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Southern California Edison's Evaluation of California Energy Commission AB 1632 Report Recommendations



February 2011

Southern California Edison’s Evaluation of California Energy Commission AB 1632 Report Recommendations

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EXECUTIVE SUMMARY

Purpose

The following submittal was prepared in response to the California Public Utilities Commission's (CPUC) direction to SCE to address certain topics regarding the San Onofre Nuclear Generating Station Unit Nos. 2 & 3 (SONGS 2 & 3), and as recommended by the California Energy Commission's (CEC) 2008 report, "*An Assessment of California's Nuclear Power Plants: AB 1632 Report*" (AB 1632 Report).¹

The CEC issued the AB 1632 Report in response to Assembly Bill (AB) 1632, which directs the CEC to "assess the potential vulnerability of California's largest baseload power plants, [including SONGS 2 & 3], to a major disruption due to a seismic event or plant aging."² The AB 1632 Report provides a number of other recommendations directed to SCE.

The CPUC stated that SCE's evaluations related to the AB 1632 Report recommendations would allow the CPUC to undertake "its AB 1632 obligations to ensure plant reliability."³ The CPUC further indicated that it would also use SCE's studies in connection with its evaluation of the "overall economic and environmental costs and benefits of license extension for SONGS."⁴

Summary of Study Results

In accordance with the CPUC's request and the CEC's recommendations, SCE has addressed the following topics:

- A. Seismic and Tsunami Evaluations
- B. Emergency Preparedness
- C. Low Level Radioactive Waste
- D. Used Fuel Management

¹ Letter to Mr. Alan J. Fohrer, Chairman and Chief Executive Officer of the Southern California Edison Company dated June 25, 2009, from Mr. Michael R. Peevey, President of the California Public Utilities Commission (CPUC June 25, 2009 Letter to SCE); California Energy Commission's November, 2008 Commission Report, "*An Assessment of California's Nuclear Power Plants: AB 1632 Report*" (AB 1632 Report).

² AB 1632 Report, p. 1; Cal. Pub. Resources Code § 25303(a)(8).

³ CPUC June 25, 2009 Letter to SCE.

- E. Economic Impact
- F. Nuclear Safety Culture
- G. Ground Water Protection
- H. Worker Training and Recruitment
- I. Alternative Generation
- J. Once Through Cooling
- K. Adequacy of Maintenance Programs

The sections below briefly summarize the evaluations contained in this submittal. The evaluations demonstrate that SONGS 2 & 3 is operated in a safe and reliable manner, in accordance with federal, state, and local regulatory requirements, and that SONGS 2 & 3 can continue to provide reliable operation through a period of extended operation, if the NRC grants license renewal for SONGS 2 & 3.

A. Seismic and Tsunami Evaluations

To support the reliability study, SCE updated the relevant portion of the SONGS probabilistic seismic hazard analysis (PSHA) in 2010 using the most recent seismic data available from the “Uniform California Earthquake Rupture Forecast, Version 2” (UCERF-2), the National Seismic Hazard Program, and the current United States Geological Survey (USGS) analysis of the UCERF-2 data. The results from the SONGS 2010 PSHA are comparable to the SONGS 1995 PSHA, indicating that the assessment of SONGS seismic hazard risk has not changed. SCE plans to continue evaluating the SONGS seismic hazard for SONGS through its on-going seismic hazard analysis program, as indicated in SCE’s 2012 General Rate Case.

SCE completed a study to identify any non-safety-related SONGS structures, systems or components (SSCs) that are important to reliability and could be the cause of a prolonged outage due to a seismic event.⁵ The study results indicate that further evaluation of the offshore discharge conduits (pipes) is required to assess the conduits’ seismic capacity. All

Continued from the previous page

⁴ *Id.*

⁵ The scope of the study was limited to non-safety-related SSCs, consistent with the AB 1632 Report’s scope description, which concluded that safety-related SSC are designed to withstand a very large earthquake.

other important-to-reliability, non-safety-related SSCs would not be the cause of a prolonged outage following a seismic event.

In addition to these studies, SCE reviewed the lessons learned from the Kashiwazaki-Kariwa nuclear power plant following the 2007 Niigata-Chuetsu-Oki earthquake in Japan. SCE's review included published reports of lessons learned prepared by the Institute of Nuclear Power Operations (INPO), Electric Power Research Institute (EPRI), and the International Atomic Energy Agency (IAEA). To determine SONGS' level of preparedness for a seismic event, SCE applied these lessons learned to SONGS. SCE's review of SONGS' design, processes, and procedures for earthquakes indicates that SONGS is well prepared for a seismic event. SCE's review of the lessons learned shows that the seismic hazard for SONGS is properly understood, and SONGS has appropriate design features, processes, and procedures to respond to earthquakes.

SCE also reassessed the tsunami hazard for SONGS by evaluating new data jointly prepared by the State of California Office of Emergency Services, California Geologic Survey, the University of Southern California Tsunami Research Center, and the National Oceanic and Atmospheric Administration. SCE determined that the seawalls for SONGS will provide ample margin for the highest potential tsunami, as determined by these independent parties, indicating that there is no potential tsunami impact to the SONGS site.

Appendices 1 – 5 provide further information regarding SCE's seismic and tsunami studies.

B. Emergency Preparedness

In the event of an emergency at SONGS, SCE's highest responsibility is safeguarding the surrounding communities and plant workers. SCE periodically reassesses the access roads and surrounding roadways near SONGS and confirms that they are adequate for allowing emergency personnel to reach SONGS and local communities and non-essential plant workers to evacuate when appropriate in the event of an emergency.

Further, SONGS' Emergency Preparedness Program is approved by the NRC and implemented pursuant to NRC and FEMA regulations. SCE and federal, state, and local authorities have successfully conducted periodic emergency-preparedness training drills for SONGS overseen by the NRC and FEMA. The results of these drills demonstrate the

effectiveness of the emergency plans and coordination between SONGS and federal, state, and local agencies in implementing those plans.

Appendices 6-7 provide a copy of SCE's Evacuation Time Evaluation (ETE) Final Report, and an Annual Assessment of the SONGS ETE.

C. Low Level Radioactive Waste (LLW)

SONGS has adequate plans for the disposal of, and sufficient space on-site for the interim storage of all classes and types of LLW, including through the period of extended operation and subsequent decommissioning period in the event the NRC grants license renewal for SONGS 2 & 3.⁶ SCE provides its forecasts for the volumes and disposal costs for LLW in Section III.C.

D. Used Fuel Management

SCE complies with all NRC requirements for used fuel storage. SCE will continue to adhere to its current used fuel management plan in which used fuel for SONGS 2 & 3 is stored in used fuel pools or dry cask storage containers. SCE transfers used fuel from the SONGS 2 & 3 used fuel pools to the dry cask storage (otherwise known as the Independent Spent Fuel Storage Installation or ISFSI) as necessary to maintain full core offload capability in the used fuel pools. SCE's used fuel management plan provides for the safe and secure storage of used fuel, until the U.S. Department of Energy (DOE) meets its acknowledged contractual obligations to remove the used fuel from the site.

E. Economic Impact

SCE studied the economic impact of SONGS 2 & 3 operations. The study showed that SONGS 2 & 3 operations affect a large number of sectors within the California economy. Overall, SONGS 2 & 3 operations directly and indirectly support approximately 9,400 jobs, and impact the California economy by more than \$3.3 billion per year.

SCE cannot assess or compare the economic impact of alternate uses of the SONGS site because SCE leases the land for SONGS from the Department of the Navy under long-term agreements that specify SCE's use of the land. The future alternate uses of the land would be at the discretion of the Department of the Navy. At this time, SCE has no information

⁶ The operating licenses for SONGS 2 & 3 expire in 2022. If the NRC grants license renewal for SONGS 2 & 3, the period of extended operation would be from 2023 to 2042.

regarding the alternate uses the Department of the Navy may consider once SONGS 2 & 3 is permanently shut down and decommissioned.

F. Nuclear Safety Culture

SCE is committed to preserving and improving a strong nuclear safety culture at SONGS. SCE is committed to ensuring an atmosphere exists that encourages workers to raise nuclear safety concerns. SCE has taken a number of actions to improve the nuclear safety culture including strengthening communications regarding nuclear safety culture and Safety Conscious Work Environment (SCWE); training station employees on nuclear safety culture, SCWE and the methods for raising nuclear safety concerns; and establishing mechanisms to monitor and assess nuclear safety culture, including the effectiveness of the aforementioned actions. SCE will continue to identify, through systematic reviews, actions to strengthen the SONGS nuclear safety culture.

The NRC continues to monitor SCE's nuclear safety culture efforts and overall plant performance through the NRC's Reactor Oversight Process (ROP). In their 2010 annual assessment letter, the NRC continued to affirm that SONGS has been operated in a manner that preserved public health and safety and fully met all cornerstone objectives. In December 2010, the NRC indicated that, while more improvement is needed, measurable progress has been made in addressing the SONGS performance issues. SCE concurs with this conclusion and continues to take actions to resolve remaining open issues and to achieve a stronger nuclear safety culture at SONGS.

G. Ground Water Protection

SCE has implemented the objectives of the nuclear industry Ground Water Protection Initiative (GPI) and the EPRI ground water protection guidelines at SONGS 2 & 3. The NRC has also assessed SCE's performance to meet the industry GPI and found that SCE met all of the objectives for a ground water protection program.

H. Worker Training and Recruitment

SCE is meeting the competitive challenge for hiring and training qualified nuclear workers in important and difficult to fill skill areas by continuing its: 1) recruitment programs for replacement of retiring workers for critical SONGS positions; 2) training programs for employees; and 3) ensuring knowledge and strong safety culture are instilled in new SONGS workers. These programs include educational partnerships with local southern California

schools that provide a pipeline of highly qualified workers for critical positions. By investing in the intellectual capital of the next generation workforce, SCE ensures it will continue to maintain the reliable operation of the plant.

I. Alternative Generation

SCE plans to submit to the CPUC an application requesting funding necessary to submit and process a SONGS license renewal application at the NRC. The CPUC application, which SCE currently expects to file in early 2011, will include a cost-effectiveness analysis of alternative power generation that will allow the CPUC to determine that the extended operation of SONGS 2 & 3 would be beneficial for SCE's customers and the state.

J. Once Through Cooling

On May 4, 2010 the State Water Resources Control Board (SWRCB) adopted a policy on the use of coastal and estuarine waters for power plant cooling. In this submittal, SCE describes the policy requirements, which became effective October 1, 2010, and the need to proceed with SONGS license renewal activities as SCE addresses the implementation of this policy, as applicable to SONGS.

Consistent with the directives of the California Coastal Commission (CCC), SCE has fully mitigated for the impact of SONGS 2 & 3 on the marine environment. In addition, cooling towers are not feasible at SONGS 2 & 3 and an alternative means of compliance will be required to allow SONGS 2 & 3 to enter a period of extended operation in the event the NRC grants license renewal for SONGS 2 & 3.

K. Adequacy of Maintenance Programs

To ensure adequate maintenance programs of SSCs, SCE follows maintenance initiatives, standards, and methodologies issued by a number of entities, including but not limited to the NRC, EPRI, American Society of Mechanical Engineers (ASME), and Institute of Electrical and Electronic Engineers (IEEE). SCE assures the reliability of SONGS' SSCs by implementing maintenance programs that guide the performance of: (1) periodic, predictive, and planned maintenance; (2) corrective maintenance; (3) performance monitoring; and (4) periodic testing and inspection. SCE's implementation of these maintenance programs meets the nuclear industry maintenance standards and has resulted in reliable service for customers. The maintenance programs provide a solid basis for reliable plant operations through a possible period of extended operation.

Conclusion

SONGS 2 & 3 is operated in a safe and reliable manner, in accordance with federal, state, and local regulatory requirements, and provides the needed electricity to meet customers' demands. Rated at 1,070 megawatts (MW) and 1,080 MW, respectively for each unit, SONGS 2 & 3 generates enough electricity to serve 1.4 million average southern California homes every day. In addition, SONGS 2 & 3 generates clean, low-carbon electricity, in support of the state's environmental and greenhouse gas (GHG) policy objectives. Further, due to the location of SONGS 2 & 3 between two major metropolitan areas in San Diego, Los Angeles, Orange, and other counties in southern California, SONGS 2 & 3 is integral to adequately maintaining the reliability of the electric grid in southern California.

In response to the CPUC's request and the CEC's AB 1632 Report recommendations, SCE provides its evaluations of the above-referenced topics in this submittal. These evaluations demonstrate that SONGS can continue to provide reliable operation through a period of extended operation, if the NRC grants license renewal for SONGS 2 & 3.

I.

PURPOSE OF SUBMITTAL

The following submittal was prepared in response to the California Public Utilities Commission's (CPUC) direction to SCE to address certain studies regarding the San Onofre Nuclear Generating Station Unit Nos. 2 & 3 (SONGS 2 & 3),⁷ and as recommended in the California Energy Commission's (CEC) 2008 report, "*An Assessment of California's Nuclear Power Plants: AB 1632 Report*" (AB 1632 Report).

