

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY	4
A. INTRODUCTION	4
1. <i>Community Engagement</i>	4
2. <i>Regulatory Basis</i>	5
B. BACKGROUND	6
C. SUMMARY OF DECOMMISSIONING ALTERNATIVES	7
II. DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES	8
A. DETAILED BREAKDOWN OF LICENSE TERMINATION PERIODS	9
B. DETAILED BREAKDOWN OF SPENT FUEL MANAGEMENT PERIODS	11
C. DETAILED BREAKDOWN OF SITE RESTORATION PERIODS	13
D. GENERAL DECOMMISSIONING CONSIDERATIONS	14
1. <i>Major Decommissioning Activities</i>	14
2. <i>Other Decommissioning Activities</i>	15
3. <i>Decontamination and Dismantlement Activities</i>	15
4. <i>Radioactive Waste Management</i>	16
5. <i>Removal of Mixed Wastes</i>	16
6. <i>Site Characterization</i>	16
7. <i>Groundwater Protection</i>	17
8. <i>Change to Management and Staffing</i>	17
III. ESTIMATE OF EXPECTED DECOMMISSIONING AND SPENT FUEL MANAGEMENT COSTS	17
IV. ENVIRONMENTAL IMPACTS	18
A. ENVIRONMENTAL IMPACTS OF DECOMMISSIONING SONGS.....	19
1. <i>Onsite/Offsite Land Use</i>	20
2. <i>Water Use</i>	20
3. <i>Water Quality – Non-Radiological</i>	20
4. <i>Air Quality</i>	21
5. <i>Aquatic Ecology</i>	22
6. <i>Terrestrial Ecology</i>	23
7. <i>Threatened and Endangered Species</i>	24
8. <i>Radiological</i>	26
9. <i>Radiological Accidents</i>	27
10. <i>Occupational Issues</i>	28
11. <i>Cost</i>	28
12. <i>Socioeconomics</i>	28
13. <i>Environmental Justice</i>	28
14. <i>Cultural Historic and Archeological Resources</i>	29
15. <i>Aesthetic Issues</i>	29
16. <i>Noise</i>	30
17. <i>Transportation</i>	30
18. <i>Irreversible and Irrecoverable Commitment of Resources</i>	31
B. ENVIRONMENTAL IMPACTS OF LICENSE TERMINATION – NUREG-1496.....	32
C. DISCUSSION OF DECOMMISSIONING IN THE FES.....	32

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

- D. ADDITIONAL CONSIDERATIONS..... 32
- E. CONCLUSION..... 32
- V. REFERENCES..... 34**
 - A. GENERAL DEVELOPMENTAL REFERENCES..... 34
 - B. SPECIFIC REFERENCES IN TEXT..... 34

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San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AIF	Atomic Industrial Forum
ALARA	As Low As Reasonably Achievable
BMP	Best Management Practices
CCC	California Coastal Commission
CFR	Code of Federal Regulations
CRWQCB	California Regional Water Quality Control Board
CSLC	California State Lands Commission
DBA	Design Basis Accident
DCE	Decommissioning Cost Estimate
Decon Pd	License Termination Period
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
HSM	Horizontal Storage Modules
IFMP	Irradiated Fuel Management Plan
ISFSI	Independent Spent Fuel Storage Installation
LTP	License Termination Plan
LLRW	Low Level Radioactive waste
MARRSIM	Multi-Agency Radiation Survey and Site Investigation Manual
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
ORISE	Oak Ridge Institute for Science and Education
PSDAR	Post-Shutdown Decommissioning Activities Report
PWR	Pressurized Water Reactor
RCS	Reactor Coolant System
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
SFP	Spent Fuel Pool
SNF Pd	Spent Fuel Period
SFSM	Spent Fuel Storage Modules
SPCC	Spill Prevention Control and Countermeasures
SR Pd	Site Restoration Period
SSC	Structures, Systems, and Components
UFSAR	Updated Final Safety analysis Report
USCB	United States Census Bureau

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

I. INTRODUCTION AND SUMMARY

A. Introduction

1. Community Engagement

San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 have been owned by four entities. Two are municipalities (Riverside and Anaheim) and two are investor owned utilities: San Diego Gas & Electric (SDG&E) and Southern California Edison (SCE, the Owner-Operator and agent for the participants). The relative obligation for operation and decommissioning varies by unit and entity. The relative financial obligations of each for decommissioning are detailed in the Decommissioning Cost Estimate (DCE). The term “SONGS participants” is used in this report to represent the four entities that have continuing decommissioning obligations.

