SONGS Units 2 and 3
Environmental Impact Evaluation

Technical Data Record

Document No.: SONGS002 (P04500594721)

Decommissioning Supplemental Environmental Analysis

Contractor Project No.: SCE-Q13-J001

Revision 1

June 2, 2014

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SONGS Units 2& 3 Environmental Impact Evaluation

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Signature Block

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SONGS Units 2& 3 Environmental Impact Evaluation

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1		See consolidated comment resolution forms (dated May 15, 2014 and June 2, 2014) and the DCE comparison to the SONGS EIE (dated May 21, 2014) for the complete record of revisions and authorizations.

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Acronyms and Abbreviations

μCi/ml	microcurie per milliliter
μg/m^3	micrograms per square meter
AADT	average annual daily traffic
ac	acres
ACHP	Advisory Council on Historic Preservation
AHSM	advanced horizontal storage modules
ALARA	as low as reasonably achievable
amsl	above mean sea level
AWS	administration warehouse and shop
BMP	best management practice
BWR	boiling water reactor
CAAQS	California Ambient Air Quality Standards
Cal/OSHA	Division of Occupational Safety and Health
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBARS	coolant and boric acid recycle system
CCC	California Coastal Commission
CCW	component cooling water
CDFW	California Department of Fish and Wildlife
CDP	coastal development permit
CDWR	California Department of Water Resources
CESA	California Endangered Species Act
CMP	congestion management plan
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CO	carbon monoxide
CO_2	carbon dioxide
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRS	coolant radwaste system
CRWQCB	California Regional Water Quality Control Board
CSLC	California State Lands Commission
CVCS	chemical and volume control system
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBa	A-weighted sound levels
DBA	design basis accident
dBC	C-weighted sound levels
DBE	design basis earthquake
DECON	decontamination and dismantlement
DoD	Department of Defense

DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSC	dry shielded canister
DTSC	Department of Toxic Substances Control
EFH	essential fish habitat
EIE	environmental impact evaluation
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FES	final environmental statement
FHA	Federal Housing Administration
FSAR	final safety analysis report
ft	feet
ft^3	cubic feet
ft/s	feet per second
GEIS	generic environmental impact statement
GPI	groundwater protection initiative
gpm	gallons per minute
GRS	gaseous radwaste system
HA	hydrologic area
HIC	high integrity container
HSA	hydrologic sub-area
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilating, and air conditioning
I-5	Interstate 5
I-15	Interstate 15
in	inch
INRMP	integrated natural resource management plant
ISFSI	independent spent fuel storage installation
km	kilometer
kV	kilovolt
kW	kilowatt
Ldn	day-night average sound level
Leq	equivalent sound level
LLRW	low-level radioactive waste
LOS	level of service
LRHR	Local Register of Historical Resources
LTP	license termination plan
m^3	cubic meter
MBTA	Migratory Bird Treaty Act
MCBCP	Marine Corps Base Camp Pendleton
mi	miles

mllw	mean lower low water
MLWS	miscellaneous liquid waste system
MMPA	Marine Mammal Protection Act
MPHF	multi-purpose handling facility
mrad	milliradium
mrem	millirem
mrem/yr	millirem per year
mSv	millisievert
mSv/yr	millisievert per year
MW	megawatts
MWDOC	Municipal Water District of Orange County
MWP	mixed waste processing
NAAQS	National Ambient Air Quality Standards
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIA	North Industrial Area
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSSS	nuclear steam supply system
OCA	owner-controlled area
ODCM	offsite dose calculation manual
OES	Office of Emergency Services
OHP	California Office of Historic Preservation
OSHA	Occupational Safety and Health Administration
OTC	once-through cooling
PM_{10}	particulate matter less than ten microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
PRC	California Public Resources Code
PSDAR	post-shutdown decommissioning activities report
PWR	pressurized water reactor
PWSA	Ports and Waterways Safety Act
RAQS	regional air quality strategies
RCA	radiological controlled area
RCRA	Resource Conservation and Recovery Act
RCS	reactor coolant system

REMP	Radiological Environmental Monitoring Program
RG	Regulatory Guide
RHB	Radiologic Health Branch
RWQCB	Regional Water Quality Control Board
RWST	refueling water storage tank
SAFSTOR	safe storage
SANDAG	San Diego Association of Governments
SCE	Southern California Edison
SDAB	San Diego air basin
SDAPCD	San Diego Air Pollution Control District
SGBPS	steam generator blowdown processing system
SIP	state implementation plan
SJHU	San Juan Hydrologic Unit
SHPO	state historic preservation office
SNF	spent nuclear fuel
SO_2	sulfur dioxide
SONGS	San Onofre Nuclear Generating Station
SONGS 2 & 3	San Onofre Nuclear Generating Station Units 2 & 3
SPCC	spill prevention, control, and countermeasure
SSC	structures, systems, or components
SWC	seawater cooling
SWMS	solid waste management system
SWPPP	storm water pollution prevention plan
SVGB	San Onofre Valley Groundwater Basin
SYF	south yard facility
T & E	threatened and endangered
TAC	toxic air contaminant
TEDE	total effective dose equivalent
TSCA	Toxic Substances and Control Act
UFSAR	updated final safety analysis report
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

SONGS Units 2 and 3

EIE Executive Summary

Revision 1

June 2, 2014

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ES 1.0 INTRODUCTION

To support the post shutdown decommissioning activities report (PSDAR), Southern California Edison (SCE) evaluated the environmental impacts of decommissioning San Onofre Nuclear Generating Station (SONGS) Units 2 & 3 to determine if anticipated impacts are bounded by existing environmental impact statements (EISs), primarily the U.S. Nuclear Regulatory Commission's (NRC's) decommissioning generic EIS (GEIS), NUREG-0586, Supplement 1, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1* (referred to herein as the decommissioning GEIS) (NRC 2002). In the decommissioning GEIS, the NRC reviewed most of the environmental impacts resulting from decommissioning on a generic basis, but requires site-specific analyses for threatened and endangered species and environmental justice.

The NRC considered various activities that are performed in conjunction with decommissioning but are reviewed and regulated by the NRC under other licenses as outside the scope of decommissioning impacts. These out-of-scope impacts include impacts related to the decision to permanently cease operations, impacts from spent fuel management in wet or dry storage, impacts from spent fuel transport and disposal away from SONGS, and the treatment and/or disposal of low-level radioactive waste at a licensed facility.