The CEC issued the AB 1632 Report in response to Assembly Bill (AB) 1632, which directs the CEC to "assess the potential vulnerability of California's largest baseload power plants, [including SONGS 2 & 3], to a major disruption due to a seismic event or plant aging."⁸ The AB 1632 Report provides a number of other recommendations directed to SCE.

The CPUC stated that SCE's evaluations related to the AB 1632 Report recommendations would allow the CPUC to undertake "its AB 1632 obligations to ensure plant reliability."⁹ The CPUC further indicated that it would also use SCE's studies in connection with its evaluation of the "overall economic and environmental costs and benefits of license extension for SONGS."¹⁰

In accordance with the CPUC's request and the CEC's recommendations, SCE has addressed the following topics:

- A. Seismic and Tsunami Evaluations
- B. Emergency Preparedness
- C. Low Level Radioactive Waste
- D. Used Fuel Management
- E. Economic Impact
- F. Nuclear Safety Culture
- G. Ground Water Protection
- H. Worker Training and Recruitment
- I. Alternative Generation

⁷ *Id.*

⁸ AB 1632 Report, p. 1; Cal. Pub. Resources Code § 25303(a)(8).

⁹ CPUC June 25, 2009 Letter to SCE.

¹⁰ *Id.*

J. Once Through Cooling

K. Adequacy of Maintenance Programs

II.

OVERVIEW OF SONGS 2 & 3

SONGS 2 & 3 consists of two pressurized water reactor (PWR) nuclear power plants rated at 1,070 megawatts (MW) and 1,080 MW, respectively, enough to serve 1.4 million average southern California homes.¹¹ Each nuclear generating unit consists of a nuclear steam supply system, a turbine-generator, and all related equipment and facilities that are necessary for the safe and efficient generation of electrical energy.

SONGS 2 & 3 is jointly owned by SCE (78.21%), San Diego Gas & Electric (20%), and the City of Riverside (1.79%). SCE acquired the City of Anaheim's prior ownership interest in SONGS 2 & 3 pursuant to a December 20, 2005, Settlement Agreement, and in accordance with that agreement, the City of Anaheim retained all liabilities and obligations arising out of its prior ownership of SONGS 2 & 3.¹² SCE is authorized to act as agent for the other co-owners.

SONGS 2 & 3 is located on an approximately 84-acre site on the San Diego County coast, near San Clemente, California. The SONGS 2 & 3 site is located entirely within the boundaries of the United States Marine Corps Base Camp Pendleton, on property leased from the United States Government.

SONGS consists of the Plant Site and the Mesa Site. The Plant Site, which is on the west side of the I-5 freeway, includes the SONGS 2 & 3 unit reactors and electric generating facilities. The Plant Site also includes a Used Fuel Dry Cask Storage Facility,¹³ electrical substation, and several administrative buildings. The Mesa Site, which is on the east side of the I-5 freeway, includes the Emergency Operations Facility, the Training and Education Center, the SONGS Warehouse, and administrative and support buildings. The Mesa Site is approximately 3.5 miles by road from the Plant Site.

¹¹ SONGS operating reactors are two (2) out of 104 nuclear units in the U.S. that collectively generate almost 20% of the total U.S. electricity generation.

¹² Decision (D.) 06-11-025. These include the City of Anaheim's ownership interest in used nuclear fuel generated during the period it held an ownership share of SONGS 2 & 3, and its share of the costs necessary to store the used fuel in SONGS 2 & 3 used fuel pools and dry cask storage.

¹³ The Used Fuel Dry Cask Storage Facility is also referred to as the Independent Spent Fuel Storage Installation (ISFSI).

III.

SCE'S EVALUATION OF CALIFORNIA ENERGY COMMISSION AB 1632 REPORT RECOMMENDATIONS

A. SEISMIC AND TSUNAMI EVALUATIONS

1. Introduction

This section addresses the seismic and tsunami recommendations¹⁴ contained in the AB 1632 Report regarding SCE's:

- Update of the SONGS seismic hazard analysis
- Update of the SONGS tsunami hazard analysis
- Evaluation of lessons learned from the Kashiwazaki-Kariwa (KK) nuclear power plant following the 2007 earthquake
- Evaluation to identify any non-safety-related structures, systems and components (SSCs) that could be the cause of a prolonged outage due to a seismic event
- Additional seismic evaluations

2. Seismic Hazard Analysis

SCE updated the SONGS probabilistic seismic hazard analysis (PSHA). The PSHA uses the Uniform California Earthquake Rupture Forecast, Version 2 (UCERF-2),¹⁵ the National Seismic Hazard Mapping Program,¹⁶ and the current United States Geological Survey (USGS) implementation of the UCERF-2 seismic source characterization.¹⁷ Additionally, the SONGS 2010 PSHA was completed by using the 2008 Next Generation Attenuation¹⁸ relationships. The seismic hazard evaluation was performed to an earthquake return period of 10,000 years or less, which supports the

¹⁴ CPUC June 25, 2009 Letter to SCE; AB 1632 Report, pp. 9-10, 13.

¹⁵ "The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF-2)," 2007 Working Group on California Earthquake Probabilities, USGS Open File Report 2007-1437.

¹⁶ "Documentation for the 2008 update of the United State National Seismic Hazard Maps," United States Geological Survey (USGS), Open-File Report 2008-1128.

¹⁷ Appendix 1, "San Onofre Nuclear Generating Station, Seismic Hazard Assessment Program, 2010 Probabilistic Seismic Hazard Analysis Report."

¹⁸ Next Generation Attenuation, 2008, Earthquake Spectra, v. 24, no. 1, pp. 1-341.

seismic reliability report discussed below. The results from the SONGS 2010 PSHA are comparable to the SONGS 1995 PSHA, indicating that the assessment of SONGS seismic hazard risk has not changed.

3. Tsunami Hazard Analysis

SCE updated the SONGS tsunami hazard analysis. The elevation at the top of the SONGS 2 & 3 seawall is 30 feet mean lower low water (mllw) and at the North Industrial Area seawall is 28.2 feet mllw. Using the data provided in the “*Tsunami Inundation Map For Emergency Planning*,”¹⁹ the new maximum tsunami height is approximately 22.9 feet mllw. During the preparation of the “*Tsunami Inundation Map For Emergency Planning*,” the North Industrial Area seawall was inadvertently excluded and the inundation map erroneously indicated the potential for flooding.²⁰ The North Industrial Area seawall protects the SONGS North Industrial Area from beach erosion, wave action, and storm and tsunami surges. The seawalls for SONGS 2 & 3 and the North Industrial Area will provide approximately 7.1 feet and 5.3 feet of margin, respectively, above the maximum tsunami, indicating that there is no potential tsunami impact to the SONGS site.

4. Evaluation of Lessons Learned from KK Nuclear Plant

SCE reviewed the following reports to assess the lessons learned from the KK nuclear plant following the 2007 Niigata-Chuetsu-Oki (NCO) earthquake:

- Institute of Nuclear Power Operations (INPO), Significant Event Notification: SEN 269, “*Earthquake at Kashiwazaki-Kariwa*,” October 24, 2007
- Electric Power Research Institute (EPRI), “*EPRI Independent Peer Review of the TEPCO²¹ Seismic Walkdown and Evaluation of the*

¹⁹ “Tsunami inundation Map For Emergency Planning,” 2009, prepared jointly by the State of California Office of Emergency Services, California Geologic Survey, the University of Southern California Tsunami Research Center, and the National Oceanic and Atmospheric Administration.

²⁰ Appendix 2, “Tsunami Hazard Evaluation.”

²¹ The Tokyo Electric Power Company, Inc. (TEPCO) is the owner and operator of the KK Nuclear Power Plant in Japan.

Kashiwazaki-Kariwa Nuclear Power Plants,” Product ID: 1016317,
January 2008

- International Atomic Energy Agency (IAEA), “*Preliminary Findings and Lessons Learned from the 16 July 2007 Earthquake at Kashiwazaki-Kariwa NPP,*” Mission Reports Volumes 1 and 2, August 17, 2007

The six key lessons learned identified in these three independent reports are that nuclear plant operators should:

- Understand the site’s seismic hazard
- Have an on-going seismic program
- Have procedures for earthquake response actions
- Have adequate fire protection measures
- Have provisions to minimize the unintended release of radioactive liquid to the environment
- Consider ground deformation at a plant site during design and construction

SCE has applied these six lessons learned to SONGS and determined the following:

- SCE properly determined the SONGS seismic hazard as part of the initial NRC licensing process. SCE continued to update SONGS seismic hazard assessment based on new and relevant seismic information.
- SCE has established an active on-going seismic program to assess the seismic hazard for the SONGS site. Under this program, new seismic data and new developments in seismic research relevant to SONGS are reviewed.
- SONGS operators have written procedures on the actions to be taken when earthquake ground motions occur at the site. These actions include determining the earthquake accelerations so that the appropriate activities can be performed to ensure plant safety.

- SONGS maintains an on-site, full-time, dedicated fire department with multiple alternative fire protection systems available to respond to fires.
- SCE assessed the potential for unmonitored releases of radioactive liquids to the environment at SONGS and identified possible radiological sources, potential areas where leaks could occur, early detection techniques, spill containment features, and mitigation measures. SONGS has taken actions to minimize the potential for an unintended release.²²
- Much of the damage to the KK nuclear plant was caused by large ground deformations. The SONGS site will not have large ground deformations, due to its location within the San Mateo geological formation, which was studied and tested prior to constructing SONGS. Testing has demonstrated that the soil at SONGS is not prone to liquefaction or extensive settlement during a seismic event.

In summary, when applying the lessons to be learned from the KK nuclear plant earthquake experience to SONGS,²³ a review of SONGS design, processes and procedures indicate that SONGS is well prepared for a seismic event. SCE has properly understood the seismic hazard for SONGS, which is designed appropriately for earthquakes. SCE has and continues to review new seismic data and developments in seismic research for the purpose of assuring the safe and reliable operation of SONGS.

5. Seismic Reliability Evaluation

SCE completed a study to identify any important-to-reliability, non-safety-related SSCs that could be the cause of a prolonged outage due to a seismic event. The study²⁴ evaluated the non-safety-related SSCs that are required for power generation; these non-safety-related SSCs are considered important-to-reliability. Additionally, SCE

²² Section III.G provides additional information regarding ground water protection.

²³ Appendix 3, "Lessons Learned from Kashiwazaki-Kariwa Nuclear Power Plant."

²⁴ Appendix 4, "Seismic Reliability Study of San Onofre Generating Station Non-Safety-Related Structures, Systems, and Components."

evaluated the SONGS non-power block buildings that are needed to support power generation.

SCE determined that further evaluation of the offshore discharge conduits is required to assess the conduits' seismic capacity. All other important-to-reliability, non-safety-related SSCs would not be the cause of a prolonged outage following a seismic event. Two non-power block buildings were identified as important-to-reliability, and would not be the cause of a prolonged outage following a seismic event.

6. Additional Seismic Evaluations

The AB 1632 Report also made the following two recommendations regarding seismic hazards research: (1) develop an active seismic hazards research program; and (2) use three-dimensional seismic reflection mapping, other techniques, and a permanent GPS array for resolving seismic uncertainties for SONGS. As indicated in SCE's 2012 General Rate Case, SCE has established and is seeking funding for an on-going seismic program for SONGS.²⁵ Additionally, SCE has proposed three categories of planned future work: (1) re-processing and re-analyzing existing data using more modern digital and numerical computer processes; (2) supplementing existing geodetic and seismological networks; and (3) completing new 2-D and 3-D offshore and onshore geophysical survey programs as necessary.²⁶

Another recommendation in the AB 1632 Report was to evaluate changes to seismic design standards and compliance with current building codes. SCE completed the evaluation and the results indicated that the SONGS 2 & 3 non-safety-related SSC designs are comparable to the current building codes and applicable seismic design standards.²⁷

7. Conclusion

The seismic and tsunami recommendations that were directed toward SCE in the AB 1632 Report have been addressed in this section. The relevant conclusions are

²⁵ A.10-11-015, SCE-2, Volume 10, p. 43.

²⁶ A.10-11-015, SCE-2, Volume 10, p. 44.

²⁷ Appendix 5, "Building Codes and Seismic Design Standards."

provided above and are further described in the referenced appendices. Further analysis is required to assess the offshore discharge conduits' seismic capacity.