SONGS Unit 1 was shut down in 1992 and largely dismantled by 2009. The decision has been made to shut down and decommission Units 2 and 3. Since the decision to shut down SONGS Units 2 and 3, 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.

In developing its plans, SONGS has benchmarked the experiences of commercial decommissioning projects in the 1990s and 2000s and has sought the input from experienced individuals and groups with a wide range of such experience. SONGS maintains close communications with those facilities currently undergoing decommissioning and with many of the organizations supporting those efforts. In particular, both the Zion and Humboldt Bay plants are currently undergoing active decommissioning. Three others (Kewaunee, Crystal River 3, and Vermont Yankee) are, or soon will be, entering SAFSTOR conditions of varying durations prior to dismantlement.

Earlier decommissioning projects faced a number of first-time technical challenges, such as cutting reactor vessel (RV) internals in a high radiation environment. Our reviews indicate that many of the technical challenges confronting SONGS decommissioning now have mature solutions. Similarly, our predecessors provide a wealth of knowledge to minimize worker radiation exposure, efficiently plan, and sequence a decommissioning project and safely manage and transport waste.

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 to seek their input on the safe, timely, and cost-effective decommissioning of SONGS.

The SONGS participants 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 standards of safety and environmental protection. Further, the SONGS participants will have a limited, if

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 with appropriate input from the larger community.

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 at least quarterly to facilitate two-way dialogue and includes several representatives of government, members from academia, labor, business, environmental organization, and a local anti-nuclear leader. Members of the CEP were provided with the opportunity to review and provide input on this document along with the included 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), this report constitutes the Post-Shutdown Decommissioning Activities Report (PSDAR) for SONGS Units 2 and 3. The PSDAR contains 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 provides 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.

The PSDAR has been developed consistent with Regulatory Guide 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report." This report is based on currently available information; however, 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.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

The IFMP is being submitted concurrently with the PSDAR and the DCE. The technical, schedule, and cost information provided therein are consistent with these submittals. The DCE provides more current estimates of annual cash flow than were previously provided in the Nuclear Decommissioning Trust Fund Exemption Request (Reference 1) and annual funding assurance updates (Reference 2). Future filings with the California Public Utilities Commission will also be based on the DCE or subsequent revisions.

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 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. An on-site Independent Spent Fuel Storage Installation (ISFSI) used to store Units 1, 2 and 3 fuel is located on the portion of the site previously occupied by SONGS Unit 1. Storage at the 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 was conducted in 2012. As discussed in the Spent Fuel Management Period details and the concurrently submitted IFMP, it will be necessary to further expand the current ISFSI capacity to store the complete inventory of Units 2 and 3 spent fuel. The location, capacity, and technology to be employed have not yet been finalized.

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 removed from the Unit 2 and 3 reactors, respectively.

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

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 license shall:

- (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.
- **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 reactor vessel 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 is currently in the planning period. During the planning period the site is being 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 will be added to meet all of the site's needs.
- Initial site characterization activities are underway.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

- Plans to isolate the Spent Fuel Pools (referred to as “islanding”) are in development.
- Other necessary actions to facilitate safe system abandonment and removal (referred to as “cold and dark”) are in development.

When the required regulatory reviews, planning, and preparation are sufficiently complete, the site will move into active decontamination and dismantlement. Current plans are for that period to overlap with completion of the relocation of spent fuel from the Spent Fuel Pools to the ISFSI.

The SONGS facility will be decontaminated and dismantled to levels that permit termination of the NRC licenses and in accordance with the requirements agreed to by the United States Navy in the easement for the site. 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 *EnergySolutions* and references the site specific DCE being submitted concurrently.
- 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 is currently in the planning period transitioning to DECON as soon as necessary planning, approvals, and conditions permit doing so in a safe and cost-effective manner. DECON is defined in Section I.C of this report.