ES 2.0 PLANT LOCATION AND DESCRIPTION

SONGS 2 & 3 is located in northern San Diego County, California, approximately 51 miles north-northwest of the city of San Diego. The nearest developed community is San Clemente, which is 5 miles north-northwest of SONGS in Orange County. The SONGS site lies entirely within the boundaries of the Marine Corp Base Camp Pendleton under a grant of easement between SCE and the United States Government. The site is bounded on the west by the Pacific Ocean; on the east by eight-lane Interstate Highway 5 (I-5) and the railroad tracks owned by the North County Transit District of San Diego, that pass within 1,000 feet of the station site; and on both the north and south along the coastline by San Onofre State Beach. The coastal side of the OCA industrial area is protected by a seawall and a public walkway that permits transit between open beach areas upcoast and downcoast from the site. (SONGS 2013)

The principal structures of SONGS 2 & 3 consist of two reactors with containment structures, turbine buildings, auxiliary building, diesel generator buildings, fuel handling buildings, switchyard, security building, maintenance building, administrative buildings, and cooling system intake and discharge structures. The water from the Pacific Ocean is supplied to the cooling water systems within separate intake conduits for each unit and cooling water flows return to the Pacific Ocean through separate discharge conduits. The onsite independent spent fuel storage installation (ISFSI) is a fenced, protected area located within the Unit 1 industrial area, dedicated to the storage of dry spent fuel from Units 1, 2, and 3. (SONGS 2013)

ES 3.0 DECOMMISSIONING ACTIVITIES

SONGS will be utilizing the decommissioning method of decontamination and dismantlement (DECON). Structures will be demolished to grade or below. Building demolition will be performed using conventional means (with no explosives). (Energy Solutions 2014) The removal of structures, including subsurface structures, will be in accordance with NRC regulations for unrestricted release of the property at license termination and U.S. Navy requirements for return of the SONGS property.

The intake and discharge conduits on the seabed are subject to the terms of the California State Lands Commission (CSLC) easement lease for this offshore land. The easement lease calls for removal of structures, building, pipelines, machinery, and facilities placed or erected by lessee and restoration as nearly as possible to the conditions existing prior to their erection or placement (CSLC 1985). However, SCE plans to pursue an amendment to allow abandonment in place of the conduits with removal of vertical risers.

Spent fuel will be stored in the ISFSI until it is accepted by the DOE. After all fuel has been removed from the ISFSI, the ISFSI will be decommissioned and remaining miscellaneous structures will be demolished and removed from the site as required for lease termination. SCE plans to enter into a separate agreement with the U.S. Navy to allow for the continued use of the existing switchyard. With the exception of the switchyard and other structures that are left in place as agreed to by the U.S. Navy, the site will be restored to meet the agreements with the U.S. Navy and any applicable state permit requirements, and the license and grant of easement will be officially terminated.

ES 4.0 ENVIRONMENTAL IMPACT EVALUATION

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

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

SCE reviewed the planned decommissioning activities for SONGS and compared these to the decommissioning activities that NRC reviewed in the decommissioning GEIS. The planned activities fall within the activities that NRC reviewed. No unique site-specific features or unique aspects of the planned decommissioning have been identified. Furthermore, the methods used to accomplish these individual tasks will employ conventional methods.

SCE's review confirmed that the anticipated or potential impacts are within the bounds of the generic impacts that the NRC described in the decommissioning GEIS. There are no applicable bounding impacts for threatened and endangered species and environmental justice. This evaluation presents these site-specific analyses, determining that the planned SONGS 2 & 3 decommissioning activities are not anticipated to result in significant impacts to threatened and endangered species or disproportionate impacts on minority or low-income populations. The following discussions summarize review and the reasons for reaching this conclusion.

ES 4.1 Onsite/Offsite Land Use

SCE decommissioning plans include building demolition and removal within the 83.63-acre easement hosting the SONGS 2 & 3 reactor units and infrastructure. SCE plans are to seek an easement lease amendment from the CSLC for the abandonment of the SONGS 2 & 3 intake and discharge conduits on the seabed with limited removal activities. To support dismantlement of structures, SCE may opt to utilize leased SONGS parcels outside the 83.63-acre easement on the west side of I-5 for decommissioning activities, e.g. staff parking, temporary non-radiological equipment storage, etc. In addition, the existing rail spur serving the site will be used in support of radioactive waste shipments.

The SONGS site is currently used for utility-related industrial land uses, with the majority of the property within the easement having been previously disturbed during construction and operation of the plant. The coastal bluff areas located in the northwest and southeast portions of the 83.63-acre easement have remained undeveloped in compliance with the California Coastal Commission (CCC) guarantee agreement in which SCE guarantees that they will be protected and that they will remain in their natural state (CCC 1974). It is anticipated that there would be no changes in onsite land use patterns during decommissioning. Any offsite land that may be utilized for decommissioning activities is anticipated to be associated with parcels already leased by SONGS from the U.S. Navy on the west side of I-5. These parcels are currently utilized to support SONGS activities, and no land use change inconsistent with current utilization is expected during decommissioning.

NRC's generic assessment for land use was that the impact would be SMALL for sites that did not require additional land for decommissioning activities and if additional land was needed, and then the impact should be determined on a site-specific basis. Therefore, SONGS onsite land use impacts during decommissioning are bounded by the decommissioning GEIS.

ES 4.2 Water Use

SONGS 2 & 3 acquires potable water through the South Coast Water District, a member agency of the Municipal Water District of Orange County (MWDOC). The site uses water from the Pacific Ocean for its circulating cooling for service water functions. The operational demand for cooling and makeup water was largely eliminated once SONGS 2 & 3 permanently ceased operation. The normal operation demand was previously 830,000 gpm. (SONGS 2013, Section 2.4.13.1)

Water uses for decommissioning include staff usage, fuel removal, large component removal, decontamination and dismantlement, and structure dismantlement. There is also a need for dewatering during decommissioning activities. Water uses, including dewatering volumes, are anticipated to be significantly less than water use during operation. The decommissioning GEIS generically determined water use impacts to be SMALL (NRC 2002, Section 4.3.2.4); therefore, SONGS's water use impacts during decommissioning are bounded by the decommissioning GEIS.

ES 4.3 Water Quality

Major activities that could impact surface and groundwater quality during decommissioning include fuel removal, stabilization, decontamination and dismantlement, structure dismantlement, and dewatering. These activities could lead to accidental spills, migration of low concentrations of radioactivity or hazardous substances not previously identified, and leaching from abandoned in place concrete subsurface structures.

SONGS 2 & 3 discharges are regulated by National Pollutant Discharge Elimination System (NPDES) permits issued by the California Regional Water Quality Control Board (CRWQCB) (CRWQCB 2006). Storm water is regulated and controlled through an industrial storm water general permit issued by the CRWQCB. The SONGS spill prevention control and countermeasures (SPCC) plan and storm water pollution prevention plan will be updated as necessary to address decommissioning activities. SCE will acquire the appropriate permit or modification of its NPDES permit for discharge of water pumped from dewatering wells.