B. EMERGENCY PREPAREDNESS

1. Introduction

This section addresses the AB 1632 Report recommendation that SCE should reassess the adequacy of access roads and surrounding roadways for allowing: (1) emergency personnel to reach SCE's nuclear generating plant, and (2) local communities and non-essential plant workers to evacuate in the event of an emergency.²⁸

2. Requirements/Regulatory Guidance Summary

As the operating agent for SONGS 2 & 3, SCE is required to meet or exceed the emergency planning regulations established for nuclear facilities by the NRC and the Federal Emergency Management Agency (FEMA). The NRC is the jurisdictional regulatory authority for the safe operation of all U.S. nuclear facilities, and in that role is responsible for the oversight of emergency preparedness activities. FEMA is responsible for the oversight of emergency preparedness activities of the offsite agencies that respond to certain emergencies at a nuclear facility.

The NRC requires each licensee to have approved, integrated emergency plans for inside and outside the nuclear facility's boundary (i.e., onsite and offsite).²⁹ As part of these requirements, SCE is required to conduct drills and exercises to evaluate all major portions of emergency response capabilities during a six-year drill cycle.³⁰ The NRC-approved emergency plan for SONGS meets these requirements.

Every two years, SCE conducts an exercise to assess the level of preparedness of local responders (e.g., police, firefighters, etc.) to react to a simulated emergency at SONGS, pursuant to FEMA policies and guidance concerning the exercise of state and local Radiological Emergency Preparedness plans and procedures. Participants in the exercise include SONGS employees, local agencies, other governmental agencies, and some members of the private sector.

²⁸ CPUC June 25, 2009 Letter to SCE; AB 1632 Report, p. 16.

²⁹ NUREG-0654 FEMA-REP 1, Rev. 1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*.

³⁰ NUREG-0654 Part II.N and 10 CFR § 50.47 (b) (14).

In connection with the approved emergency plan, the NRC requires each licensee to address an Evacuation Time Estimate (ETE) study³¹ for the site and surrounding areas. The ETE is used for pre-planning protective action recommendations.³² The ETE addresses potential challenges to efficient evacuation, such as weather and earthquake damage, allowing mitigative measures to be pre-planned. SCE completed an ETE for SONGS in 2007,³³ in accordance with this guidance. The ETE assesses the time needed to evacuate the public³⁴ from a potential exposure pathway (Emergency Planning Zone or EPZ)³⁵ during a general emergency. The results provide both SCE and offsite agencies information to support protective action decisions, including whether evacuation or shelter in place is the appropriate response to the emergency.

3. Overview of Evacuation Plan

In the event of an emergency at SONGS, SCE's highest responsibility is safeguarding the surrounding communities and plant workers. To meet the responsibility in an emergency at SONGS and to evacuate the public and non-essential workers, SCE (1) has proven methods to inform workers, communities, and local agencies of emergency conditions; (2) actively partners with local, state, and federal agencies to coordinate evacuation activities; and (3) validates the ability to evacuate plant workers.

a) Overview of Evacuation Plan for the Public

SCE maintains a system of electronic sirens (Community Alert Siren System or CASS) strategically located in communities within the Emergency Planning Zone surrounding SONGS 2 & 3. Community officials for local jurisdictions are

³¹ NUREG-CR-6863.

³² Protection Action Recommendation: recommendations made by plant personnel, based on plant conditions, to state and local government agencies on actions that could be taken to protect the population in the Emergency Planning Zone (EPZ) from exposure to radiation or radioactive materials. Based on the recommendation and independent assessment of other local factors, the state or local government agencies are responsible for making decisions on the actions necessary to protect the public and for relaying the decisions to the public.

³³ Appendix 6, "San Onofre Nuclear Generating Station Evacuation Time Evaluation Final Report."

³⁴ The public also includes non-essential SONGS 2 & 3 personnel once they leave the plant.

³⁵ Emergency Planning Zone (EPZ): an area around a nuclear power plant that is defined as part of the pre-planned strategy for protective actions during an emergency.

responsible for activating the CASS in the event of a nuclear emergency requiring public action. Sounding the sirens will alert area residents to turn on a broadcast news station or radio for public safety information. Annually, a highly publicized siren test is conducted by the offsite agencies to familiarize the public with the distinctive sound of the sirens.³⁶

Additionally, local community emergency responders have the ability to use AlertOC (Alert Orange County), which is a free, regional, county-wide mass notification system. AlertOC can send emergency voice messages from public safety officials to the home, cell, or business phone of nearby residents. Text messages also can be sent to email accounts, and receiving devices for the hearing impaired. AlertOC complements other emergency notification systems such as CASS, Emergency Alert System, or roving public address systems.

SCE also has an ongoing public outreach effort to educate local residents and businesses on the actions they should take in the event of an emergency, including the actions they should take when responding to the CASS. This outreach effort includes public meetings with local schools, communities, and residential groups; informational mailings to residents and businesses; and information booths at safety expos and other public venues.

Local jurisdictions' and SONGS' emergency plans provide for precautionary and planned actions, for example:

- Closure of California State Parks, as deemed appropriate by California State Parks personnel, prior to an announcement of a General Emergency.
- Relocation of students and faculty in the Capistrano Unified School District, as deemed appropriate by District personnel, prior to an announcement of a General Emergency.

³⁶ In the event of an inadvertent siren actuation, a process has been developed and includes a range of responses based on the circumstances (e.g. length of siren activation, time of day, etc.). The offsite agencies will determine the most suitable method of notifying their communities of an inadvertent siren actuation.

- Closure of I-5 Northbound at SR-78 in Oceanside and I-5 Southbound at the 5/405 El Toro intersection by CHP in a General Emergency

An interjurisdictional planning committee (IPC) was established in 1982 to “promote nuclear power preparedness through agency coordination and integration of emergency plans.”³⁷ To achieve this mission, the IPC collaborates and drills on emergency plans and procedures designed to protect the public health and safety during a declared emergency. The IPC includes community officials from the following local jurisdictions:³⁸

- City of Dana Point
- City of San Clemente
- City of San Juan Capistrano
- Orange County
- San Diego County
- California State Parks
- Marine Corps Base Camp Pendleton
- Southern California Edison

IPC associate members (support jurisdictions) are:

- Capistrano Unified School District
- Oceanside Fire Department
- Orange County Fire Authority
- Mission Regional Medical Center
- California Highway Patrol
- California Emergency Management Agency
- Federal Emergency Management Agency
- Nuclear Regulatory Commission

³⁷ <http://www.nrc.gov/reading-rm/doc-collections/commission/slides/2006/20060502/rose-slides.pdf>, p. 6.

³⁸ The IPC complies with the California Health & Safety Code § 114650(a).

b) Overview of Evacuation Plan for Non-Essential Workers

All SONGS employees are trained to respond to emergencies, and participate in periodic emergency preparedness drills. SONGS communication methods include public address (PA) announcements, sirens, beacons, and announcements at assembly areas. SONGS 2 & 3 emergency procedures call for the evacuation of non-essential personnel when the emergency classification level is "Site Area Emergency."³⁹ Site drills have confirmed SCE's ability to assemble and evacuate non-essential personnel during accident scenarios.

4. Overview of Plan for Plant Access for Essential Plant Workers

Essential members of the Emergency Response Organization (ERO) at SONGS are assigned a pager. In the event of a declared emergency, ERO pagers are activated, and personnel report to one of the Emergency Response Facilities on the plant site, or at staging areas, when I-5 has been closed. Communication arrangements have been made for ERO personnel to communicate with the plant and, if necessary, obtain a California Highway Patrol (CHP) escort to the plant.

5. Experience

a) Experience with Evacuation Plans for the Public

The biennial Radiological Emergency Preparedness exercise for SONGS was conducted in 2009. The exercise, held in accordance with FEMA policies and guidance, assessed the level of preparedness of local responders to react to a simulated emergency at SONGS. SONGS employees, local agencies, other governmental agencies, and private sector organizations who participated in the exercise, demonstrated knowledge of the emergency response plans and procedures, and the ability to execute those plans. There were no deficiencies identified during the course of the exercise.

SCE's emergency-response coordination with local agencies was also demonstrated during the week of October 2007, when several large brush fires

³⁹ There are four emergency classification levels defined by the Emergency Plan. In order of increasing severity the classifications are: 1) Unusual Event, 2) Alert, 3) Site Area Emergency, and 4) General Emergency. These are described in an SCE publication entitled, "A Guide to San Onofre Nuclear Generating Station for Visitors and Newcomers," p. 6.

burned in Orange, Riverside, and San Diego counties. The event did not endanger the SONGS site, but the severity of the fires caused mandatory evacuations of many communities in southern California, forced the closure of the I-5 freeway used to access the plant, and required an evacuation of the SONGS Mesa facility. SONGS employees and the local agencies that were involved appropriately responded to this event, demonstrating effective coordination between SCE and local agencies.

b) Experience with Station Personnel Response

As stated above, SCE routinely trains on the assembly and evacuation of station personnel for an emergency at SONGS. Pursuant to 10 CFR § 50.47 (b) (10) and NUREG-0654 Part II.J, SCE is required to maintain provisions for the evacuation of non-essential personnel from the site in the event of a Site Area Emergency or General Emergency. Pursuant to 10 CFR § 50.47 (b) (14) and NUREG-0654 Part II.N, SCE is required to conduct drills and exercises to evaluate all major portions of emergency response capabilities during a six-year drill cycle. In accordance with these requirements, SCE tests the evacuation of non-essential personnel during a site evacuation drill. The last site evacuation drill was conducted on July 18, 2007. The results for the drill were successful. SCE also implemented improvements, which included: (1) the process for assembly and evacuation was enhanced to provide for evacuation at the Site Area Emergency level as soon as personnel in Assembly Areas have been provided necessary information regarding evacuation routes, safe area meeting locations, etc.; (2) a telecommunications bridge was established to allow for more efficient communication between the Assembly Areas and Administrative Leader relaying the directions from the Emergency Coordinator; and (3) additional training was conducted to ensure adequate Health Physics personnel and equipment resources are properly deployed to ensure proper radiological monitoring of all evacuated personnel.

In addition to training drills, the October 2007 fires in Orange, Riverside, and San Diego counties caused an emergency evacuation of the SONGS Mesa facility. The SONGS Mesa evacuation was successfully completed without incident. Additionally, offsite ERO personnel successfully exercised the escort arrangements with the CHP to gain access to the site during this event.

6. Modeling of Evacuations

As discussed above, NUREG-CR-6863 recommends that an ETE study should be updated as local conditions change. ETE modeling provides a tool for developing comprehensive evacuation planning studies, including estimating evacuation times, developing traffic management and control strategies, and identifying routes, traffic control points, and other elements of an evacuation plan.

The NRC recommends that ETE studies be performed when the possibility exists that ETE would change significantly.⁴⁰ The June 12, 2007 ETE study⁴¹ was conducted using DYNASMART-P, a state-of-the-art dynamic route assignment model sponsored by the Federal Highway Administration and developed at the University of Maryland. This software package provides a blend of four-step regional models and corridor level micro-simulation models. This software dynamically models individual driver behavior in selecting available evacuation routes, and driving in gridlock conditions. Input data for this report includes:

- Geographic Information System (GIS) database of the study area
- Identification of resident and transient population within the study area
- Identification of existing institutions requiring special evacuation assistance, as well as known new institutions planned for construction
- Review of Emergency Response Plans for jurisdictions and agencies in the EPZ
- Inventory of existing highway facilities, including roadway facility type, number of lanes, operating speeds, and traffic controls
- Caltrans (California Department of Transportation) identified non-earthquake-retrofitted bridges, and locations for potential landslides in the area in the event of an earthquake
- Inventory of available demographic data, employment data, recreational facility usage and forecast usage

⁴⁰ NUREG-CR-6863, p. 26.

⁴¹ Appendix 6, "San Onofre Nuclear Generating Station Evacuation Time Evaluation Final Report."

The ETE models various scenarios to determine evacuation times as listed below:

- Summer weekday evacuation – Assumed the evacuation occurred during business hours with many residents working outside the EPZ, a significant number of non-resident workers in the EPZ, and a moderately heavy number of beach visitors.
- Summer weekend evacuation – Assumed the evacuation occurred during a summer weekend, with significant portions of the population consisting of non-resident workers in the EPZ, as well as recreational visitors. Assumed a large number of beach visitors (based on July 4th holiday) had to be evacuated in this scenario.
- Night Evacuation – Assumed the evacuation occurs during a night scenario in which the maximum number of residents, and the minimum number of non-residents were in the EPZ.

Other scenario variations considered were:

- Adverse weather – Assumed a slower evacuation rate out of the EPZ, than in non-adverse weather scenarios.
- Earthquake – Assumed the evacuation from the EPZ took place after an earthquake which resulted in landslides restricting available lanes of traffic along the ocean and adjacent cliffs, as well as failure of non-earthquake-retrofitted bridges that blocked egress by the population.