Table II-1 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 identified in Table II-1 are discussed in more detail in the sections that follow. The periods are logical groupings of activities. The categories are reflective of portions of the Nuclear Decommissioning Trust (NDT) funds which are based on specific regulatory requirements. The activities executed during these periods will, in many cases progress in parallel, and may not be as completely segregated as the text implies. For instance, while distinct decontamination and dismantlement activities are listed, it may be determined to be more effective from dose, labor, or waste perspectives to dismantle structures and systems and dispose of them as radioactive waste rather than decontaminate them and dispose of the balance as non-radioactive waste.

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 decommissioning activities unique to the site have been identified and no activities or environmental impacts outside the bounds considered in the GEIS have

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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.

Table II-1
San Onofre Nuclear Generating Station Units 2 and 3
Current Schedule of Decommissioning Periods

Task Name	Start	Finish
Part 50 License Termination (other than ISFSI)	06/07/2013	03/03/2033
Announcement of Cessation of Operations	06/07/2013	06/07/2013
Decon Period 1 – Transition to Decommissioning	06/07/2013	01/01/2014
Decon Period 2 – Decommissioning Planning and Site Modifications	01/01/2014	06/30/2015
Decon Period 3 – Decommissioning Preps/Reactor Internals Segmentation	06/30/2015	06/01/2019
Decon Period 4 – Plant Systems and Large Component Removal	06/01/2019	09/24/2022
Decon Period 5 – Building Decontamination	09/24/2022	04/20/2024
Decon Period 6 – License Termination During Demolition	04/20/2024	12/30/2032
Spent Fuel Management	06/07/2013	03/17/2051
SNF Period 1 – Spent Fuel Management Transition	06/07/2013	12/31/2013
SNF Period 2 - Spent Fuel Transfer to Dry Storage	01/01/2014	06/01/2019
SNF Period 3 – Dry Storage During Decommissioning – Units 1, 2 & 3	06/01/2019	12/05/2031
SNF Period 4 – Dry Storage Only – Units 1, 2 & 3	09/12/2031	12/30/2036
SNF Period 5 – Dry Storage Only – Units 2 & 3	12/30/2036	12/31/2049
SNF D&D Period 1 – ISFSI Part 50 License Termination	12/31/2049	06/24/2050
SNF D&D Period 2 – ISFSI Demolition	06/24/2050	03/17/2051
Site Restoration	06/07/2013	02/02/2052
SR Period 1 – Transition to Site Restoration	06/07/2013	06/30/2015
SR Period 2 – Building Demolition During Decommissioning	06/30/2015	07/11/2017
SR Period 3 – Subsurface Demolition Engineering and Permitting	07/09/2019	04/20/2024
SR Period 4 – Building Demolition to 3 Feet Below Grade	04/20/2024	07/02/2028
SR Period 5 – Subgrade Structure Removal Below -3 Feet	07/22/2028	09/12/2031
SR Period 6 – Final Site Restoration and Easement Termination	06/24/2050	02/02/2052
Final Easement Termination	02/02/2052	02/02/2052

Note [1]: Shipping dates are an assumption based on the previously documented positions of the DOE which indicates that shipments from the industry could begin as early as 2024 and SONGS place in the current queue. Both are certainly subject to changes.

A. Detailed Breakdown of License Termination Periods

The License Termination Periods (referred to as decontamination periods) include those activities necessary to remove or reduce the levels of radioactive contamination to levels necessary to terminate the Part 50 licenses for the site (other than the ISFSI) and release it back to the Navy. Also included are the development, submittal, and support for the review of the primary decommissioning documents.

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

Periods 1 and 2 generally consist of planning and transition of the site to a condition where it is ready for significant decontamination and dismantlement activities. As detailed above, these periods include: system abandonment and isolation of the remaining structures, systems and components (SSC) from normal power and water sources. System abandonment and isolation allow the decontamination and dismantlement to proceed safely and in an efficient sequence. Additionally, the selection of the contractor for managing the bulk of the decommissioning activities will be made.