An SCE review concluded that no drinking water pathway exists for exposure from SONGS operations (SONGS 2007); furthermore, the nearest drinking water well is more than one mile inland. Previous studies (SONGS 2007) indicate that even under extreme pumping conditions, a seaward gradient will exist, so dewatering is not expected to result in saltwater intrusion. Compliance with the CRWQCB policy to maintain a seaward gradient would also ensure against saltwater intrusion.

SCE will follow standard work and best management practices (BMPs) and comply with SPCC plans to minimize the chance of groundwater contamination. In the event an unknown area of hazardous substances is identified during sub-grade soil excavation and structures removal, the area will be assessed and controlled. Due to the implementation of BMPs, compliance with permits, and the unlikelihood of low concentrations of hazardous substances, the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater are considered SMALL. In its decommissioning GEIS, the NRC generically determined water quality impacts to be SMALL (NRC 2002, Section 4.3.3.4); therefore, SONGS 2 & 3's water quality impacts during decommissioning are bounded.

ES 4.4 Air Quality

Emission sources in San Diego County are primarily mobile sources and violations of ambient air quality standards for particulate matter are persistent. Relatively minor stationary sources are in use at SONGS that result in annual emissions that are a fraction of the average daily emissions for the San Diego Air Pollution Control District (SDAPCD).

The most likely impact of decommissioning on air quality would be due to fugitive dust. SCE will include standard dust control measures during decommissioning in accordance with SDAPCD dust abatement requirements. Air emissions due to commuting workers will also be less since the work force during decommissioning is expected to be smaller than the number of workers used for construction or refueling outages.

The NRC's decommissioning GEIS generically determined air quality impacts associated with decommissioning to be SMALL due to the sufficiency of current and commonly used control and mitigation measures (NRC 2002, Section 4.3.4). SCE will implement standard mitigating measures to reduce particulate matter and ozone emissions during decommissioning, per the requirements of the SDAPCD. Therefore, air quality impacts related to decommissioning of SONGS 2 & 3 are bounded by the decommissioning GEIS.

ES 4.5 Aquatic Ecology

SCE has characterized the aquatic environment in the vicinity of the SONGS 2 & 3 intake and discharge conduits prior to construction and during entrainment and impingement studies completed in 2008 (SCE 2008). There are a variety of habitat types surrounding the SONGS 2 & 3 conduits. The fish habitat offshore of SONGS consists of a mixture of sand, cobble, and isolated areas of exposed rock. The area of richest marine productivity in the immediate vicinity of the plant site is the shallow sub-tidal zone, approximately 1,300 ft up the coast from SONGS. This area supports a biological community dominated by surfgrass and feather boa kelp. The San Onofre kelp bed is approximately 650 ft down the coast from the SONGS Unit 2 diffusers at a depth of about 40 to 50 ft. The benthic (bottom) community is generally dominated by queenfish (*Seriphus politus*); northern anchovy (*Engraulis mordax*); white croaker (*Genyonemus lineatus*); and speckled sanddab (*Citharichthys stigmaeus*). (SCE 2008)

Since ceasing permanent operations at SONGS 2 & 3, SCE has continued water withdrawals and discharge to support cooling for SONGS 2 & 3 spent fuel pools at approximately 96 percent reduction from normal operating flows (SCE 2013a). Management of spent fuel is not considered a decommissioning activity and its impacts are out-of-scope for assessing impacts from decommissioning. SONGS will comply with its NPDES permit, applicable Clean Water Act Section 316(b)-related regulations, and California's once-through cooling policy addressing reduction of impingement and entrainment impacts due to water withdrawals.

SCE plans to pursue an amendment to the CSLC easement lease for SONGS 2 & 3 intake and discharge conduits on the seabed. If the CSLC approves the amendment to allow SCE to abandon the conduits in place after removing the vertical risers, the environmental impacts are projected to be SMALL with the application of mitigation measures enumerated in the lease amendment. Complete removal of the conduits, as is currently required by the CSLC easement lease, is anticipated to have environmental impacts that are greater than SMALL. If the CSLC easement lease is not amended, the environmental impacts from complete removal of the conduits would be evaluated at that time.

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

The potential impacts to aquatic ecology would be SMALL, and no additional mitigation measures beyond those anticipated as a condition of the CSLC easement lease amendment are warranted. The NRC generically determined aquatic ecology impacts to be SMALL when only aquatic resources within a plant's operational areas is disturbed (NRC 2002, Section 4.3.5.4); therefore, the aquatic ecology impacts during the decommissioning of SONGS 2 & 3 are bounded by the decommissioning GEIS.

ES 4.6 <u>Terrestrial Ecology</u>

SONGS 2 & 3 is almost entirely paved and developed. However, there are several small strips of intact scrub-shrub habitat and ornamental vegetation surrounding the parking lots and between developed areas of the plant. The SONGS site also has undeveloped coastal bluffs that are explicitly protected from development under the CCC coastal development permit. The onsite coastal bluff in the northwest area of SONGS 2 & 3 is sparsely vegetated, California desert-thorn scrub habitat (BonTerra 2012a). The larger onsite coastal bluff in the southeast area of SONGS 2 & 3 is approximately 5 acres (CCC 1974) and is dominated by California sagebrush scrub vegetation (BonTerra 2012a). This bluff is contiguous with the San Onofre bluffs of the San Onofre State Beach which supports two native vegetation associations (Diegan coastal sage scrub and southern foredune) and small areas of disturbed coastal sage scrub habitat (Odgen 1994). The coastal bluff areas provide opportunity to support wildlife however, the light, noise, and frequent human presence due to the proximity of SONGS structures and activities; the highway, beach road, and railroad; and frequent human presence on the state beach would provide a more disturbed habitat than optimal for many species. Avian species are highly mobile and not subject to barriers such as roads and developed areas that would deter ground-limited organisms, and may utilize scrub habitat or open surfaces for nesting and temporary perching.

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

SONGS is located within the coastal zone and prior to active dismantlement, SCE will file a coastal development permit application with the CCC. As part of this permitting process, decommissioning activities within the coastal sage habitat areas, coastal bluff, and beach areas will be reviewed by the CCC for potential environmental impact particularly for the federally listed coastal California gnatcatcher (*Polioptila californica californica*) and other protected species and species of concern. The need to implement mitigation measures would be conditions of the CCC permit. The removal of security barriers along the perimeter of the developed plant adjacent to and within the natural area could potentially require ground disturbance in unpaved areas. Appropriate avoidance and minimization measures will be used to minimize the impact of any ground disturbance.