The ETE study states that ETE estimates range from 1.5 hours for the least populated areas under the most favorable of circumstances, to 18 hours for the most densely populated areas under earthquake conditions. It should be noted that evacuation is only part of an effective emergency plan, and shelter in place is at times a more appropriate option. The range of uncertainty for evacuation of the EPZ is plus or minus 2 hours.⁴²

Annual reviews re-evaluate the key factors that impact the ETE. Most recently, for example, SCE evaluated population changes (increases in population,

⁴² Appendix 6, "San Onofre Nuclear Generating Station Evacuation Time Evaluation Final Report," p. E-2.

changes in age demographics, etc.) and roadway capacity (improvements, constraints, traffic flow, etc). The 2010 updated evaluation concluded that there have been no significant changes in the SONGS EPZ that would adversely affect the information contained in the June 12, 2007, ETE study.⁴³ The next ETE study will be conducted when the 2010 census information is released.

7. Conclusion

SCE periodically reassesses the access roads and surrounding roadways near SONGS and confirms that they are adequate for allowing (1) emergency personnel to reach SONGS, and (2) local communities and non-essential plant workers to evacuate when appropriate in the event of an emergency. SONGS' Emergency Preparedness Program is approved by the NRC and implemented pursuant to NRC and FEMA regulations. Based on the results of drills, overseen by the NRC and FEMA, as well as actual events that have caused local area evacuations, the emergency plans for SONGS have demonstrated their effectiveness.

⁴³ Appendix 7, "Annual Assessment of the San Onofre Nuclear Generating Station Evacuation Time Evaluation," dated August 23, 2010.

C. LOW LEVEL RADIOACTIVE WASTE

1. Introduction

This section addresses the following AB 1632 Report recommendations regarding Low Level Radioactive Waste (LLW):⁴⁴

- During the upcoming CPUC proceeding on decommissioning costs, SCE should provide estimates of the amounts of LLW to be generated and ultimately disposed of during plant operation and decommissioning and the cost of this disposal based on current and projected market prices.
- As part of license renewal feasibility studies, SCE should assess the costs of disposing of LLW that will be generated during a 20-year license extension. The assessments should include the cost to dispose of LLW that would be generated from major capital projects that might be required over this period. SCE should also provide information on their plans for storage and disposal of LLW and spent fuel through plant decommissioning.

During the CPUC Nuclear Decommissioning Cost Triennial Proceeding (NDCTP), SCE updates its estimates of the volumes of LLW to be generated and disposed of during decommissioning and the cost of this disposal based on current and projected market prices. Most recently, SCE submitted an updated estimate on April 3, 2009.⁴⁵

This section discusses the projected quantities, disposal options, and transportation and disposal costs for LLW generated at SONGS 2 & 3 during the remainder of the current licensed period, the period of extended operation, and the decommissioning period. The assumed volumes and costs for LLW from the SONGS Independent Spent Fuel Storage Installation (ISFSI) are included in the assumptions for the decommissioning period.

⁴⁴ CPUC June 25, 2009 Letter to SCE; AB 1632 Report p. 28.

⁴⁵ Application (A.) 09-04-009, Nuclear Decommissioning Cost Triennial Proceeding.

a) Class A, Class B, and Class C LLW

10 CFR § 61.55 divides LLW into three different classifications:

Class A, Class B, and Class C. Class A contains the lowest concentrations of radioactivity, and Class C contains the highest. Class A waste includes materials such as slightly contaminated tools or plant components. Class B and C waste includes materials such as primary system (i.e., reactor coolant system) filters and ion exchange resins.

b) Mixed LLW

Some waste generated during nuclear power operations contains both radioactive and hazardous waste constituents.⁴⁶ Such waste is known as mixed low-level radioactive waste (mixed waste). Examples of the hazardous constituents of mixed wastes include: (1) petroleum-based oils, (2) flammables and chlorofluorocarbons, and (3) solids (e.g., asbestos, lead, and electrical waste (e-waste) materials).

2. Onsite Interim Storage, Offsite Disposal, and Disposal Costs of SONGS 2 & 3 LLW

This section will discuss the projected quantities, disposal plans, and disposal costs for Class A, B, and C LLW, and mixed waste, generated at SONGS 2 & 3 during the remainder of the current licensed period, the period of extended operation, and the decommissioning period.

The licensed LLW disposal facility operated by EnergySolutions at Clive, Utah, is expected to be available to accept Class A waste from SONGS 2 & 3 throughout the remainder of the current SONGS 2 & 3 licensed period, the 20-year period of extended operation, and the decommissioning period. The EnergySolutions disposal facility at Barnwell, South Carolina, was available to accept Class A, Class B, and Class C waste from SONGS 2 & 3 until June 30, 2008. As of July 1, 2008, that facility stopped accepting LLW from waste generators in California and all other states outside the Atlantic Coast LLW Compact, as mandated by South Carolina state law.⁴⁷ The nuclear industry is working to license new disposal facilities, and is working with the NRC to

⁴⁶ Hazardous wastes are defined in Subtitle C of the Resource Conservation and Recovery Act (RCRA). Reference <http://www.epa.gov/rpdweb00/mixed-waste/guidance-identification-llmw.html>.

⁴⁷ S. C. Code Ann. § 48-46, Atlantic Interstate Low-Level Radioactive Waste Compact Implementation Act.

develop alternative disposal methods for these types of materials. Current licensed waste disposal companies are also looking to expand their licenses to receive Class B and Class C waste. SCE will ship Class B and Class C waste when a disposal facility becomes available. Until such time, SCE has sufficient on-site interim storage capacity to accommodate all Class B and Class C waste generated during the current licensed period and the period of extended operation. Table III-1 below provides the disposal rates published in a recent industry study to project the cost of LLW disposal:⁴⁸

Table III-1
LLW Disposal Rates from 2008 NEWEX Study
(2011 \$, 100% Level)

Bulk Class A LLW ⁴⁹	\$74.83 per cubic foot
General Class A LLW ⁵⁰	\$307.02 per cubic foot
Class B and C LLW	\$3,565.65 per cubic foot

Mixed waste must be disposed of separately from LLW. Mixed waste with different hazardous constituents is subject to different disposal requirements.⁵¹ Licensed disposal facilities are currently available for each type of mixed waste, and are projected to be available throughout the remainder of the current licensed period, the period of extended operation, and the decommissioning period.⁵²

⁴⁸ Reference “Establishing an Appropriate Disposal Rate for Low-level Radioactive Waste During Decommissioning,” dated July 2008, by Robert Snyder, NEWEX. SCE assumes these LLW disposal rates will escalate by approximately 7 percent per year.

⁴⁹ “Bulk” Class A LLW includes materials such as crushed concrete rubble and scrap metal.

⁵⁰ “General” Class A LLW includes materials such as containerized waste, high density or oversized packages, and large components (e.g., steam generators).

⁵¹ Each mixed waste disposal or treatment facility must possess not only a license from the NRC or NRC Agreement state, but also a permit from the EPA or EPA Authorized state.

⁵² All mixed waste generated to-date at SONGS have contained Class A radioactivity concentrations, for which disposal facilities are currently available. Licensed disposal facilities are not currently available for mixed wastes that contain Class B or Class C radioactivity levels. SCE does not anticipate generating any mixed waste Class B or Class C mixed waste during the remainder of the current licensed period, the period of extended operation, or decommissioning.

a) Remainder of Current Licensed Period

Based on historical volumes, SCE projects that SONGS 2 & 3 will dispose of 7,500 cubic feet of Class A waste, on average, in each remaining year of the current licensed period (through 2022).⁵³ SCE also projects that it will dispose of an additional 27,000 cubic feet of Class A waste in 2011-2012 from the steam generator replacement project. In addition, SCE projects that 5,000 cubic feet of Class A waste from the SONGS 2 & 3 reactor vessel head replacement project will require disposal in 2012-2013. If SONGS 2 & 3 is permanently shut down at the end of the current licensed period, disposal costs for Class A LLW will be approximately \$14.8 million (2011 \$, 100% level) during the current licensed period.⁵⁴

SCE projects that SONGS 2 & 3 will generate, on average, 100 cubic feet of Class B and Class C waste from routine plant operations in each remaining year in the current licensed period (through 2022).⁵⁵ For purposes of this report, SCE assumes that Class B and Class C waste will remain in onsite interim storage until decommissioning. Therefore, SCE has included the disposal costs for all Class B and Class C waste projected to be generated during the remaining years of the current licensed period with the LLW disposal costs projected during the decommissioning period, discussed in section (c) below.

The volumes and hazardous constituents of mixed waste generated at SONGS 2 & 3 vary from year to year. SCE generates, on average, 550 cubic feet of mixed waste per year, at an annual disposal cost of approximately \$340,000 (2011 \$, 100% level). SCE projects that it will continue to generate similar mixed waste volumes and incur similar mixed waste disposal costs throughout the remaining years of the

⁵³ Projections of annual Class A, Class B, and Class C LLW volumes from routine nuclear power operations are based roughly on the corresponding quantities of materials shipped to licensed LLW disposal facilities recorded during the 2001-2009 period, as reported to the Southwestern Low-level Radioactive Waste Compact Commission.

⁵⁴ For estimating purposes, SCE assumes that 80% of Class A LLW will be Bulk Class A material, and 20% will be General Class A material.

⁵⁵ Projections of annual Class A, Class B, and Class C LLW volumes from routine nuclear power operations are based roughly on the corresponding quantities of materials shipped to licensed LLW disposal facilities recorded during the 2001-2009 period, as reported to the Southwestern Low-level Radioactive Waste Compact Commission.

current licensed period. The projected cost for mixed waste disposal during the remainder of the current licensed period is \$4.1 million (2011 \$, 100% level).

b) Period of Extended Operations

SCE projects that SONGS 2 & 3 will dispose of 7,500 cubic feet of Class A LLW, on average, in each year during the 20-year period of extended operation (2023-2042).⁵⁶ During the 20-year period of extended operation, disposal costs for Class A waste will be approximately \$18.2 million (2011 \$, 100% level).

In addition, SCE projects that it will generate, but not dispose of, 100 cubic feet of Class B and Class C LLW in each year during this extended period.⁵⁷ For purposes of this report, SCE assumes that Class B and Class C waste will remain on-site in interim storage until decommissioning. At this time, SCE has not identified any one-time projects that would require disposal of additional quantities of Class A, Class B, or Class C waste during the period of extended operation. SCE has included the disposal costs for all Class B and Class C waste generated throughout the period of extended operation with the LLW disposal costs projected during the decommissioning period, discussed in section (c) below.

SCE generates, on average, 550 cubic feet of mixed waste, at an annual disposal cost of approximately \$340,000 (2011 \$, 100% level). SCE projects that it will continue to generate similar mixed waste volumes and incur similar mixed waste disposal costs throughout the period of extended operation. The projected cost for mixed waste disposal during the period of extended operation is \$6.8 million (2011 \$, 100% level).

c) Decommissioning Period

If SONGS 2 & 3 commences decommissioning in 2023, SCE projects that the decommissioning of SONGS 2 & 3 would require disposal of approximately 1.5 million cubic feet of Class A waste; approximately 6,100 cubic feet of

⁵⁶ *Id.*

⁵⁷ *Id.*

Class B waste; and approximately 1,400 cubic feet of Class C waste.⁵⁸ These quantities include all Class B and Class C waste that is projected to be generated during the current licensed period. The total LLW disposal cost during the decommissioning period is projected to be \$208.6 million (2011 \$, 100% level).

Alternatively, if SONGS 2 & 3 commences decommissioning in 2043, SCE projects that the decommissioning of SONGS 2 & 3 would require disposal of approximately 1.5 million cubic feet of Class A waste, 7,300 cubic feet of Class B waste, and 2,200 cubic feet of Class C waste.⁵⁹ These quantities include all Class B and Class C waste that is projected to be generated during both the remainder of the current licensed period and the period of extended operation.⁶⁰ The total LLW disposal cost during the decommissioning period is projected to be \$215.8 million (2011 \$, 100% level).

SCE projects that it will generate approximately 13,000 cubic feet of mixed waste annually during decommissioning. The projected cost of disposal for mixed waste during decommissioning is \$14.1 million (2011 \$, 100% level).⁶¹ SCE projects that it will generate the same amount of mixed waste during decommissioning, regardless of whether SONGS 2 & 3 is permanently shut down at the end of the current licensed period or after the period of extended operation.

⁵⁸ Projected quantities of Class B and Class C waste include volumes generated during the remaining years of the current operating licensed period plus projected volumes contained in San Onofre Nuclear Generating Station Units 2 and 3 Decommissioning Cost Estimate, prepared for Southern California Edison Company by ABZ, Incorporated, February 2009, Unit 2 Volume, Appendix A, p. 3, and Unit 3 Volume, Appendix A, p. 3.

⁵⁹ Projected quantities of Class B and Class C waste include volumes generated during the remaining years of the current operating licensed period and the period of extended operation, and the projected volumes contained in "San Onofre Nuclear Generating Station Units 2 and 3 Decommissioning Cost Estimate," prepared for Southern California Edison Company by ABZ, Incorporated, February 2009, Unit 2 Volume, Appendix A, p. 3, and Unit 3 Volume, Appendix A, p. 3.