Period 3 is focused on decontamination and dismantlement of the major components in the containment building (RV internals, vessel, head, steam generators, pressurizer, and main piping).

Period 4 addresses the decontamination and dismantlement of SSCs known to be substantially contaminated and the removal of the components from both Periods 3 and 4.

Period 5 is focused on decontamination of the various buildings. As noted elsewhere it may be more appropriate to simply proceed with dismantlement if it is more timely and cost-effective to simply dispose of building material as radioactive waste.

Period 6 is focused on the final site survey to confirm that the site is acceptable for release back to the Navy. The process for doing so (MARRSIM) was developed by the NRC and is the consensus standard endorsed by the Department of Defense as well as other stakeholders. Its application will be validated by the NRC.

Decontamination Period 1 – Transition to Decommissioning

- Announcement of Cessation of Operations
- Defuel Reactors
- Notification of Permanent Fuel Removal
- Disposition of legacy Low Level Radioactive Waste (LLRW)

Decontamination Period 2 – Decommissioning Planning and Site Modifications

- Preparation of Decommissioning Related Licensing Submittals
 - Permanently Defueled Technical Specifications (Submitted March 21, 2014)
 - Permanently Defueled Radiological Emergency Plan (Submitted March 31, 2014)
- Submit PSDAR, DCE and IFMP to NRC
- Perform Historical Site Assessment and Site Characterization
- Planning, Design, and Implementation of Cold and Dark (Site Repowering)
- Design and Install Spent Fuel Pool Islanding, Control Room Relocation, and Security Modifications
- Select Decommissioning General Contractor (DGC)

Decontamination Period 3 – Decommissioning Preparations and Reactor Internal Segmentation

- DGC Mobilization and Planning
- System Decontamination
- Reactor Internals Removal Preparations
- Reactor Internals Segmentation Planning and Implementation

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

- Purchase Dry Storage Canisters for GTCC Waste
- Segment and Package Reactor Internals for Storage in the ISFSI

Decontamination Period 4 – Plant Systems and Large Component Removal

- Upgrade Rail Spur in Owner Controlled Area
- Install Large Array Radiation Detection System to Monitor Shipments In/Out of Site
- Remove, Package, and Dispose of Non-Essential Systems
- Asbestos and Lead Abatement
- Spent Fuel Pool Closure
- Remove Spent Fuel Pool Racks, Spent Fuel Pool Island Equipment, and Bridge Crane
- Remove and Dispose of Legacy Class B and C Wastes
- Remove, Package, and Dispose of Essential Systems
- Removal and Disposal of Spent Resins, Filter Media, and Tank Sludge
- Large Component Removal
- Prepare License Termination Plan

Decontamination Period 5 – Building Decontamination

- Decontaminate Containment Buildings
- Decontaminate Turbine Buildings
- Decontaminate Fuel Handling Buildings
- Decontaminate Auxiliary Rad-waste Building
- Decontaminate Auxiliary Control Building
- Decontaminate Penetration Buildings
- Decontaminate Safety Equipment and Main Steam Isolation Valve (MSIV) Buildings
- Radiological Survey of Structures During Decontamination

Decontamination Period 6 – License Termination

- Final Status Survey
- Verification and NRC Approval

B. Detailed Breakdown of Spent Fuel Management Periods

The Spent Nuclear Fuel Management Periods began with all spent fuel off-loaded from the reactor vessel into the Spent Fuel Pools and the certification of permanent defueling letters submitted to the NRC in accordance with 10 CFR 50.82(a)(1)(ii) (References 4 and 5).

During Period 1 measures will be planned, designed, and implemented to ensure spent fuel storage and handling systems will continue to function to support fuel storage in the spent fuel pool and to facilitate transfer of the spent fuel to the ISFSI. Systems, structures, and programs needed to support the safe storage and transfer of spent fuel such as security, fire protection, and environmental and radiological

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

monitoring will be maintained in accordance with applicable requirements. Equipment maintenance, inspection, and operations will be performed on these systems and structures as appropriate.