With the implementation of appropriate avoidance and minimization measures and compliance with permit conditions as discussed above, decommissioning of SONGS Units 2 & 3 is not anticipated to adversely impact any terrestrial resources and the impacts would be SMALL. Therefore, SONGS 2 & 3's terrestrial ecology impacts during decommissioning are bounded by the decommissioning GEIS.

ES 4.7 Threatened and Endangered Species

Seventeen federally or state-protected species utilize habitat within a 6-mi radius (vicinity) of the SONGS site. These species are listed in Table ES4.7-1, along with their protection status and critical habitat designation. The list includes four federally listed marine turtles; however, none are considered full-time residents in the vicinity of SONGS, as they are mostly transient and only migrate through the vicinity. Another federally listed marine reptile, the Hawksbill turtle (*Eretmochelys imbricata*), sporadically nests in the southern part of the Baja peninsula and foraging sub-adults and juveniles have been sighted along the California coast (NOAA 2013a).

The decommissioning activities would indirectly impact protected species through dust generation due to structure demolition, noise from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and potentially bird collisions with crane booms or other construction equipment. The decommissioning activities will be conducted in compliance with air quality and noise regulations and SCE will use avoidance and minimization measures. Compliance with applicable regulations, air permits, noise restrictions related to daylight working along with the temporary nature of the various decommissioning tasks (e.g., use of cranes) will minimize the impacts. Decommissioning plans do not include the use of explosives, whose noise could disturb protected species. These mitigation measures would serve to minimize impacts to protected terrestrial species that inhabit or visit the SONGS site.

SCE will also employ other measures such as planning decommissioning activities to avoid and further minimize potential impacts during the nesting season to ensure species, such as the coastal California gnatcatcher, are not significantly impacted. Based on SCE's experience with SONGS Unit 1 decommissioning, it is assumed that the CCC will condition the SONGS 2 & 3 coastal development permit to ensure that there are no significant impacts to special-status species. For the Unit 1 decommissioning, the CCC analyzed the potential for decommissioning activities to impact the coastal California gnatcatcher's habitat and determined that there would be no significant impacts (CCC 2000).

Only one of the protected species in the vicinity of SONGS is a plant species, the thread-leaved brodiaea. It was not identified during a 2012 survey of the site (BonTerra 2012c). Decommissioning activities will be confined to paved areas unless the SONGS environmental department has first conducted an environmental assessment per its environmental procedure, "Handling and Treatment of Endangered and Threatened Species" (SO123-IX-2.9) that serves to protect threatened and endangered species. The procedure requires that the SONGS environmental protection group conduct assessments prior to any land disturbance, soil addition, digging, grading, or trenching outside the paved and concreted areas; maintenance activities near surface water and wetlands; and trimming or removal of native plants other than landscape maintenance. Therefore, impacts on thread-leaved brodiaea are not anticipated.

In addition to federal- and state-listed species, SCE also reviewed impacts to species identified within the California Natural Diversity Database as imperiled or critically imperiled that have been recorded as being observed within approximately one mile of the SONGS site. The SCE review indicated that impacts, if any, to these species would be minimized through the implementation of the avoidance and mitigation measures applicable to the protection of the listed species.

Decommissioning of SONGS 2 & 3 is not anticipated to adversely impact any federally or state-listed species. As discussed above, decommissioning activities would be limited to paved areas onsite and nearshore and offshore disturbance to support removal of intake and outfall risers and potential temporary disturbance on the beach for seawall and walkway removal activites. SCE will employ mitigation measures as required by California agencies to minimize impacts to the environment and protect listed species. In addition, SCE will implement BMPs and conduct assessments as called for in its environmental protection procedure, as well as comply with permit and regulatory requirements to minimize indirect impacts from noise, air emission, dust, and run-off. Therefore, it is reasonable to conclude that impacts to threatened or endangered species from decommissioning would be SMALL.

Table ES 4.7-1 Species of Concern Identified within the Vicinity[(a)] of SONGS

Scientific Name	Common Name	State Status[(b)]	Federal Status[(c)]	Critical Habitat within Vicinity
AMPHIBIAN SPECIES				
Anaxyrus californicus	Arroyo toad	—	FE	yes[(d)]
AVIAN SPECIES				
Athene cunicularia	Burrowing owl	(e)	—	no
Charadrius alexandrinus nivosus	Western snowy plover	—	FT	yes[(d)]
Empidonax traillii extimus	Southwestern willow flycatcher	SE	FE	no
Haliaeetus leucocephalus	Bald eagle	SE	delisted	no
Polioptilacalifornica californica	Coastal California gnatcatcher	—	FT	yes[(d)]
Vireo bellii pusillus	Least Bell's vireo	SE	FE	yes[(d)]
FISH SPECIES				
Orcorhynchus mykiss	Steelhead trout	—	FE	yes[(d)]
INVERTEBRATE SPECIES				
Branchinecta sandiegoensis	San Diego fairy shrimp	—	FE	yes[(d)]
Coelus globosus	Globose dune beetle	(e)	—	no
Streptocephalus woottoni	Riverside fairy shrimp	—	FE	no
MAMMALIAN SPECIES				
Chaetodipus californicus femoralis	Dulzura pocket mouse	(e)	—	no
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	(e)	—	no
Dipodomys stephensi	Stephen's kangaroo rat	ST	FE	no
Perognathus longimembris pacificus	Pacific pocket mouse	—	FE	no
PLANT SPECIES				
Atriplex coulteri	Coulter's saltbush	(e)	—	no
Atriplex pacifica	South coast saltscale	(e)	—	no
Brodiaea filifolia	Thread-leafed brodiaea	SE	FT	yes[(d)]
Eryngium pendletonense	Pendleton button-celery	(e)	—	no
Myosurus minimus ssp. *apus*	Little mousetail	(e)	—	no

Scientific Name	Common Name	State Status[(b)]	Federal Status[(c)]	Critical Habitat within Vicinity
REPTILIAN SPECIES				
Caretta caretta	Loggerhead sea turtle	—	FE	no
Chelonia mydas	Green sea turtle	—	FT	no
Dermochelys coriacea	Leatherback sea turtle	—	FE	no
Lepidochelys olivacea	Olive Ridley's turtle	—	FT	no

(CDFW 2013a; CDFW 2013b; NOAA 2013b; NOAA 2013c; SCE 2014a; USFWS 2013b; USFWS 2013c; USMC 2012)

a. Vicinity includes a 6-mile radius of the SONGS site for state or federal threatened or endangered species. Vicinity includes a 1-mile radius of the SONGS site for other species of concern (see note [e] below).

b. SE = state endangered; ST = state threatened;

c. FE = federally endangered; FT = federally threatened

d. The USFWS has critical habitat delineated within the SONGS site vicinity; however, the designation explicitly excludes MCBCP land.

e. Species included in the California Natural Diversity Database (CNDDB) with a ranking of S1 (critically imperiled) or S2 (imperiled) that has been recorded as observed within one mile of the SONGS site.