⁶⁰ Because SCE has not identified any one-time projects that would require disposal of additional quantities of Class A waste during the period of extended operation, the projected volumes of Class A LLW that will require disposal during decommissioning remain the same whether decommissioning occurs at the end of the current operating license expires or after the period of extended operation.

⁶¹ "San Onofre Nuclear Generating Station Units 2 and 3 Decommissioning Cost Estimate," prepared for Southern California Edison Company by ABZ, Incorporated, February 2009, Unit 2 Volume, Appendix E, p. 31.

3. Transportation of LLW to Licensed Disposal Facilities

Transportation of Class A waste from SONGS 2 & 3 to the licensed disposal facility at Clive, Utah, during the current licensed period and the period of extended operation, are projected to be 99% by truck and 1% by rail. Transportation costs are projected to be \$12.23 (2011 \$, 100% level) per cubic foot for truck shipments, and \$6.11 (2011 \$, 100% level) per cubic foot for rail shipments. Truck shipments will be used predominantly during plant operations due to the relatively small volumes of materials expected to be shipped, except for large, heavy shipments for which rail shipment is warranted. During decommissioning, however, shipments of Class A waste are projected to be 90% by rail and 10% by truck. This is because the shipping volumes will be much greater during decommissioning. Shipments of Class B and Class C waste are assumed to be by truck at a projected cost of \$489.06 (2011 \$, 100% level) per cubic foot. LLW transportation costs are projected to be \$1.5 million (2011 \$, 100% level) during the remaining years of the current licensed period and \$1.8 million (2011 \$, 100% level) during the period of extended operation. LLW transportation costs during decommissioning are projected to be approximately \$13.7 million (2011 \$, 100% level) if decommissioning commences at the end of the current licensed period and approximately \$14.7 million (2011 \$, 100% level) if decommissioning commences after the period of extended operation.

Each type of mixed waste is shipped to a different disposal facility. Transportation costs for mixed wastes to each disposal facility are approximately \$10,000 per shipment (2011 \$, 100% level), regardless of the number of container in the shipment. SCE projects that it will make one shipment of each mixed waste type per year during the remainder of the current licensed period and during the period of extended operations. This would result in mixed waste transportation costs of \$360,000 (2011 \$, 100% level) throughout the remainder of the current licensed period and \$600,000 (2011 \$, 100% level) throughout the period of extended operation. SCE projects that it will make, on average, six mixed waste shipments per year during the decommissioning period. The cost to transport all mixed waste generated during decommissioning will be approximately \$900,000 (2011 \$, 100% level).

4. Conclusion

SONGS 2 & 3 has adequate plans for storage and disposal of LLW and has estimated the costs for LLW disposal as provided in Table III-2 below:

Table III-2
SONGS 2 & 3 LLW and Mixed Waste
Disposal and Transportation Costs
(2011 \$ in Millions, 100% Level)

	Class A LLW Disposal	Class B & C LLW Disposal	LLW Transportation	Mixed Waste Disposal	Mixed Waste Transportation
Remaining Licensed Period	\$14.8	N/A	\$1.5	\$4.1	\$0.4
Period of Extended Operations	\$18.2	N/A	\$1.8	\$6.8	\$0.6
Decommissioning (begin in 2023)	\$181.9	\$26.7	\$13.7	\$14.1	\$0.9
Decommissioning (begin in 2043)	\$181.9	\$33.9	\$14.7	\$14.1	\$0.9

D. USED FUEL MANAGEMENT

1. Introduction

This section describes SCE's plan for the safe and secure storage of used fuel.⁶²

2. Used Fuel Management Plan

SCE complies with NRC requirements for used fuel storage. SCE will continue to adhere to its current used fuel management plan in which used fuel for SONGS 2 & 3 is stored in used fuel pools or dry cask storage containers. Both configurations are safe and have measures in place to protect the public. SCE transfers used fuel from SONGS 2 & 3 used fuel pools to dry cask storage (otherwise known as the Independent Spent Fuel Storage Installation or ISFSI) as necessary to maintain full core offload capability, in accordance with NRC requirements.

SCE intends to periodically increase the amount of dry cask storage containers to accommodate (1) maintaining full core offload capability within the used fuel pool during operations, and (2) storing all used fuel in the ISFSI approximately 5 to 12 years after SONGS 2 & 3 is permanently shut down. SCE plans to continue safely storing used fuel at SONGS pursuant to this plan until the Department of Energy (DOE) fulfills its contractual obligations to remove all used fuel at SONGS for permanent disposition.

This plan is consistent with the NRC's position on used fuel storage, as outlined in the recently approved Waste Confidence Decision.⁶³ The NRC issued a revision to 10 CFR § 51.23, which specifies that used fuel can be safely stored for at least 60 years beyond the licensed life of a nuclear power plant including license renewal.⁶⁴ SCE plans to safely store its used fuel onsite in the ISFSI and in its used fuel storage pools, as necessary, until the DOE fulfills its contractual obligations to remove the used fuel from the site. The technology exists to evaluate, refurbish, and repair or replace

⁶² CPUC June 25, 2009 Letter to SCE; AB 1632 Report, p. 34.

⁶³ SECY-09-0090 – Final Update of the Commission's Waste Confidence Decision.

⁶⁴ "Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation; Waste Confidence Decision Update; Final Rules," 75 Fed. Reg. 81,032-81,706 (Dec. 23, 2010) (to be codified at 10 CFR pt. 51).

used fuel dry cask storage system components, for as long as it is necessary to extend the life of the used fuel dry cask storage facility.

3. Used Fuel Storage Costs

The capital costs associated with used fuel storage are addressed in SCE's 2012 General Rate Case (GRC).⁶⁵ The costs associated with SONGS used fuel storage are also components of the costs included in SCE's cost-effectiveness analysis that SCE will submit in a separate license renewal funding application to the CPUC. Cost estimates for decommissioning the ISFSI have been included in the NDCTP. The incremental costs for decommissioning the dry cask storage modules due to an additional 20 years of operation if SONGS 2 & 3 operating licenses are renewed, will be included in a future NDCTP proceeding, as appropriate. These additional costs have a negligible impact on the cost-effectiveness analysis that will be included with SCE's license renewal funding application.

In addition to the costs identified above, SCE customers contribute 1 mil per kWh for electricity produced from nuclear fuel to the federal government for the Nuclear Waste Fund to pay for all costs incurred by DOE in fulfilling its contractual obligations to remove and permanently disposition all used fuel from SONGS.

4. Used Fuel Storage Systems

a) Used Fuel Pool

The NRC has approved the use of engineered pools to store used fuel. These pools provide cooling, prevent criticality, and protect the fuel assemblies from excess mechanical or thermal loading. Used fuel is stored underwater in the pools in storage racks. Used fuel assemblies are maintained in a safe configuration by several design aspects of the used fuel storage racks including: (1) the pattern of the fuel assemblies in the racks, and (2) the design of the racks which limit fuel assembly interaction. Design of the used fuel pools ensures adequate convective cooling for the removal of decay heat. The used fuel pools are located in a secured area at SONGS 2 & 3, with one pool for each unit. Cooling and system integrity monitoring and maintenance are performed as part of routine operation and maintenance programs.

⁶⁵ A.10-11-015, SCE-02, Volume 2.

As indicated above, the NRC requires that sufficient space in each used fuel pool be available to allow off-loading of a full core of each reactor. SCE adheres to this requirement.

b) Independent Spent Fuel Storage Installation

The NRC has approved the use of dry cask storage to store used fuel once it has cooled to acceptable levels in a used fuel pool. SONGS 2 & 3 used fuel requires 5 to 12 years of cooling in pools before it can be transferred to dry cask storage. Transfers from SONGS 2 & 3 used fuel pools to dry cask storage in the ISFSI are scheduled as necessary to maintain the capability to offload a full core of used fuel.

The ISFSI is located in a secured area at SONGS, dedicated to the dry cask storage of SONGS used fuel. The ISFSI (the dry cask storage system) consists of reinforced concrete modules, in which the sealed steel canisters containing used fuel are stored. The size of the ISFSI is expanded as necessary to accommodate used fuel from SONGS 2 & 3 operations. There is sufficient space to store in the ISFSI, all used fuel generated from SONGS 2 & 3 operations, through the period of extended operation if SONGS 2 & 3 operating licenses are renewed, until the DOE removes the used fuel from the site.

5. Conclusion

SCE continues to follow its used fuel management plan, transferring used fuel from SONGS 2 & 3 used fuel pools to ISFSI dry cask storage as needed to maintain the full core offload capability required by the NRC. SCE's used fuel management plan provides safe and secure storage of used fuel, until the DOE meets its acknowledged obligations to remove the used fuel from the site.

E. ECONOMIC IMPACT

1. Introduction

This section addresses the AB 1632 Report recommendation that SCE provide an economic impact evaluation regarding SONGS 2 & 3, and compare that impact with the alternate uses of the SONGS site.⁶⁶ SCE leases land for SONGS 2 & 3 from the Department of the Navy under long term agreements that specify SCE's use of the land. Future alternative use of the land would be at the discretion of the Department of the Navy. At this time, SCE has no information about what alternate uses the Department of the Navy might consider.

2. Methodology

SCE retained IHS Global Insight to study the economic impacts of SONGS 2 & 3. IHS Global Insight is a leading economic forecasting and consulting company.⁶⁷ IHS Global Insight used the IMPLAN input/output (I/O) model to estimate the total economic impacts of SONGS 2 & 3 on the California economy. The IMPLAN model computes a set of multipliers that produce estimates of the total regional increases in output,⁶⁸ value added,⁶⁹ employment, and income produced by direct spending. The IMPLAN model uses inter-industry purchasing relationships to derive sector-specific multipliers that are unique to the regional economy being analyzed (California). The sizes of the multipliers are determined by the production functions in the affected final demand sectors, or by the number and types of industries that supply inputs to the directly affected sectors. The multipliers are used to derive indirect⁷⁰ and induced⁷¹ effects, which

⁶⁶ CPUC June 25, 2009 Letter to SCE; AB 1632 Report, p. 25.

⁶⁷ Both the Commission and SCE have used IHS Global Insight's macroeconomic projections for over 3 decades.

⁶⁸ Output - The value of production by industry for a given time period.

⁶⁹ Value Added - Payments made by industry to workers, interest, profits, and indirect business taxes.

⁷⁰ Indirect effects result from direct suppliers purchasing additional inputs from other regional suppliers, such as a concrete contractor purchasing sand and gravel from a local quarry.

⁷¹ Induced effects result from the increase in local spending of disposable income by the newly hired workers. For example, an induced effect may be a newly hired contractor spending their earnings at local restaurant, gas station or grocery store.

are then added to the direct effects to obtain the total change in regional economic activity.

3. Results

IHS Global Insight prepared a study to assess the economic impact, over a 5-year period (2010 - 2014), using SONGS 2 & 3 expenditure estimates provided by SCE.⁷² The study first discusses the wage, employment, and expenditure estimates used in the study. Next, the study provides estimates of the indirect and induced effects on other economic sectors in California. The results of the study provide a macroeconomic estimate of wages, total output, taxes, and value added activity generated in the California economy due to the direct, indirect, and induced impacts of SONGS 2 & 3.

Specifically, the operation of SONGS 2 & 3 affects a large number of sectors within the California economy. The study indicates that the operation of SONGS 2 & 3 supports about 9,400 jobs and impacts the California economy by more than \$3.3 billion per year. The type of employment at SONGS 2 & 3 also has significant impacts. In California, average annual wages in 2010 totaled \$56,000 and value added per employee is measured at about \$135,000. In comparison, SONGS 2 & 3 average annual wages in 2010 were \$84,000 and the value added per employee was over \$243,000 per year, which were both substantially more than the state average.

Employment and economic impacts were as follows:

Employment Impacts

- 3,751 jobs,⁷³ on average, are directly supported per year.
- 9,451 jobs, on average, are directly and indirectly supported per year.
- The value added per employee is \$243,000 per year.

⁷² Appendix 8, "Economic Impacts of the San Onofre Nuclear Generating Station on the California Economy."

⁷³ Individuals counted in "direct employment" include SCE employees, contractors, and services employees.

Economic Impacts

- SONGS 2 & 3 total impact on the California economy on average is over \$3.3 billion annually or \$16.5 billion over the 5-year study period.
- State Tax Revenue is estimated to be \$246 million annually or \$1.2 billion over the 5-year study period.
- During the study period, each dollar spent on SONGS 2 & 3 generates a total of \$4.30 in output in the California economy.
- During the study period, each dollar spent on SONGS 2 & 3 generates a total of \$3.00 in value added in the California economy.
- During the study period, each dollar spent on SONGS 2 & 3 produces \$1.35 of labor earnings.