During Period 2 the ISFSI capacity will be expanded to accommodate transfer of all spent fuel to dry storage. All spent fuel for Units 1, 2 and 3 will be transferred to the ISFSI and stored there until it is accepted by the Department of Energy and transferred to an off-site facility.

The next three periods reflect slightly different ISFSI conditions. Period 3 is concurrent with ongoing site decontamination and dismantlement activities. Period 4 reflects the ISFSI with spent fuel from all three units in dry storage and Period 5 recognizes the potential that Unit 1 fuel may be accepted by the DOE earlier than Units 2 and 3 spent fuel and ends with DOE acceptance of all Units 2 and 3 fuel.

The SNF D&D Periods (1 and 2) follow DOE acceptance and may be well after License Termination for the balance of the site.

Spent Nuclear Fuel Period 1 – Spent Fuel Transfer Management Transition

- Implementation of Initial Security Enhancements Required for Reductions in Staff
- Design and Fabricate Dry Storage Canisters for Current ISFSI Scope

Spent Nuclear Fuel Period 2 – Spent Fuel Transfer to Dry Storage

- Submit IFMP
- Select Dry Storage System Canister Design and Vendor for Balance of the ISFSI
- Design and Construct ISFSI Expansion
- Purchase, Deliver, and Load Dry Storage Canisters and Storage Models for Balance of the ISFSI
- Complete Transfer of Spent Fuel to ISFSI

Spent Irradiated Nuclear Fuel Period 3 – Dry Storage During Decommissioning Units 1, 2, and 3 Fuel

Spent Nuclear Fuel Period 4 – Dry Storage Only – Units 1, 2, and 3 Fuel

Spent Nuclear Fuel Period 5 – Dry Storage Only – Units 2 and 3 Fuel

Spent Nuclear Fuel Period D&D 1 – ISFSI License Termination

- Preparation and NRC Review of ISFSI Portion/Revision of License Termination Plan

Spent Nuclear Fuel Period D&D 2 – ISFSI Demolition

- Decontamination of Storage Modules (SFSMs)
- Final Status Survey of ISFSI
- Clean Demolition of HSFSM's and ISFSI Pad
- Clean Demolition of ISFSI Support Structures
- Restore ISFSI Site
- Preparation of Final Report on ISFSI Decommissioning and NRC Review

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

C. Detailed Breakdown of Site Restoration Periods

The Site Restoration periods reflect the planning and implementation of dismantlement activities not associated with radioactive materials. The DCE and descriptions below conservatively include activities from which the SONGS participants will plan to seek alternatives. These include the complete removal of the intake and discharge conduits in the Pacific Ocean currently required by the California State Lands Commission (CSLC) easement. Previously, the CSLC and SONGS developed an alternative for the SONGS Unit 1 conduits. Another is associated with removal of all subsurface structures that may be required by the US Navy easement. Typical practice is to remove structures to that depth necessary to remove contaminated materials. These activities are costly both from a funding and environmental impact perspective.

Also included as part of site restoration are severance costs and cost associated with returning the Mesa and other parcels to the U. S. Navy.

Site Restoration Period 1 –Transition to Site Restoration

- Severance Costs Associated with Staffing Reduction in Accordance with State Law
- Other off-site activities are included in the DCE but are not considered part of the Units 2 and 3 PSDAR activities

Site Restoration Period 2 –Building Demolition During Decommissioning

- Demolish South Access for Decommissioning, South Yard Facility
- Other off-site activities are included in the DCE but are not considered part of the Units 2 and 3 PSDAR activities

Site Restoration Period 3 – Subsurface Demolition Engineering and Permitting

- Hydro-geologic Investigation and Outfall Conduit Survey
- Subsurface Structure Removal Analyses for Lease Termination Activities
- Final Site Grading and Shoreline Protection Engineering Planning and Design