ES 4.8 Radiological

Nearly all decommissioning activities have the potential to contribute to radiological impacts. Many activities that take place during decommissioning are generally similar to those that occur during normal operations and maintenance activities. In addition to these decommissioning activities, SONGS 2 & 3 will continue to have gaseous and liquid effluents from maintaining the spent fuel pool(s) operation until the spent fuel is transferred to dry storage and the wet storage systems are decommissioned.

Occupational Dose

SCE reviewed decommissioning activities related to stabilizing systems for wet storage of spent nuclear, transfer of spent fuel into dry storage, and decommissioning, dismantlement, removal of the SONGS 2 & 3 structures, and packaging and loading radiological waste for transport. SCE would expect the SONGS occupational dose to be bounded by the NRC's estimate for occupational dose from decommissioning a pressurized water reactor (PWR) dose. SCE's review took into account that major components of SONGS 2 & 3, which often contribute to area dose rates, are relatively new (steam generators and reactor vessel heads) and the implementation of operational dose reduction efforts (i.e., zinc injection). SCE plans to develop a more detailed estimate to support development and evaluation of decontamination work plans. (SCE 2014b)

The NRC considered estimates for occupational dose in its 1988 review of decommissioning impacts, NUREG-0586 (NRC 1988, Table 4.3-2). In the decommissioning GEIS, the NRC reviewed data available from decommissioning experience subsequent to the 1988 review. Because the range of cumulative occupational doses reported by reactors undergoing decommissioning was similar to the range of estimates for reference plants presented in the 1988 GEIS, the NRC did not update its estimates for occupational dose. (NRC 2002, Section 4.3.8.3)

The regulatory standard for worker exposure is a dose limit per worker rather than a cumulative dose. The decommissioning activities will involve radiological surveys prior to decontamination activities and decommissioning activities will be conducted with ongoing monitoring and radiation protection for personnel. The activities that have potential radiological impacts will be conducted following approved procedures to keep doses as low as reasonably achievable (ALARA) and well within regulatory limits.

Public Dose

SCE intends to keep the public doses attributable to SONGS 2 & 3 decommissioning within the PWR reference plant range estimated by the NRC and to keep the dose ALARA (NRC 1988; SCE 2013d). NRC concluded that reactors undergoing decommissioning could reasonably be expected to have emissions and public doses comparable to or substantially less than the levels experienced during normal operation of those facilities (NRC 2002, Section 4.3.8.3). The SONGS Radiological Environmental Management Plan (REMP) monitoring results demonstrated that the radiological environmental impact of the operation of SONGS through

2012 has been negligible, and the resulting dose to a member of the general public is negligible (SONGS 2012b).

SCE will continue to monitor effluents, comply with all applicable regulatory limits, continue its REMP to assess the impacts to the environment from these effluents annually, and keep worker exposure levels ALARA. SCE estimates that SONGS 2 & 3 decommissioning activities would result in occupational and public doses within NRC estimates. In its GEIS for decommissioning, the NRC generically determined radiological impacts to be SMALL (NRC 2002, Section 4.3.8.4); therefore, SONGS's radiological impacts during decommissioning are bounded by the decommissioning GEIS.

Groundwater Monitoring

A Ground Water Protection Initiative Program exists at SONGS in accordance with the Nuclear Energy Institute Technical Report 07-07. Onsite groundwater monitoring for radioactivity will continue during decommissioning. Groundwater sample data indicated the presence of low but detectable levels of tritium in shallow ground water in the area formerly occupied by Unit 1, attributable to legacy activities. The concentrations of tritium are below all regulatory limits (SONGS 2012a, Section K).

ES 4.9 Radiological Accidents

Many activities that occur during decommissioning are similar to activities that commonly take place during maintenance outages at operating plants such as decontamination and equipment removal. Accidents that could occur during these activities may result in injury and local contamination; however, they are not likely to result in contamination offsite. The only design basis accidents (DBAs) or severe (beyond design basis) accidents applicable to a decommissioning plant are those involving the spent fuel pool. (NRC 2002, Section 4.3.9) The environmental impacts of DBAs, including those associated with the spent fuel pool, were evaluated during the initial licensing process and documented in the final environmental statement (NRC 1981).

The NRC's decommissioning GEIS analysis relied in part on the waste confidence rule regarding spent nuclear fuel related accidents. In the GEIS, the NRC also independently reviewed potential impacts associated with radiological accidents during decommissioning. Based on the low likelihood of a significant accident occurring and design and performance criteria being maintained, the GEIS determined these impacts to be SMALL. SONGS addresses accidents in Chapter 15 of its final safety analysis report (FSAR) (SONGS 2013) and SCE will update the FSAR and emergency plans and implementing procedures to protect health and safety in the event of an accident to cover decommissioning activities, as required. Thus, SONGS's radiological accident impacts during decommissioning are bounded by NRC's decommissioning GEIS.

ES 4.10 Occupational Impacts

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

SONGS has an average occupational injury rate well below that of the heavy construction industry sector and between the power generation industry as a whole and the nuclear power industry (BLS 2012; SCE 2013g). Decommissioning activities are expected to have a SMALL impact on occupational issues. In its decommissioning GEIS, the NRC generically determined occupational issues impacts to be SMALL (NRC 2002, Section 4.3.10.4); therefore, SONGS's occupational issues impact during decommissioning is bounded.

ES 4.11 Cost

As instructed in NRC Regulatory Guide 1.185, SCE evaluates cost in the PSDAR Section 3.

ES 4.12 Socioeconomics

All of the socioeconomic impacts of decommissioning are related to organizational or staffing changes and decreasing tax revenues. Impacts related to the decision to permanently cease operations are outside the scope of this evaluation; however, SCE determined the staff reduction impacts from the decision to be SMALL, with the staff reduction representing 0.04 percent and 0.03 percent of San Diego County's and Orange County's workforce, respectively.

While SCE has a strong tax presence in San Diego County, the SONGS property assessment is a relatively small portion of San Diego's total tax collections. SCE's contribution to the county property tax collections has been consistently less than 1 percent. SCE's tax obligations will be reduced due to SONGS decommissioning, but SCE and SONGS will continue to contribute to county tax revenues throughout the decommissioning time period and there would be no negative impact to services in the community.

