration units (also termed a “spent fuel pool island”). This has facilitated earlier system abandonment and parallel decommissioning activities.

Currently, all irradiated fuel in the SONGS Units 2 and 3 spent fuel pools is being 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 the time of permanent cessation of SONGS Units 2 and 3, 3,792 SONGS Units 2 and 3 irradiated fuel assemblies had already been transferred to the common ISFSI. Beginning in January 2018, SCE has been loading the remaining 2,668 irradiated fuel assemblies into fuel storage canisters and transferring them to the ISFSI. This activity is forecast to be complete in 2020.

The ISFSI is located in a protected area inside the Owner Controlled Area. At the time of permanent cessation of operations, the ISFSI consisted of an AREVA Transnuclear (TN) system that was constructed to accommodate SONGS Unit 1 irradiated fuel and provided 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 AREVA TN ISFSI system contains 18 Dry Shielded Canisters (DSCs) storing Unit 1 fuel and Greater than Class C (GTCC) waste. The AREVA TN ISFSI system also contains 33 DSCs which store Units 2 and 3 fuel. All of the fuel in the AREVA TN system at SONGS is stored in Transnuclear NUHOMS Model Number-24PT1 or PT4 DSCs.

The ISFSI has been expanded to accommodate the remaining inventory of the SONGS Units 2 and 3 spent fuel pools. The ISFSI expansion consists of a Holtec HI-STORM

UMAX system. A total of 73 storage canisters will be required for the SONGS Units 2 and 3 irradiated fuel in the Holtec portion of the ISFSI.

The IFMP major periods, including start and end dates 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 7), with the exception that some dates have been modified to reflect performance since completion of the 2017 DCE.

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 performance to date, a common 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 (with the exception of the oldest SONGS spent fuel that is currently stored at the GE-Hitachi Nuclear America LLC's Morris Operation ISFSI located in Morris, Illinois. Moving this fuel last will allow removal of all spent fuel from the SONGS site earlier).

This plan is based upon a 2028 start date (Reference 13) for US DOE acceptance of spent fuel from the industry and the SONGS Units 2 and 3 positions in the queue. As indicated in Table 2, SCE is therefore 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 SONGS DCE considers 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 2020 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.

SONGS management 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 Proceedings (Reference 5). Financial assurance reports including the balances and expenditures for SONGS Units 1, 2, and 3 and the ISFSI were supplied to the NRC (as required by 10 CFR 50.82(a)(8)(v) and 10 CFR 72.30(c)) annually (most recently in Reference 6). Going forward, balances and expenditures will be supplied annually to the NRC for all three units and the ISFSI.

An updated site-specific DCE was prepared and submitted to the NRC concurrently with Revision 0 of the PSDAR (Reference 4). Revision 1 to the IFMP is based on an updated site-specific 2017 DCE (with some changes to dates to reflect performance since completion of the 2017 DCE) that is available on site for inspection. As summarized in Table 1, Revision 1 of the IFMP is based on decommissioning and the termination of the license by 2051, approximately 38 years following the permanent cessation of operations.

The total of all Nuclear Decommissioning Trust fund balances for SONGS Units 2 and 3 was \$3,426 million as of December 31, 2019 (Reference 6). 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 continue to be updated as appropriate and annual updates of spending and trust fund balances will be submitted as required.

IV. Regulatory Activities

The IFMP assumes that the SONGS Participants will make withdrawals from their nuclear decommissioning trusts for spent fuel management purposes. The 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 (radiological decontamination and dismantlement); (2) spent fuel management; and (3) site restoration. Each year SCE files a Tier 2 Advice Letter (see Reference 10 for a previous example) 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. SDG&E files a similar letter (see Reference 14 for a previous example) with the CPUC. In addition to authorizing and overseeing the withdrawals, the CPUC has designated 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 have been allocated to separate subaccounts within each trust fund and, as such, are available for license termination (radiological decontamination and dismantlement), 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 and site restoration including other transitional costs. Absent an exemption, the regulations limit the use of the nuclear trust fund to decommissioning costs. That exemption was granted on September 5, 2014 (Reference 12).

The 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), SONGS 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.

V. References

1. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, 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. (ADAMS Accession No. ML131640201)
2. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Dockets 50-361 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2, dated July 22, 2013. (ADAMS Accession No. ML13204A304)
3. Letter from P. Dietrich, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Dockets 50-362 Permanent Removal of Fuel from Reactor Vessel, San Onofre Nuclear Generating Station, Unit 3, dated June 28, 2013. (ADAMS Accession No. ML13183A391)
4. Letter from Thomas J. Palmisano, Southern California Edison, to U.S. Nuclear Regulatory Commission, Subject: Post-Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station, Units 2 and 3, dated September 23, 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. Letter from Al Bates, Southern California Edison to U. S. Nuclear Regulatory Commission, Subject: 10 CFR 50.82(a)(8)(v-vii) and 10 CFR 72.30(c) Decommissioning Funding Status Report 2019 San Onofre Nuclear Generating Station Units 1, 2 and 3 and Independent Spent Fuel Storage Installation dated March 17, 2020; ADAMS Accession No. ML20079J032
7. San Onofre Nuclear Generating Station Units 2 and 3 2017 Decommissioning Cost Estimate
8. Deleted
9. Deleted
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