4. Conclusion

As the IHS Global Insight study demonstrates, operations of SONGS 2 & 3 will provide broad economic benefits to the California economy.

F. NUCLEAR SAFETY CULTURE

1. Introduction

This section addresses the AB 1632 Report recommendation that SCE report on its progress in addressing nuclear safety culture issues at SONGS,⁷⁴ and includes a summary of the NRC's evaluation of these efforts and of overall performance at SONGS.⁷⁵ In particular, this section outlines SCE's:

- Overall commitment to a strong nuclear safety culture;
- Actions to strengthen the nuclear safety culture;
- Actions to preserve and improve the environment in which all personnel are encouraged and able to raise concerns by multiple pathways; and
- Monitoring and progress in achieving a strong plant nuclear safety culture.

2. SCE's Commitment to a Strong Nuclear Safety Culture

Nuclear safety culture refers to an organization's values and behaviors – modeled by its leaders and internalized by its members – that make nuclear safety the overriding priority for the organization. In an organization with a strong nuclear safety culture, personnel feel personally responsible for nuclear safety and act in ways that demonstrate their commitment to keeping nuclear safety the highest priority.

At SONGS, a strong nuclear safety culture is the foundational principle, ensuring that safety is always the top priority. SCE is committed to cultivating an open, collaborative culture, where:

- Everyone is personally responsible for nuclear safety;
- Leaders demonstrate commitment to safety;
- Trust permeates the organization;
- Decision-making reflects safety first;
- Nuclear technology is recognized as special and unique;

⁷⁴ CPUC June 25, 2009 Letter to SCE; AB 1632 Report, p. 19.

⁷⁵ CPUC June 25, 2009 Letter to SCE.

- A questioning attitude is cultivated;
- Organizational learning is embraced;
- Nuclear safety undergoes constant examination; and
- Leadership establishes and maintains a healthy safety conscious work environment where individuals are free to raise concerns without fear of retaliation.

SCE is committed to conducting business every day in a manner consistent with these standards and principles. Site management consistently and clearly communicates nuclear safety messages, including that (1) safety is the first priority; (2) site personnel are expected to identify and report potential safety concerns; (3) site personnel must comply with regulatory requirements and SONGS procedures and programs, and stop when uncertain on how to implement requirements; and (4) retaliation against those who raise safety concerns is not permitted and will not be tolerated.

SCE is responsible day-to-day for ensuring that SONGS 2 & 3 is operated safely. In addition, the NRC has increasingly focused its oversight on nuclear safety culture in the nuclear power industry. The NRC continues to strengthen its rules, update its guidance, and enhance its inspection and enforcement programs to meet the agency's mission to ensure public health and safety. The NRC's evaluation and regulation of nuclear safety culture⁷⁶ provides further assurance that safety is always the top priority at SONGS.

3. Nuclear Safety Culture Action Plan

To preserve and strengthen the nuclear safety culture at SONGS, SCE completed the following actions as part of SONGS Nuclear Safety Culture Action Plan:⁷⁷

⁷⁶ NRC Inspection Manual Chapter 0310, Components Within The Cross-Cutting Areas, describes the components of nuclear safety culture. The safety culture components are described as the human performance, problem identification and resolution, and safety conscious work environment cross-cutting area components, and other components (accountability, continuous learning environment, organizational change management, and safety policies). The cross-cutting area components are evaluated during the conduct of both baseline and supplemental inspection programs, while the other components are evaluated during the conduct of the supplemental inspection program.

⁷⁷ SCE letter to the NRC, dated October 29, 2009, regarding the independent safety culture assessment results and action plans.

- Developed mechanisms to monitor nuclear safety culture progress and effectiveness, including designating a project manager to track progress;
- Strengthened on-going communications to site personnel to improve understanding of nuclear safety culture and Safety Conscious Work Environment;
- Developed and continue to align station personnel to the SONGS Excellence model, which includes overall site and nuclear safety culture standards;
- Conducted leadership seminars for station managers and supervisors to improve understanding and alignment around nuclear safety; and
- Established and is implementing a Leadership Academy to strengthen management alignment and demonstration of their role in enhancing nuclear safety culture.

4. SCE's Response to NRC Letter Regarding Work Environment Issues at SONGS

SCE identified actions to improve the SONGS Safety Conscious Work Environment (SCWE) – an environment in which everyone is encouraged to raise concerns, and those concerns are addressed, without fear of retaliation. SCWE is a subset of nuclear safety culture.

In March 2010, the NRC issued a letter to SCE identifying a potential chilling effect regarding work environment issues. Although surveys and interviews indicated that most (95% or more) site personnel felt comfortable raising safety concerns, NRC inspection results and SCE's own reviews indicated there were areas for improvement that require action to ensure a strong SCWE among all work groups at SONGS. SCE leadership is committed to fostering an environment in which all personnel are encouraged and able to raise concerns using multiple paths. To ensure an approach that is consistent with industry best practices for resolving SCWE issues, SCE adopted the following "Four Pillar" model as the framework for development of actions to strengthen the SCWE at SONGS:

- **Pillar 1** – Employees Raise Concerns Without Fear of Retaliation
- **Pillar 2** – Effective Normal Problem Resolution Processes
- **Pillar 3** – Effective Alternate Resolution Processes
- **Pillar 4** – Effective Methods to Detect and Prevent Retaliation

The Four Pillar model, supported by organizational structures and formal processes, is now the basis for SCWE improvement actions at SONGS. Action⁷⁸ areas included:

- **Communications** – SCE continues to provide numerous site-wide communications to reinforce SCE’s SCWE expectations and policies, and to encourage workers to raise concerns to their supervisors, by writing a Nuclear Notification,⁷⁹ by contacting the Employee Concerns Program or by informing the NRC. An important part of this effort includes senior site management meeting with smaller groups of employees throughout the site to hear personnel’s issues and concerns;
- **Training** – SCE has provided training to managers and supervisors on SCWE principles and behaviors to ensure that their behavior encourages workers to raise concerns without the fear of retaliation; SCE has provided training to SONGS employees and contractors on SCWE policies and principles, and avenues to raise concerns, including via management, through the Corrective Action Program, through alternate processes such as the Employee Concerns Program and to the NRC without fear of retaliation;
- **Employee Concerns Program (ECP)** – SCE made this program more accessible and responsive to SONGS employees and

⁷⁸ SCE letter to the NRC, dated March 31, 2010, regarding actions associated with work environment issues.

⁷⁹ A Nuclear Notification is a document that captures a problem or concern and allows for the formal evaluation and resolution of the problem.

contractors, and increased face-to-face contact between Employee Concerns Program personnel and members of the workforce.

- **Corrective Action Program (CAP)** – SCE made the CAP – the program used to identify and track resolution of issues at SONGS – easily accessible to SONGS employees and contractors for reporting concerns, and ensured that concerns can be reported anonymously, and that personnel readily obtain feedback on how their concerns were addressed.
- **Management Engagement and Oversight**—SCE improved the processes for monitoring, management engagement and taking prompt action to address SCWE issues as they emerge. This includes additional surveys, meeting with groups of employees, and the Employee Concerns Program personnel contacting workers to facilitate identification and prompt resolution of SCWE issues.

5. SCE’s Nuclear Safety Culture Monitoring and Progress

SCE initiated monitoring processes to track the progress and effectiveness of actions associated with strengthening SONGS nuclear safety culture, including SCWE. These processes include:

- Monthly review of performance metrics for nuclear safety culture and SCWE;
- Quarterly review for effectiveness of the nuclear safety culture and SCWE improvement actions by an Effectiveness Review Challenge Board; during reviews, this board identifies any “check and adjust” actions deemed necessary to meet improvement goals; and
- Conducting follow-up effectiveness reviews through periodic assessments and surveys.

An effectiveness review was completed in June 2010 by a team of five individuals independent of SCE with experience in assessing and improving SCWE. This team interviewed over 400 personnel, with ninety-two percent being non-management personnel. Additionally, another effectiveness review was completed in August where

over 1200 employees were surveyed regarding several SCWE areas including their willingness to raise concerns. The conclusions from these effectiveness reviews⁸⁰ were:

- SONGS personnel were willing to raise safety, compliance and quality issues, and were encouraged to do so by their management. Additional work is needed to ensure that individuals feel comfortable challenging what they consider a non-conservative decision, and to ensure their understanding that the SONGS culture supports raising nuclear safety and quality concerns. The continuation of the senior site management meetings with smaller groups of SONGS personnel and the subsequently completed management, supervision and employee training is expected to improve the willingness of SONGS personnel to challenge decisions and improve their understanding of and compliance with SCE's expectation for SONGS personnel to raise nuclear safety and quality concerns.
- SONGS has improved accessibility of the CAP, and personnel agreed that SONGS management at all levels reinforces the use of the CAP and the Nuclear Notification process.
- Virtually every person interviewed exhibited a general awareness of the alternative avenues for raising concerns. An overwhelming majority of those interviewed indicated no fear of retaliation if they or someone they knew raised a safety concern to the NRC. Interviewees were aware of recent programmatic changes to the ECP. Based on the survey results, additional work is needed to improve workers' confidence in the results of the ECP investigations and findings. The implementation of the enhanced Employee Concerns Program is expected to improve worker's confidence in ECP investigations and findings.

⁸⁰ SCE letter to NRC, dated August 31, 2010, regarding status of action associated with work environment issues.

- Personnel were aware that any type of harassment, intimidation, retaliation or discrimination against anyone for raising concerns is expressly prohibited. SCE has reinforced this standard through various ongoing communications and training regarding SCWE and related issues.

Based on the effectiveness reviews, performance measures, and other survey tools, actions to strengthen the nuclear safety culture, including SCWE, are showing progress. SCE recognizes that additional improvement is needed and continues to adjust its programs as necessary to achieve a strong nuclear safety culture.

The NRC continues to monitor SCE's nuclear safety culture efforts and overall plant performance through the NRC's Reactor Oversight Process⁸¹ (ROP). When implementing the ROP, the NRC conducts inspections and may identify findings. During 2009 and 2010, the NRC's findings were of very low safety significance. In their 2010 annual assessment letter, the NRC continued to affirm that SONGS has been operated in a manner that preserved public health and safety and fully met all cornerstone⁸² objectives. In December 2010, the NRC informed SCE that the White Finding⁸³ is closed and that the performance at SONGS 2 had improved, allowing SONGS 2 to be in the Licensee Response Column (Column 1) of the ROP Action Matrix, improved from the Regulatory Response Column (Column 2).⁸⁴ Additionally, in their December Inspection of

⁸¹ The Reactor Oversight Process (ROP) provides a framework for the NRC to monitor performance in three broad areas -- reactor safety; radiation safety for both plant workers and the public during routine operations; and protection of the plant against sabotage or other security threats. The ROP also features three "cross-cutting" elements, so named because they affect and are therefore part of each of the cornerstones: human performance, problem identification and resolution, and safety-conscious work environment.

⁸² The seven cornerstones are: initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety, and physical protection. Satisfactory licensee performance in the cornerstones provides reasonable assurance of safe facility operation and that the NRC's safety mission is being accomplished. Each cornerstone contains inspection procedures and performance indicators to ensure that their objectives are being met.

⁸³ Reference NRC Inspection Report Inspection Report 2009003 in Section 4OA2.3 for information related to the White Finding issued on Dec 11, 2008, for the "Failure to Establish Appropriate Instructions."

⁸⁴ Reference NRC Letter to SCE, December 22, 2010, NRC Inspection Procedure 95001 Supplemental Inspection Report.

the substantive cross cutting issues, the NRC concluded there was measurable progress toward closing two of the CAP cross cutting issues. SCE concurs with this conclusion and continues take actions to resolve remaining open NRC substantive cross-cutting issues and to achieve a stronger nuclear safety culture at SONGS.

6. Conclusion

SCE is committed to preserving and improving a strong nuclear safety culture at SONGS. SCE is committed to ensuring an atmosphere exists that encourages workers to raise nuclear safety concerns. SCE will not tolerate retaliation against workers who identify nuclear safety or other concerns. SCE has taken actions to improve the nuclear safety culture at SONGS. SCE will continue to identify, through systematic reviews, actions to strengthen the SONGS nuclear safety culture.

G. GROUND WATER PROTECTION

1. Introduction

This section addresses the AB 1632 Report recommendation that Electric Power Research Institute's (EPRI) ground water protection guidelines should be followed to prevent inadvertent releases of tritium due to degraded material or operational failures.⁸⁵

2. Requirements/Regulations Summary

Nuclear power plant licensees are required to control releases of radioactive liquids and airborne materials from their facilities to ensure that they are below limits set forth in 10 CFR §§ 20 and 50, and to operate the facility in a manner that adequately protects public health, safety, and the environment. Regulatory requirements for the control of radioactive effluents include sampling, analysis, monitoring and controlling releases, and assessing and reporting the potential impacts to the public. In addition, licensees are required by the NRC to establish a radiological environmental monitoring program to assess the long-term impacts due to plant operation and to report the results of the monitoring program. The EPA also established in 40 CFR § 190 a nuclear power plant standard on environmental radiation protection.