It is anticipated that there would be no changes or impacts to the local community and socioeconomic conditions. In its decommissioning GEIS, the NRC generically determined socioeconomic impacts to be SMALL (NRC 2002, Section 4.3.12.4), and therefore, SONGS socioeconomic impacts during decommissioning is bounded.

ES 4.13 Environmental Justice

Decommissioning activities that may potentially affect identified minority and low-income populations are related to staffing changes and offsite transportation. However, the assessment of environmental justice is related other specific issues (e.g. water use, air quality, etc.). Any decommissioning activity that results in a disproportionate share of negative environmental impacts to identified minority or low-income populations has the potential to be an adverse environmental justice impact.

Environmental justice analyses utilize a 50-mile radius around the plant as the environmental impact area. To complete this evaluation, the 2006–2010 low-income data and 2010 minority population data for California were obtained from the USCB website and processed using ESRI ArcGIS 10.1 software. All census data were downloaded in USCB block group level geography so that the environmental justice evaluations were consistent between the minority and low-income analyses.

The percentage of census block groups exceeding the "Aggregate of All Races" minority population criterion was 30.2 percent based on total number of block groups with population within the 50-mile radius. For the "Aggregate and Hispanic" category, 66 percent of the block groups contained minority populations. (USCB 2013a) The identified minority population closest to SONGS is located in San Clemente, CA, approximately 5 mi northwest of the site in Block Group 60590421082. This census block group contained a total of 678 people, with over 50 percent of the population falling under the "Aggregate and Hispanic" category. (USCB 2013a; ESRI 2013b) When individual race or ethnicity categories were analyzed, no block groups were located within a 6-mile radius that met the criteria for a minority population. The nearest block group from the individual category assessment was Block Group 60590423104. Located approximately 10 mi from SONGS in San Juan Capistrano, CA, this block group had a total population of 2,303 persons, with over 50 percent of the population falling within the "Hispanic or Latino" category. (USCB 2013a; ESRI 2013b)

Within the 50-mile radius of SONGS, 262 of the total 5,046 census block groups (5.2 percent) have low-income individual populations. (USCB 2013b; USCB 2013e) The closest low-income block group (60590423123) that meets the guidance criteria for individuals or families is located approximately 11 mi northwest of SONGS in San Juan Capistrano, CA. No low-income populations were identified in the 6-mile vicinity of SONGS during the environmental justice review (USCB 2013e).

In its decommissioning GEIS, the NRC concluded that adverse environmental justice impacts and associated significance of the impacts must be determined on a site-specific basis. SCE has determined that no significant offsite environmental impacts will be created by SONGS 2 & 3 decommissioning activities. As LIC-203 recognizes (NRC 2013d, page D-2), if no significant offsite impacts occur in connection with the proposed action, then no member of the public would be substantially affected. Therefore, there can be no disproportionately high and adverse impact or effects on members of the public, including minority and low-income populations, resulting from the decommissioning of SONGS 2 & 3.

ES 4.14 Cultural, Historical, and Archeological Resources

No prehistoric or historic archaeological sites or historic sites eligible for listing or listed on the National Register of Historic Places, California Register of Historical Resources, or San Diego County Local Register of Historical Resources are located within the SONGS site easement and no traditional cultural properties are known to be present there either (ICF 2012; SCE 2005). Two prehistoric archaeological sites (CA-SDI-1074 and CA-SDI-4916), and three historic archaeological sites (P-37-024479, concrete culvert beneath Amtrak railroad mainline; P-37-

024480, and P-37-024481, wooden culverts beneath Amtrak railroad mainline) were identified within 0.5 mi of SONGS 2 & 3 (ICF 2012; SCE 2005).

In its decommissioning GEIS, the NRC concluded that for plants where the disturbance of lands beyond the operational areas is not anticipated, the impacts on cultural, historic, and archeological resources would be SMALL (NRC 2002, Section 4.3.14). Decommissioning activities are confined to the SONGS site and adjacent leased parcels and no adverse impacts are anticipated. SONGS's impacts on cultural, historical, and archeological resources during decommissioning fall well within the bounds established by the NRC in the decommissioning GEIS.

ES 4.15 Aesthetic Impacts

In its decommissioning GEIS, the NRC stated that removal of structures is generally considered beneficial to the aesthetic impacts of a site and drew the generic conclusion that for all plants, the potential impacts from decommissioning on aesthetics are SMALL and that any mitigation measures are not likely to be beneficial enough to be warranted (NRC 2002, Section 4.3.15). The aesthetic impact of decommissioning SONGS 2 & 3 would be that of the current aesthetic impact of the plant prior to dismantlement. During dismantlement, the visual intrusion would be temporary and would serve to reduce the aesthetic impact of the site. Therefore, the impacts of SONGS on aesthetic resources during decommissioning are bounded by the decommissioning GEIS.

ES 4.16 Noise

Offsite noise sources that affect the ambient noise environment in the vicinity of SONGS include I-5 and the San Diego Northern Railroad, the ocean, and military operations (SCE 2005). During the decommissioning process, the sounds that might be heard at offsite locations include noise from construction vehicles, grinders, saws, pneumatic drills, compressors, and loudspeakers. Predicted noise ranges from decommissioning activities are 85-90 dBA at 50 ft from the noise source and 65-75 dBA at 500 ft. The timing of noise impacts and the duration or intensity will vary. The nearest sensitive receptors to SONGS 2 & 3 are recreational users of San Onofre State Beach where the ambient noise environment can exceed 70 dBA due to ocean sounds, which could mask some noise from decommissioning. The more intense decommissioning activities would primarily occur approximately 400 ft or more from the beach access public walkway in front of the SONGS seawall.

In its decommissioning GEIS, the NRC generically determined noise impacts associated with decommissioning to be SMALL (NRC 2002, Section 4.3.16). Due to the relatively high ambient noise levels surrounding SONGS, decommissioning activities are not expected to produce noise levels that could impact the activities of humans or threatened and endangered species. In addition, SCE will comply with the local noise regulations for construction sites which restrict the average sound level at the property boundary to 75 dBA between 7 a.m. and 7 p.m. and CCC permit requirements. Therefore, noise impacts during decommissioning of SONGS 2 & 3 are bounded by the previously issued GEIS.