11. Letter from Tom J. Palmisano, Southern California Edison, to U. S. Nuclear Regulatory Commission, Subject: San Onofre Nuclear Generating Station Units 2 and 3, Access to Nuclear Decommissioning Trust Funds, dated February 13, 2014 (ADAMS Accession No. ML14051A632)
12. Letter from Thomas Wengert (NRC) to T. J. Palmisano (SCE) Granting Exemptions from the Requirements of 10 CFR 50, Sections 50.82(a)(8)(i)(A) and 50.75(h)(2) (TAC Nos. MF3544 and MF3545), dated September 5, 2014 (ADAMS Accession No. ML14101A132)
13. Testimony on Nuclear Decommissioning of SONGS 2 & 3 and Palo Verde, exhibit No. SCE-2, dated December 21, 2012
14. Letter from Clay Faber, San Diego Gas & Electric, to Public Utilities Commission of the State of California submitting a Tier 3 Advice Letter, dated February 21, 2014
15. Letter from Dwight E. Nunn, Southern California Edison to U. S. Nuclear Regulatory Commission, Subject: Post-Shutdown Decommissioning Activities Report, San Onofre Nuclear Generating Station, Unit 1, dated December 15, 1998.

Table 1

Irradiated Fuel Management Plan – Summary Schedule

Schedule Summary				
Spent Fuel Storage Periods				
Period No.	Period Description	Start	End	Years
SNF Pd 1	Initial Activities	6/7/2013	12/31/2016	3.6
SNF Pd 2	Transition and Pool Storage	1/1/2017	12/31/2019	3.0
SNF Pd 3	D&D and Pool Storage	1/1/2020	12/31/2020	1.0
SNF Pd 4	D&D and Dry Storage	1/1/2021	12/31/2028	8.0
SNF Pd 5	Dry Storage	1/1/2029	12/31/2045	17.0
SNF Pd 6	Civil Works Project and Dry Storage	1/1/2046	12/31/2049	4.0
SNF Pd 7	ISFSI Demolition & Final Site Restoration	1/1/2050	12/31/2051	2.0
	Category Total			38.6

Table 2

**SONGS Unit 2 & Unit 3
Spent Fuel Shipping Schedule
2028 DOE Acceptance
(as of 1/2/2020)**

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 1, 2 & 3 Canisters in ISFSI*	Units 2 & 3 Fuel Assemblies Transferred to ISFSI	Units 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	Units 1, 2 & 3 Canisters Transferred to DOE
2016	2668	792	3460	50	0	0	0	0	0	0
2017	2668	792	3460	50	0	0	0	0	0	0
2018	2668	792	3460	50	1073	29	0	0	0	0
2019	1558	1865	3460	79	555	15	0	0	0	0
2020	1040	2420	3460	94	1040	29	0	0	0	0
2021	0	3460	3460	123	0	0	0	0	0	0
2022	0	3460	3460	123	0	0	0	0	0	0
2023	0	3460	3460	123	0	0	0	0	0	0
2024	0	3460	3460	123	0	0	0	0	0	0
2025	0	3460	3460	123	0	0	0	0	0	0
2026	0	3460	3460	123	0	0	0	0	0	0
2027	0	3460	3460	123	0	0	0	0	0	0
2028	0	3460	3460	123	0	0	0	0	0	4
2029	0	3460	3460	119	0	0	0	0	0	2
2030	0	3460	3460	117	0	0	0	0	0	5
2031	0	3460	3460	112	0	0	0	0	0	2
2032	0	3460	3460	110	0	0	0	0	0	2
2033	0	3460	3460	108	0	0	0	0	0	0
2034	0	3460	3460	108	0	0	48	48	96	6
2035	0	3364	3364	102	0	0	192	96	288	12
2036	0	3076	3076	90	0	0	120	168	288	12
2037	0	2788	2788	78	0	0	48	72	120	5
2038	0	2668	2668	73	0	0	74	111	185	5
2039	0	2483	2483	68	0	0	111	111	222	6
2040	0	2261	2261	62	0	0	111	74	185	5
2041	0	2076	2076	57	0	0	0	0	0	0
2042	0	2076	2076	57	0	0	111	111	222	6
2043	0	1854	1854	51	0	0	74	111	185	5
2044	0	1669	1669	46	0	0	111	74	185	5
2045	0	1484	1484	41	0	0	0	0	0	0
2046	0	1484	1484	41	0	0	222	222	444	12
2047	0	1040	1040	29	0	0	74	74	148	4
2048	0	892	892	25	0	0	222	222	444	12
2049	0	448	448	13	0	0	208	240	448	13
2050	0	0	0	0	0	0	0	0	0	13
2051	0	0	0	0	0	0	0	0	0	0

* Excluding GTCC Waste

NOTE 1: Before 2038, SONGS 2 and 3 fuel assemblies shipped in AREVA 24-PTH canisters. Beginning in 2038, SONGS 2 & 3 fuel assemblies shipped in Holtec MPC canisters

NOTE 2: In 2050, Unit 1 fuel assemblies transferred to DOE from GE facility in Morris, Illinois in TADS (21 assemblies per TAD)

NOTE 3: From August 2018 to July 2019, 37 assemblies were stored in an MPC in the U3 Fuel Handling Building and thus were neither in wet storage nor dry storage, but in transport.