Site Restoration Period 4 – Building Demolition to Three Feet Below-Grade

- Demolition Preparations
- De-tension and Remove Containment Building Tendons
- Demolish Diesel Generator Buildings
- Demolish Condensate Buildings and Transformer Pads
- Demolish Full Flow Areas and Turbine Buildings
- Demolish Auxiliary Rad-waste Building
- Demolish Auxiliary Control Building
- Remove Systems and Demolish Make-up Demineralizer Structures
- Demolish Penetration Buildings
- Demolish Safety Equipment and MSIV Buildings
- Demolish Fuel Handling Buildings
- Demolish Containment Buildings

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

- Demolish Intake and Discharge Structures

Site Restoration Period 5 – Subgrade Structure Removal Below Three Feet (if required)

- Install Sheet Piling and Excavation Shoring, Dewatering System, and Effluent Treatment and Discharge Controls
- Demolish and Backfill Subsurface Structures
- Demolish and Backfill Intake Structure Inside Seawall
- Remove Off-shore Intake and Outfall Conduits
- Remove Sheet Piling and Excavation Shoring, and Perform Dewatering and Effluent Treatment
- Finish Grading and Re-vegetate Site As Needed/Required

Site Restoration Period 6 – Final Site Restoration and Easement Termination

- Install Dewatering System and Effluent Treatment and Discharge Controls
- Remove and Stockpile Existing Seawall Erosion Protection
- Remove Seawall and Pedestrian Walkway
- Remove Remaining Intake Structure Beneath Seawall
- Backfill and Compaction of Excavation
- Remove Dewatering System and Effluent Treatment
- Remove Railroad Tracks, Stabilized Slopes, Access Road, and North Parking Lot
- Finish Grading and Re-vegetate Site as Needed/Required

D. 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 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 piping and components. Following RV and cavity reflood and RV head removal and disposal; the reactor vessel internals will be removed from the reactor vessel 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 reactor vessel.

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

When the internals segmentation effort is completed, the reactor vessel and cavity will be drained and any remaining debris will be removed.

Removal of the reactor vessel follows the removal of the reactor internals. It is likely that the components would 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, 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 including steel framing and concrete surfaces. 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 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

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 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 will be 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 will be 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.

Class A LLRW will be disposed at a licensed disposal site. (SONGS has contracted with EnergySolutions to use the facility located in Clive, Utah as well as WCS). If other licensed Class B and C LLRW facilities become available in the future, SONGS may choose to use them as well.

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. 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 ensure that

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 has prepared an updated site-specific DCE for SONGS, which also provides projected costs of managing irradiated fuel, as well as non-radiological decommissioning and other site restoration costs, accounted for appropriately. The site-specific decommissioning cost analysis is being submitted concurrently and fulfills 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 are provided in the Irradiated Fuel Management Plan also being concurrently submitted in accordance with 10 CFR 50.54(bb).

The methodology used by EnergySolutions to develop the site-specific decommissioning cost analysis follows the basic approach originally advanced by the Atomic Industrial Forum (now Nuclear Energy Institute) in their program to develop a standardized model for decommissioning cost estimates. The results of this program were published as AIF/NESP-036, "A Guideline for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (Reference 7). This document presents a unit cost factor method for estimating direct activity costs, simplifying the estimating process. The unit cost factors used in the study reflect the latest available data at the time of the study concerning worker productivity during decommissioning.

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

The decommissioning of the SONGS site will be funded from Nuclear Decommissioning Trusts established by each participant for each unit. The relative liabilities of each participant are detailed in Attachment 1. 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 seeking NRC approval to use the Nuclear Decommissioning Trust Funds for all three categories of activities detailed in Section II.

As discussed in Section IV of the IFMP the CPUC will establish processes for oversight of withdrawals from the nuclear decommissioning trusts by SCE and SDG&E, and designate the specific amounts from the existing fund balances that are available for the three decommissioning cost categories: 1) spent fuel management; 2) site restoration; and 3) license termination. 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. 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 (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. These activities include those related to the decision to permanently cease operations, irradiated fuel management in wet or

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

dry storage, irradiated fuel transport and disposal, and the treatment, and/or disposal of LLRW. SCE similarly excluded consideration of such activities 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 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 summarizes the full Environmental Impact Evaluation (Reference C) focusing on the reasons for reaching this conclusion.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 plans to seek an easement lease amendment from the CSLC for the partial removal abandonment in place of the SONGS Units 2 and 3 intake and discharge conduits on the seabed. In addition, the existing rail spur serving the site will most likely be used in support of radioactive waste shipments.