ES 4.17 Transportation

Transportation impacts are dependent on the number of shipments to and from the facility, the type of shipments, the distance that material is shipped, and the number of workers commuting to and from the site. SCE estimated the types and volumes of waste generated during decommissioning to be the following (Energy Solutions 2014, Table 6-4):

- Radioactive waste:
    - Class A – 3,500,000 ft^3
    - Class B – 6,700 ft^3
    - Class C – 1,500 ft^3
    - Greater-than-Class C – 190 ft^3
- Mixed (LLWR and hazardous waste) – 3,000 ft^3
- Nonradioactive, nonhazardous – 38 million ft^3

Transportation infrastructure within the vicinity of SONGS includes one major north-south freeway, I-5, an assortment of local and county roads, passenger and cargo rail service (part of the Los Angeles–San Diego corridor), and an existing rail spur serving the SONGS site. General highway access to SONGS 2 & 3 is via I-5 from the north or south to Basilone Road, and then to State Route (SR) 101 to the entrances for SONGS 2 & 3. The 2011 average annual daily traffic (AADT) count for I-5 at the Basilone Road junction was 132,000 vehicles (Caltrans 2011).

SCE compared the assumptions and analysis inputs used for NRC's analysis with waste volumes estimated for SONGS 2 & 3 decommissioning, transport mode, and disposal facility options. The waste volumes estimated per unit to be shipped would be lower for the high-activity waste and higher for the lower activity waste (i.e., Class A) than the NRC had assumed for its analysis. Two other parameters greatly reduce worker and population exposure. Due to the availability of the rail line, SCE plans to ship the bulk of radiological waste by rail; however, there may be times when truck shipments will be required. The NRC indicates use of rail reduces radiological impacts by more than a factor of 10 over truck shipments (NRC 2002, Section 4.2.17.3). Furthermore, disposal facilities available for SONGS 2 & 3 radiological waste are less than half the distance assumed by NRC in its analysis (i.e., up to approximately 1,100 miles to the 3,000-mile distance assumed by NRC).

The disposal facilities considered in the SCE comparison are Energy Solutions in Clive, Utah, and Waste Control Specialists in Andrews, Texas. Both are licensed for Class A waste, and Waste Control Specialists is also licensed for Class B and C waste. (NRC 2013f) In addition, both facilities can dispose of mixed waste within the LLRW classifications for which they are licensed (Energy Solutions 2013; WCS 2013). The inputs and assumptions, including the assumption that very low-activity waste would have negligible radiological impacts, indicate that transportation worker and public exposure would be considerably less due to the lower shipping mileage alone, without considering the use of rail for the bulk of LLRW shipments, which offers further reduction in exposure.

SCE will comply with all applicable NRC and U.S. Department of Transportation (DOT) regulations, including Federal Railroad Administration regulations and requirements, and will use approved packaging and shipping containers for the shipping of radiological waste. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol. The NRC holds the position that its regulations for the transportation of radioactive material are adequate to protect the public against unreasonable risk, and thus compliance with existing regulations would result in radiological impacts that were neither detectable nor destabilizing (NRC 2002). Therefore, the radiological impacts of transporting radiological waste from decommissioning SONGS 2 & 3 would be SMALL and are bounded by the decommissioning GEIS.

SCE estimated a peak of approximately 560 workers during decommissioning (Energy Solutions 2014, Tables 6-2 and 6-3) and the vehicular traffic due to commuting would likely exceed the 200 per peak hour threshold, prompting review for potential to impact traffic congestion as required under the local congestion management plan (SDC 2011). SCE estimated peak truck traffic due to nonradiological waste and scrap metal shipments to be approximately 150 per day. The decommissioning traffic associated with SONGS is considered negligible compared to existing traffic volumes and would not be expected to significantly alter congestion on roadways. In addition, this amount of traffic is not expected to significantly deteriorate roadways. The decommissioning GEIS determined nonradiological transportation impacts of decommissioning to be SMALL (NRC 2002); therefore SONGS nonradiological transportation impacts are bounded.

Offshore activities to remove vertical risers on the intake and discharge conduits would increase vessel traffic in the area. It is not expected that these activities would cause a navigational safety hazard or a substantial delay in the normal movements of commercial or recreational vessels. The environmental impacts review for the Unit 1 conduit disposition indicated that impacts to recreational and commercial transportation would be insignificant (EDAW 2005).

ES 4.18 Irreversible and Irretrievable Commitment of Resources

SONGS 2 & 3 decommissioning will involve dismantlement and removal of structures and restoration of the property to a state for unrestricted release per NRC regulations in accordance with the criteria for decommissioning in 10 CFR 20, subpart E. Furthermore, the property would be returned to the U.S. Navy under the terms of the lease and further negotiations. Thus, land used for SONGS is not irreversible or irretrievable.

The decommissioning of SONGS 2 & 3 would consume some materials, an irretrievable commitment, including materials for decontamination, solvents, industrial gases, tools, and fuel for construction equipment and transportation of workers and materials to and from the facility. The irreversible commitment of such resources was considered by the NRC in the decommissioning GEIS and their consumption was considered minor.

SONGS 2 & 3 will consume capacity at waste facilities for treatment and disposal of its nonradiological waste. California has multiple facilities permitted for the storage, treatment, and disposal of hazardous waste (CDTSC 2013a). The nonradioactive waste generated from SONGS 2 & 3 decommissioning is assumed to be shipped to an out-of-state landfill due to the moratorium on disposal of decommissioned materials at California nonhazardous landfills imposed by California Executive Order D-62-02 (Energy Solutions 2014, Section 5.0). Landfills permitted to receive the waste and that have available disposal capacity will be used for disposal.

The decommissioning of SONGS 2 & 3 would result in SMALL irretrievable or irreversible commitment of resources. In its decommissioning GEIS, the NRC made the generic determination that the impacts on irreversible and irretrievable commitments are SMALL (NRC 2002, Section 4.3.18.4); therefore, the impact of SONGS on irreversible and irretrievable commitments during decommissioning is bounded.

ES 5.0 CONCLUSION

SCE has performed an environmental review to evaluate environmental impacts associated with decommissioning activities, confirming that the anticipated or potential impacts are within the bounds of the generic impacts that NRC described in the decommissioning GEIS. There are no applicable bounding impacts for threatened and endangered species and environmental justice. The planned SONGS 2 & 3 decommissioning activities are not anticipated to result in significant impacts to threatened and endangered species or disproportionate impacts on minority or low-income populations. This is principally due to the following:

- Planned activities fall within the activities that the NRC reviewed. There are no unique aspects of the plant or decommissioning techniques that would invalidate previously reached conclusions.

- Methods to be employed to dismantle and decontaminate the site are standard construction based techniques fully considered in the GEIS.

- SCE will continue to comply with NRC dose limits and conduct activities in accordance with ALARA principles.

- SCE will continue to comply with the SONGS offsite dose calculation manual, REMP, and the Groundwater Protection Initiative Program during decommissioning.