In November 2005, the Nuclear Energy Institute (NEI) sponsored the development of a nuclear industry-wide voluntary Ground Water Protection Initiative (GPI). The GPI was formally approved in May 2006 by the chief nuclear operating officers of each operating utility, and each utility was expected to implement the GPI no later than July 31, 2006. The GPI is designed to improve nuclear power plant licensees' management⁸⁶ of unintentional releases of radioactive substances to ground water and to enhance communications with stakeholders about those instances of unintentional releases. None of the instances of unintentional releases of radioactive substances to ground water that have been identified at operating and decommissioning nuclear power plants have posed any risk to public health and safety. The industry guidance contained

⁸⁵ AB 1632 Report, p. 19.

⁸⁶ "Management" as used for ground water protection in NEI 07-07 refers to establishing measures to assure timely detection of unintended releases and taking actions to prevent the migration of licensed radioactive material from an unintended release off-site.

in NEI 07-07 was published in August 2007.⁸⁷ NEI 07-07 provides the industry's policy position on ground water protection. In January 2008, EPRI published a companion set of guidelines, "Groundwater Protection Guidelines for Nuclear Power Plants," for establishing a ground water protection program to implement NEI 07-07.⁸⁸

In March 2006, the NRC convened a Liquid Radioactive Release Lessons Learned Task Force to review industry events and any associated public health impacts, industry actions, applicable NRC's regulatory and inspection requirements, and communications with external stakeholders. The NRC task force's final report⁸⁹ was issued on September 1, 2006 and provided a number of recommendations, including among other things, recommendations to: (1) augment the existing regulatory framework, (2) review design and maintenance requirements for components that contain radioactive fluids but are not safety-related, and (3) perform additional reviews of guidance and regulations for decommissioning and license renewal. With regard to the public health impacts resulting from unintended radioactive liquid discharges to the environment, the report concluded:⁹⁰

The most significant conclusion of the task force regarded public health impacts. Although there have been a number of industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, based on the data available, the task force did not identify any instances where the health of the public was impacted.

In March 2010, the NRC established a Groundwater Contamination Task Force to evaluate the completeness of the NRC's actions and responses to recent incidents of unintended releases of radioactive substances to ground water and soils. The task force also reassessed the NRC's regulatory framework for ground water

⁸⁷ NEI 07-07 "Industry Ground Water Protection Initiative – Final Guidance Document."

⁸⁸ "Groundwater Protection Guidelines for Nuclear Power Plants" Report 1016099, EPRI, issued January 2008.

⁸⁹ "Liquid Radioactive Release Lessons Learned Task Force Final Report," U.S. NRC, issued September 1, 2006.

⁹⁰ *Id.*

protection, health impacts resulting from the unintended releases, communications with stakeholders, and international perspectives. The task force issued a final report in June 2010 that reiterated the NRC's previous statements that the leaks/spills to date have not posed a hazard to human health.⁹¹ The senior NRC management team is reviewing the final report and will provide recommendations to the NRC as appropriate. Other information on the NRC's oversight on this issue may be found on the NRC's website.⁹²

NEI 07-07 establishes the industry's commitment to go beyond the regulatory requirements that are imposed by the NRC. SCE was an active participant in the development of both the industry GPI and the EPRI ground water guidelines and continues to take a leadership role in the industry effort. SCE has a comprehensive program and procedures in place for the implementation of the GPI that are consistent with the EPRI ground water protection guidelines.

3. Overview of SCE's Implementation of the Industry GPI

In the four years since the initial implementation of the industry GPI, SCE has taken actions to meet each of the objectives and acceptance criteria outlined in NEI 07-07. These actions include:

- Completed studies under the direction of a professional geologist to update the characterization of the site hydrology and to develop a site conceptual model to describe the flow of ground water beneath the site.
- Evaluated structures, systems, and components and work practices to assess the potential for equipment failure or human performance to result in an unintended leak or spill of radioactive fluids to the environment.
- Installed on-site ground water monitoring wells to provide timely detection of unintentional releases to ground water. These wells are sampled routinely and the sample results are provided in the Annual

⁹¹ "Groundwater Task Force Final Report" U.S. NRC, issued June 2010.

⁹² <http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html>

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/buried-pipes-fs.html>

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/tritium-radiation-fs.html>

Effluent Radioactive Release Report to the NRC. These annual reports are available to the public and are posted on the NRC's website.

- In support of the objective to improve transparency, developed procedures for voluntary communication and reporting to ensure that stakeholders would be contacted in the event of a spill or leak to ground water that meets the thresholds for communication identified in NEI 07-07. The thresholds for contacting designated stakeholders are well below any events that would require reporting to the NRC or to any other agency. SCE discussed the Industry Initiative with designated stakeholders prior to the initial implementation date in August 2006 and provides annual updates on both industry and SONGS-specific efforts on this issue.

SCE's implementation of the GPI was assessed by industry peers and by a team sponsored by NEI. The assessments determined that SCE met the criteria in NEI 07-07 and the EPRI ground water protection guidelines. The NRC has also assessed SCE's performance to meet the industry GPI and found that SCE met all of the objectives for a ground water protection program.

4. Conclusion

The nuclear power industry has identified instances of unintended releases of radioactive substances to ground water. However, none of those instances has threatened public health and safety or compromised environmental protection. SCE has and continues to implement the objectives of the industry GPI and the EPRI ground water protection guidelines at SONGS 2 & 3.

H. **WORKER TRAINING AND RECRUITMENT**

1. **Introduction**

This section addresses the AB 1632 Report recommendations that (1) the CPUC continue to recognize the importance of SCE's plant worker training and recruiting programs for SONGS 2 & 3, and approve adequate funding for such programs; and (2) the CPUC should assess the adequacy and success of SCE's training and recruiting programs for replacing retiring plant workers and ensuring that knowledge held by the retiring workers and the commitment to maintaining a strong safety culture are instilled in the new workers.⁹³ This section describes the programs and activities that demonstrate SCE's commitment to and ability for maintaining a highly skilled and knowledgeable workforce at SONGS 2 & 3.

2. **Recruitment Programs**

SCE competes with other nuclear utilities, other industries, vendors, and regulatory agencies such as the NRC to attract a qualified nuclear workforce. SCE needs to continue to build for the future by recruiting and training nuclear workers in advance of the anticipated retirement of workers in critical positions at SONGS 2 & 3. In addition, to meet the competitive challenge for recruiting qualified nuclear workers in important and difficult-to-fill positions, SCE must continue its strategy to utilize enhanced recruitment tools necessary to successfully recruit a qualified nuclear workforce.

In 2003, SCE initiated efforts to recruit new workers in advance of the anticipated retirement of workers in critical positions at SONGS 2 & 3. SCE requested funding in its 2006 GRC for these efforts.⁹⁴ Emphasis was placed on filling positions in which new qualified workers were in short supply or required a longer period of time for training, such as instrumentation and control (I&C) technicians, test technicians, nuclear electricians, boiler and condenser (B&C) mechanics, machinists, chemical technicians, health physics technicians, and engineers. The training duration for these types of critical positions at SONGS 2 & 3 range from one year for B&C mechanics and machinists, two

⁹³ AB 1632 Report, p. 19.

⁹⁴ Decision (D.) 06-05-016.

years for nuclear electricians and engineers, and three years for I&C technicians, health physics technicians, test technicians, and chemical technicians.

SCE's 2009 GRC requested funding to enhance existing recruitment tools and expand its investment in the development of staffing pipelines for important and difficult-to-fill nuclear positions.⁹⁵ SCE established a number of educational partnerships with local area community colleges and high schools to expand the pipeline of nuclear qualified workers in important skill areas. As an example, SCE collaborated with Mira Costa College, a San Diego County-based community college, to develop a certificate program in Nuclear Technology that provided the technical skills required to qualify for entry-level positions in radiation protection and nuclear plant operations. The program was successful and has expanded into an official two-year Associates Degree program in Energy Technology that will provide future highly qualified and motivated entry-level workers. This pipeline program enhances the existing pipeline. Program graduates will have an accredited college associate's degree in technology based upon an industry-recognized uniform curriculum. Between the first and second years of the program, students will spend 12 weeks at SONGS 2 & 3 working and rotating through four departments: maintenance, operations, chemistry, and health physics. This program benefits both SONGS 2 & 3 and the local communities. Mira Costa College is providing qualified entry-level candidates to support SCE's ability to maintain skilled nuclear workforce candidates and ensure continued reliable nuclear plant operations at SONGS 2 & 3.

In addition to establishing educational partnerships to attract and retain highly skilled and knowledgeable employees at SONGS 2 & 3, SCE uses supplemental tools in its recruitment processes, including offering sign-on bonuses, relocation benefits, enhanced housing allowances, and student loan repayment plans, as warranted. SCE also continues to meet the demand for nuclear workers through the use of contingent workers.

SCE's 2012 GRC continues to request funding for recruiting new workers in advance of the anticipated retirement of workers in critical positions at SONGS 2 & 3,

⁹⁵ Decision (D.) 09-03-035.

including funding for supplemental recruitment tools and maintaining educational partnerships with local schools.

In summary, SCE continues to meet the demand for nuclear workers through the successful implementation of recruitment programs and the use of contingent workers.

3. Training Programs

To maintain high standards for the training and qualification of nuclear plant workers, the industry established a training program accreditation process that is endorsed by the NRC. The training program ensures that personnel, who operate the plant, maintain plant systems, conduct radiological protection activities, maintain plant chemistry, and perform engineering duties, are initially provided with and subsequently maintain, through continuing training programs, the skills and knowledge to perform their job. SONGS 2 & 3 training programs were initially accredited through this process and are reviewed for re-accreditation on a four-year basis.

The objectives and criteria for training program accreditation in the nuclear power industry provide the framework for the application of a systematic approach to training (SAT), which ensures the workers have the necessary knowledge, skills and abilities to do their job. Experience and insights gained in the industry are fed back into SONGS 2 & 3 training programs through the use of the SAT process. This feedback loop for capturing industry-wide operating experience ensures that future generations of SONGS 2 & 3 workers will learn from the past and current workforce.

Beyond the accredited programs, general employee training and training targeted for management and supervision is provided to enhance knowledge, skills and further learning through understanding lessons learned from operating experience.

Training is critical to SONGS 2 & 3 success and is used as a strategic tool to provide highly skilled and knowledgeable personnel to ensure safe and reliable operations. Training accreditation by the National Nuclear Accrediting Board shows that SONGS 2 & 3 owns its training and is meeting industry standards for providing nuclear employees who safely operate and maintain SONGS 2 & 3. General employee training ensures employees have the knowledge and the skills to independently perform their job assignments.

4. Safety Culture Training

Nuclear safety is the top priority at SONGS. Nuclear safety culture refers to an organization's values and behaviors – modeled by its leaders and internalized by its members – that make nuclear safety the overriding priority for the organization.

SCE uses many methods to instill a strong nuclear safety culture in its new employees. These various methods include a variety of training modules that address nuclear safety culture. These training modules include: 1) new employee orientation whose objectives include commitment to Nuclear Safety, Safety Conscious Work Environment (SCWE), and the Employee Safety Concerns program; 2) basic training for supervisors on SCWE and Nuclear Safety Concerns whose objectives include establishing and maintaining a SCWE and guidance on what to do when a worker raises a safety concern. The program requires new supervisors receive this training within their first year of supervising. Nuclear Safety Culture is also included in General Employee Training (GET) for all personnel having unescorted protected area access.

5. Conclusion

SCE is meeting the competitive challenge for hiring and training qualified nuclear workers in important and difficult-to-fill skill areas by continuing its: 1) recruitment programs for replacement of retiring workers for critical SONGS 2 & 3 positions and through the use of contingent workers; 2) training programs for employees; and 3) ensuring knowledge and strong safety culture are instilled in new SONGS 2 & 3 workers.

I. ALTERNATIVE GENERATION

This section addresses the AB 1632 Report recommendation that as a part of license renewal studies for SONGS 2 & 3, the CPUC should require detailed studies of alternative power generation options to quantify the reliability, economic, and environmental impacts of replacement options.⁹⁶

SCE plans to submit a request to the CPUC for funding the processing of a license renewal application at the NRC. The CPUC filing, expected in early 2011, will include a cost-effectiveness analysis of alternative power generation that will allow the CPUC to determine that the extended operation of SONGS 2 & 3 would be beneficial for SCE's customers and the state.

⁹⁶ CPUC June 25, 2009 Letter to SCE; AB 1632 Report, p. 31.