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 acquires 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 its condenser cooling and service water cooling functions. The operational demand for cooling and makeup water has been significantly reduced since SONGS Units 2 and 3 permanently ceased operation. Condenser cooling is not required when the plant is not operating and service water cooling demands have been reduced to the extent possible (primarily spent fuel pool cooling). The normal operation demand was previously over 830,000 gpm per unit and is currently approximately 34,000 gpm total for both Units 2 and 3. During the decommissioning period, SONGS intends to continue to reduce cooling 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). Water uses are anticipated to be significantly less than during operation. Thus water use impacts during decommissioning are bounded by the GEIS.

3. Water Quality – Non-Radiological

San Onofre Nuclear Generating Station Units 2 and 3 **Post-Shutdown Decommissioning Activities Report**

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 condenser cooling and service water cooling functions. Water used for cooling functions is discharged through the ocean outfalls for Units 2 and 3, 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 may be merged into a single NPDES Permit which would also continue to address 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 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 removal, the area will be assessed and controlled. Due to the implementation of BMPs, compliance with permits, and the unlikelihood of low concentrations of hazardous substances, 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. 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).

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

The most likely 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 or refueling outages.

The NRC's GEIS generically 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 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 96 percent from normal operating flows. The remaining flow is primarily associated with cooling spent fuel while in wet storage. As noted earlier, spent fuel storage is an existing operational activity and is not re-addressed as part of this environmental review. Therefore, its impacts are out-of-scope for assessing impacts from decommissioning. SONGS will continue to comply with its applicable regulatory and permit requirements associated with reduction of impingement and entrainment impacts due to water withdrawals.

SCE sought and obtained an amendment to the CSLC easement lease for Unit 1 which allowed the intake and discharge conduits to remain on the seafloor. SCE is planning to pursue similar amendments for SONGS Units 2 and 3. If the CSLC approves the amendment to allow SCE to abandon the conduits in place, the environmental impacts are projected to be SMALL with the application of appropriate mitigation measures enumerated in the lease amendment. Complete removal of the conduits, as is currently required by the CSLC lease, is anticipated to have more significant environmental impacts. The detailed Environmental Impact Evaluation presumes the CSLC lease is amended. If the CSLC easement lease is not amended, the environmental impacts from complete removal of the conduits will have to be further addressed and could require an update to the PSDAR and other regulatory interactions.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 storm water pollution prevention plan, 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 easement 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 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 prior to active dismantlement, SCE will file a coastal development permit application with the CCC. As part of this permitting process, decommissioning activities within the coastal sage habitat areas, coastal bluff, and beach areas will be reviewed by the

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

CCC for potential environmental impacts particularly for the federally listed coastal California gnatcatcher and other protected species and species of concern. The need to implement mitigation measures would be conditions of 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. These species are listed in [Table IV-1], along with their protection status and critical habitat designation. 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.

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 daylight working 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 2012 survey of the site. Decommissioning activities will generally be confined to previously disturbed areas (e.g., paved, high traffic) areas. Otherwise, the SCE environmental staff will conduct an environmental assessment per established procedures. The

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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.

Table IV-1

Threatened and Endangered Species Identified within the Vicinity of SONGS

Scientific Name	Common Name	State Status ^(a)	Federal Status ^(b)	Critical Habitat within Vicinity
AMPHIBIAN SPECIES				
Anaxyrus californicus	Arroyo toad	—	FE	yes ^(c)
AVIAN SPECIES				
Charadrius alexandrinus nivosus	Western snowy plover	—	FT	yes ^(c)
Empidonax traillii extimus	Southwestern willow flycatcher	SE	FE	No
Haliaeetus leucocephalus	Bald eagle	SE	delisted	No
Poliophtilacalifornica californica	Coastal California gnatcatcher	—	FT	yes ^(c)
Vireo bellii pusillus	Least Bell's vireo	SE	FE	yes ^(c)
FISH SPECIES				
Orcorhynchus mykiss	Steelhead trout	—	FE	yes ^(c)
INVERTEBRATE SPECIES				
Branchinecta sandiegoensis	San Diego fairy shrimp	—	FE	yes ^(c)
Streptocephalus woottoni	Riverside fairy shrimp	—	FE	No

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

Scientific Name	Common Name	State Status ^(a)	Federal Status ^(b)	Critical Habitat within Vicinity
MAMMALIAN SPECIES				
Dipodomys stephensi	Stephen's kangaroo rat	ST	FE	No
Perognathus longimembris pacificus	Pacific pocket mouse	—	FE	No
PLANT SPECIES				
Brodiaea filifolia	Thread-leafed brodiaea	SE	FT	yes ^(c)
REPTILIAN SPECIES				
Caretta caretta	Loggerhead sea turtle	—	FE	No
Chelonia mydas	Green sea turtle	—	FT	No
Dermochelys coriacea	Leatherback sea turtle	—	FE	No
Lepidochelys olivacea	Olive Ridley's turtle	—	FT	No

- a. SE = state endangered; ST = state threatened;
- b. FE = federally endangered; FT = federally threatened
- c. The USFWS has critical habitat delineated within the SONGS site vicinity. However, the designation explicitly excludes Camp Pendleton and thus the SONGS site. Further, the term vicinity includes any area within a 6 mile radius of the site and is not limited to the site itself.

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. SCE is evaluating options to significantly reduce, if not eliminate, all routine liquid effluents through the use of self-contained clean-up systems for ongoing systems and activities.

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.

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 reactor vessel 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.

San Onofre Nuclear Generating Station Units 2 and 3 Post-Shutdown Decommissioning Activities Report

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 reactor vessels 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 draft waste confidence GEIS (Reference 9) continues to consider severe accidents involving the spent fuel pool to be a SMALL risk.

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

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 Decommissioning Cost Estimate being submitted concurrently.

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.

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 2 & 3 decommissioning activities. As generic NRC guidance recognizes, if no significant offsite impacts occur in connection with

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 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, 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

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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.

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 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 likely 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

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

wastes are less than half 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 1,500 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. SCE estimated peak truck traffic due to waste shipments to be approximately 22 per day. 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 review for the Unit 1 conduit disposition indicated that impacts to recreational and commercial transportation would be insignificant.

18. Irreversible and Irrecoverable 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 property would be returned to the U.S. Navy under negotiated terms of the easement. 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.

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. California has 15 active landfills permitted to receive industrial, construction, and demolition waste. The anticipated decommissioning waste from SONGS Units 2 and 3 represents less than 1 percent of the remaining local capacity and an even smaller fraction of the overall capacity.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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 need to be further addressed. The previous topic summaries address a sufficiently wide range of issues.

E. Conclusion

SCE has performed an environmental review to evaluate 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 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. This 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.
- 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.

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

- 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.
- SCE will seek and comply with an amendment to its CSLC easement lease to largely abandon the intake and discharge conduits in place.
- SCE will seek and comply with a coastal development permit from the CCC for decommissioning.

DRAFT

San Onofre Nuclear Generating Station Units 2 and 3
Post-Shutdown Decommissioning Activities Report

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-DCE-001, "2014 Decommissioning Cost Analysis of the San Onofre Nuclear Generating Station Units 2 and 3," August 2014
- Enercon Technical Data Record No. SONGS002, "SONGS Units 2 and 3 Environmental Impact Evaluation," June 2014

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.
2. Letter from Robert C. Brabec (SCE) to the Nuclear Regulatory Commission dated March 31, 2014; Subject: Decommissioning Funding Status Report, San Onofre Nuclear Generating Station Units 2 and 3
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
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
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
6. U. S. Nuclear Regulatory Commission; NUREG-0586, "Final Generic Environmental Impact Statement (GEIS) on Decommissioning Nuclear Facilities" (November 2002)
7. AIF/NESP-036, "A Guideline for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates"
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, "Waste Confidence Generic Environmental Impact Statement, Draft Report for Comment" (September 2013)
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)