J. ONCE THROUGH COOLING

1. Introduction

This section addresses the AB 1632 Report recommendation that the California Independent System Operator (CAISO) address the Stakeholder Study of Aging Power Plants and Once-Through Cooling Mitigation as quickly as feasible and that the review determine the extent supplemental studies are needed.⁹⁷ SCE's review of the once through cooling (OTC) policy, as it relates to SONGS 2 & 3 and its environmental mitigation status, is included below.

On May 4, 2010 the State Water Resources Control Board (SWRCB) adopted a policy⁹⁸ on the use of coastal and estuarine waters for power plant cooling. The policy, which became effective October 1, 2010, includes a schedule for implementation, including milestones for thermal fossil plants using OTC technology to retrofit using alternative cooling technologies, such as cooling towers, or to shut down no later than the end of 2020.

The OTC policy also established separate requirements for the state's nuclear-fueled power plants, such as SONGS 2 & 3, because of these plants' positive environmental benefits and importance to the reliability of the electric grid. The requirements include: (1) installing large organism exclusion devices around the SONGS 2 & 3 intake structures within one year after the effective date of the policy (i.e., by October 1, 2011); (2) conducting and providing to the SWRCB within three years after the effective date of the policy (i.e., by October 1, 2013) a special study of alternatives for SONGS 2 & 3 to meet the policy's objectives, including costs for the alternatives;⁹⁹ and (3) achieving full compliance with the policy by implementing alternative cooling technologies such as a closed cycle cooling system (i.e., cooling towers) at SONGS 2 & 3 or shut down by December 31, 2022.

⁹⁷ AB 1632 Report, p. 24.

⁹⁸ Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Policy), Resolution No. 2010-0020; adopted by SWRCB May 4, 2010; effective October 1, 2010.

⁹⁹ The special study to assess alternatives for nuclear-fueled power plants must be conducted by an independent third party under the oversight of a Review Committee; reference Policy, § 3(D).

The relevance of the OTC policy requirements to SONGS 2 & 3 is discussed below.

2. SCE Has Fully Mitigated For the Impact of SONGS 2 & 3 on the Marine Environment¹⁰⁰

SONGS 2 & 3 employs state-of-the-art engineering and operational measures to minimize impingement and entrainment of marine organisms. These include velocity caps on the mid-water depth offshore intakes,¹⁰¹ an in-plant fish handling system (diversionary louvers, rescue elevators, and return lines), and customized outfall heat treatment procedures to maximize fish handling system effectiveness.

In addition to the design engineering and operational measures described above, SCE has performed mitigation measures that include: (1) restoring wetlands in San Dieguito; (2) constructing the largest artificial giant kelp reef in California, the 174-acre Wheeler North Reef; (3) funding the Hubbs white sea bass hatchery in Carlsbad; and (4) funding ongoing independent monitoring of the mitigation measures.

Independent verification monitoring of SCE's environmental mitigation efforts show substantial enhancement of habitat resources, even before the mitigation projects are physically complete. For example, the San Dieguito wetlands project created over 160 acres of new wetlands (including 100 acres of tidal salt marsh land) and restored tidal flows, natural habitats, and vegetation to a former wetland area, resulting in measurable increases of fish and wildlife in the project area.¹⁰² Additionally, the Wheeler North Reef is a significant new marine kelp habitat on the southern California coast that produces and nourishes as many as 50 varieties of fish and invertebrates and the 174-acre kelp forest ecosystem that supports them.

¹⁰⁰ Appendix 9, Letter from Peter Douglas, Executive Director, California Coastal Commission, dated February 4, 2010.

¹⁰¹ Mid-water location of the intakes is a design feature intended to minimize fish entrainment.

¹⁰² UCSB SONGS Mitigation Monitoring website: <http://marinemitigation.msi.ucsb.edu/>.

3. SCE Will Install Large Marine Organism Exclusion Devices at SONGS 2 & 3 If Feasible

The requirement for SONGS 2 & 3 to install large marine organism exclusion barriers around the circulating water intake velocity caps within one year after the effective date of the policy is not achievable. Such a barrier requires time to design and requires a detailed review to ensure that conditions of the NRC operating license will continue to be satisfied. If an exclusion device is determined to be feasible, a considerable amount of time would be required to install the modifications while the units are off-line. SCE is currently identifying options for meeting this policy requirement, and is working with the SWRCB regarding this policy.

4. Cooling Towers Are Not Feasible

The SWRCB OTC policy requires plants utilizing OTC to reduce their intake of cooling water by installing closed-cycle wet cooling systems or by reducing intake to a comparable level by alternative means. Installing a closed-cycle wet cooling system (i.e., cooling towers or the equivalent) has been evaluated and is not feasible at SONGS 2 & 3. A retrofit with a closed-cycle cooling system at SONGS 2 & 3 would face unparalleled engineering challenges, insuperable permitting obstacles, and adverse environmental impacts likely greater than those associated with OTC.

5. Possible Exceptions to the SWRCB OTC Policy

The OTC policy requires completion of special studies conducted by an independent third party within three years of the effective date of the policy. These studies are to assess alternatives for the nuclear-fueled power plants to meet OTC policy requirements. Pursuant to the policy, the SWRCB must consider the study results in evaluating whether to modify the compliance requirements for nuclear-fueled power plants. The SWRCB staff is in the initial phases of selecting the contractor for the nuclear plant special studies and appointing the oversight committee.

The date for SONGS 2 & 3 to comply with the OTC policy is December 31, 2022, but this date could be adjusted by the SWRCB based on written notification from the CAISO that the plant is needed to maintain reliability of the electric system; however, SONGS 2 & 3 cannot operate beyond 2022 unless the NRC grants license renewal.

6. Conclusion

Consistent with the directives of the California Coastal Commission (CCC), SCE has fully mitigated for the impact of SONGS 2 & 3 on the marine environment. Cooling towers are not feasible at SONGS 2 & 3 and an alternative means of compliance will be required to allow SONGS 2 & 3 to enter a period of extended operation; however, SONGS 2 & 3 cannot operate beyond 2022, even if the CAISO determines it would be necessary, unless NRC license renewal had been obtained.

K. ADEQUACY OF MAINTENANCE PROGRAMS

1. Introduction

This section addresses the AB 1632 Report recommendation that, to help ensure plant reliability, SCE should address the adequacy of maintenance programs at SONGS 2 & 3.¹⁰³ This section describes SCE's maintenance programs and results for assuring that SONGS 2 & 3 structures, systems, and components (SSCs) support reliable operations. Specifically, this section focuses on non-safety-related SSCs that are important to plant reliability.

2. Standards

There are a number of entities that provide initiatives, standards, and methodologies for maintaining plant SSCs, including but not limited to:

- Nuclear Regulatory Commission (NRC) – a federal agency whose requirements are provided in the CFR. SCE is required to adhere to CFRs that are applicable to operation of a nuclear power plant. In addition, SCE must meet maintenance-related technical specifications mandated by the NRC in the operating licenses for SONGS 2 & 3. An example of a program required by the CFR is SCE's Maintenance Rule Program. This program monitors, trends, and assesses performance of plant SSCs in accordance with 10 CFR 50.65.¹⁰⁴ Given the link between effective maintenance and SSC reliability, the program seeks to reduce the number of challenges to safety systems by improving operability, availability, and reliability of SSCs, including the reliability of non-safety-related SSCs.
- Electric Power Research Institute (EPRI) – an organization that includes scientists, engineers, and experts in the energy industry to help address challenges in reliability, efficiency, health, safety, and

¹⁰³ AB 1632 Report, p. 34.

¹⁰⁴ 10 CFR § 50.65, Requirements For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.

the environment. SCE utilizes EPRI guidelines to establish standardized inspection and acceptance criteria for various plant programs at SONGS 2 & 3, such as SCE's program for maintaining the plant's water chemistry.

- American Society of Mechanical Engineers (ASME) – an organization that developed the Boiler and Pressure Vessel Code that establishes rules of safety governing the design, fabrication, and inspection of nuclear power plant SSCs, such as feedwater heaters.
- Institute of Electrical and Electronic Engineers (IEEE) – an organization for the advancement of technology related to electricity. IEEE develops industry standards that help define the performance and reliability criteria of electrical systems and components in a broad range of disciplines, such as for differential relays in the 220kV switchyard at SONGS 2 & 3.

3. Approach to Maintenance of Non-Safety-Related SSCs Important to Plant Reliability

Maintenance is performed on non-safety-related plant SSCs for a variety of reasons, including to address normal wear and tear and aging degradation, or component obsolescence. Plant SSCs experiencing normal wear and tear¹⁰⁵ and/or aging degradation¹⁰⁶ are identified and corrected through periodic maintenance that includes monitoring and testing to ensure they are in good working order, are replaced as appropriate, and demonstrate component reliability.

Maintenance is performed on active and passive components. Because active components have moving parts or continuously operate, degradation is more readily observed. Operators monitor the plant's operating components through routine rounds where data is collected and assessed. Maintenance and engineering personnel also monitor components for changes in performance or condition, when components are

¹⁰⁵ An example of normal wear and tear degradation is oil or bearings in a pump that need periodic changing due to use.

¹⁰⁶ An example of aging degradation is external corrosion of piping components over time due to salt air exposure.

in-service or taken out of service for inspections. Because passive components do not have moving parts and may be used intermittently, degradation is identified through inspections.

SCE manages both active and passive components (mechanical, structural, and electrical) through the following types of maintenance activities:

- periodic, predictive, and planned maintenance
- corrective maintenance
- performance monitoring
- periodic testing and inspection

Several existing programs at SONGS 2 & 3 have been implemented to address the types of maintenance described above. These programs ensure that plant SSCs support reliable operation.

a) Equipment Reliability Program

SCE has an Equipment Reliability Program (ERP) that integrates a broad range of activities into one program. In this program, personnel evaluate plant SSCs; develop and implement long-term health plans; monitor performance and conditions; and make continuous adjustments to preventive maintenance tasks and frequencies based on SSC operating experience.

The Life Cycle Management Program (a sub-program of the ERP) develops long-term health plans by assessing SSC performance trends; component age; obsolescence and reliability concerns; industry operating experience; and periodic and predictive maintenance history.

Examples of non-safety-related SSCs covered under the ERP to maintain plant reliability include:

- Main Feedwater Pumps and Turbines – refurbishments and routine maintenance were completed in accordance with vendor recommendations.
- Generator Stator Water System – the system was modified to improve the corrosion product removal process.
- Generator Seal Oil System – design changes were implemented to prevent continued corrosion from salt air.

- Main Transformers – performed maintenance to correct corroded oil lines that were discovered during routine transformer inspection.
- Feedwater Piping – sections of piping were replaced due to corrosion identified by the Flow Accelerated Corrosion Program that is established at SONGS 2 & 3.

b) Work Management Program

SCE established the Work Management Program to provide timely identification, selection, planning, coordination, prioritization, and execution of work necessary to maximize the availability and reliability of plant SSCs. Personnel implementing this program are able to manage the risk associated with conducting work, identify the impact of work to the plant, and protect the station from unanticipated transients due to the conduct of work. The Work Management Program maximizes the efficiency and effectiveness of plant personnel and material resources by prioritizing work, and coordinating all aspects of work performed on SSCs. All work performed at SONGS 2 & 3 is done under this program.

c) Support of Maintenance Programs

To support the effective implementation of the maintenance programs at SONGS 2 & 3, SCE also employs a variety of underlying programs, including for example:

- Shelf Life Program – uses industry guidelines and manufacturer recommendations to establish controls to maintain parts and equipment in storage that may be subject to deterioration.
- Procedures Control Program – ensures proper identification, development, approval, and revision of procedures used to maintain plant equipment at SONGS 2 & 3.
- Training Programs ¹⁰⁷ – a structured training process that ensures plant personnel are provided with the skills and knowledge necessary to perform their jobs.

¹⁰⁷ Section H, Worker Training and Recruitment.

4. Conclusion

SCE's implementation of the programs described above meets the nuclear industry maintenance standards and has resulted in reliable service for customers. As a recent example, in 2010, SONGS 3 surpassed a plant record when it reached 660 days of continuous operation. The maintenance programs provide a solid basis for reliable plant operations through a possible period of extended operation.

IV.

CONCLUSION

SONGS 2 & 3 is operated in a safe and reliable manner, in accordance with federal, state, and local regulatory requirements, and provides the needed electricity to meet customers demands. Rated at 1,070 megawatts (MW) and 1,080 MW, respectively for each unit, SONGS 2 & 3 generates enough electricity to serve 1.4 million average southern California homes every day. In addition, SONGS 2 & 3 generates clean, low-carbon electricity, in support of the state's environmental and greenhouse gas (GHG) policy objectives. Further, due to the location of SONGS 2 & 3 between two major metropolitan areas in San Diego, Los Angeles, Orange, and other counties in southern California, SONGS 2 & 3 is integral to adequately maintaining the reliability of the electric grid in southern California.

As discussed above, SCE's evaluations demonstrate that SONGS can continue to provide reliable operation through a period of extended operation, if the NRC grants license renewal for SONGS 2 & 3.