- SCE will comply with all applicable NRC and DOT regulations, including Federal Railroad Administration regulations and requirements, and use approved packaging and shipping containers for the shipping of radiological waste. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol.

- SCE will continue to comply with federal, state, and local requirements for non-radiological interfaces with the environment including limitations on water withdrawal and discharges, air emissions including fugitive dust, noise levels, protection of terrestrial and aquatic species, protection of cultural resources, disposal of non-radiological waste, and worker health protection.

- SCE will seek and comply with an amendment to its CSLC easement lease to largely abandon the intake and discharge conduits in place.

- SCE will seek and comply with a coastal development permit from the CCC for decommissioning.

REFERENCES

NOTE: Reference citations are in accordance with supporting documentation for Chapter 4 of the SCE environmental impact evaluation, and thus are not necessarily sequential. Reference PDFs can be found in the eRoom folder for EIE Chapter 4 references.

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1. INTRODUCTION

1.1 Purpose and Need for This Evaluation

The decommissioning regulatory process requires the licensee to submit a post-shutdown decommissioning activities report (PSDAR) to the U.S. Nuclear Regulatory Commission (NRC) within two years of permanently ceasing operations and at least 90 days prior to beginning major decommissioning activities [10 CFR 50.82 (a)(4) and (a)(5)]. The PSDAR must describe the planned decommissioning activities, contain a schedule for the accomplishment of significant milestones, provide an estimate of expected cost, and provide documentation that the environmental impacts associated with site-specific decommissioning activities have been considered in previously approved environmental impact statements (EISs). The environmental impacts portion of the PSDAR is to include a discussion providing reasons for the conclusion that the environmental impacts of all decommissioning activities are bounded by existing EISs. The licensee is precluded from performing any major decommissioning activities that result in significant environmental impacts not previously reviewed [10 CFR Part 50.82(a)(4)(1), (5), and (6)].

While the PSDAR is not required to include the detailed analysis of the environmental impacts, the licensee must have supporting documentation available at the reactor site for NRC review (NRC 2013). This environmental impact evaluation (EIE) will serve as the required supporting documentation for the environmental impact portion of the PSDAR. This EIE presents the licensee's review of the environmental impacts of its decommissioning plans as summarized in Section 3.2, determining whether the anticipated or potential impacts are within the bounds of the existing EISs, thus serving as the PSDAR-supporting documentation called for in Regulatory Guide (RG) 1.185, Rev. 1. This evaluation includes a description of the affected environment (i.e., the existing environmental and societal conditions post permanently ceasing operations) as a baseline for assessing the impacts of decommissioning activities both for the PSDAR-related review and, as discussed below, for the review related to the license termination plan (LTP).

As stated above, applicants are required to review their decommissioning activities to determine if they are bounded by existing EISs. As explained in Section 1.6, there are no applicable bounding impacts for those impact areas for which NRC called for site-specific analyses. Site-specific analyses are required for impacts to threatened and endangered (T & E) species and environmental justice (NRC 2002). This evaluation presents these site-specific analyses, determining that the planned San Onofre Nuclear Generating Station Units 2 & 3 (SONGS 2 & 3) decommissioning activities are not anticipated to result in significant impacts to T & E species or disproportionate impacts on minority or low-income populations.

The decommissioning regulatory process requires the licensee to submit an LTP at least two years before the anticipated license termination date. The LTP is to include a supplement to the environmental report (ER) describing any new information or significant environmental change associated with the licensee's proposed termination activities [10 CFR Part 50.82(a)(9)(ii)(G)]. In the case of SONGS 2 & 3, a supplement to the *San Onofre Nuclear Generating Station Units 2 & 3 Applicant's Environmental Report Operating License Stage* was submitted to the NRC on November 30, 1976. The NRC's standard review plan for the LTP (NRC 2003) calls for the supplement to include a detailed description of remaining activities, the interaction between those activities and the environment, the likely environmental impact of those activities, and the licensee's determination regarding whether the activities and their impacts are bounded by the impacts predicted by their own site-specific EIS developed in support of licensing the facility, NUREG-0586 as supplemented, or the PSDAR. This evaluation serves as both the foundation of the LTP's supplement to the ER with its presentation of the affected environment of San Onofre Nuclear Generating Station (SONGS), and in conjunction with the PSDAR, as one source of bounded environmental impacts.

1.2 Process Used to Determine Scope of This Evaluation

Southern California Edison (SCE) used NUREG-0586, Supplement 1, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1* (decommissioning GEIS), to determine the scope, and considered the guidance in RG 1.185, *Standard Format and Content for Post-Shutdown Decommissioning Activities Report,* Rev. 1, with regard to providing sufficient detail to support SCE's determination that decommissioning activities would not result in significant environmental impacts.

1.3 Scope of This Evaluation

This evaluation addresses the scope of NUREG-0586, Supplement 1. The NRC considered various activities that are performed in conjunction with decommissioning but are reviewed and regulated by the NRC under other licenses as out of scope. These out-of-scope activities include impacts related to the decision to permanently cease operations; impacts from spent fuel transport and disposal away from SONGS, and the treatment and/or disposal of low-level radioactive waste (LLRW) at a licensed facility.

The NRC also considered the impacts from spent fuel management in wet or dry storage outside the scope of NUREG-0586 (NRC 2002, Sections 1.3 and 4.3.8.3). This evaluation includes impacts that directly or indirectly result from wet storage or dry storage when data or estimates do not discriminate between those attributable to spent fuel management and the remainder of SONGS.

1.4 Categories for Environmental Impacts and Extent of Issues

Environmental impacts can be assessed on a generic or site-specific basis. Impacts are then assigned a level of significance based on certain criteria as discussed below.

1.4.1 Levels of Significance of Environmental Impacts

SCE followed the same criteria as NUREG-0586 in assigning levels of significance for environmental impacts. The definitions of the three levels of significance as used by the NRC (NRC 2002) are as follows:

SMALL: Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in this evaluation, impacts that do not exceed permissible levels in the NRC's regulations are considered small.

MODERATE: Environmental impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE: Environmental impacts are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Using the same definitions facilitates the comparison of the SONGS site-specific impact determinations with the bounding environmental impacts found in NUREG-0586 (see Section 1.6).

1.4.2 Regulatory Distinction of Generic and Site-Specific Approaches

An impact designation could be applied generically across all nuclear plants as the NRC has determined for many impact areas in NUREG-0586 (NRC 2002). This evaluation reviews SCE's decommissioning plans for SONGS 2 & 3 for their potential impact on the SONGS site and the surrounding area. However, these analyses draw from the NRC's generic analyses and generic determinations of bounding impacts in NUREG-0586. NUREG-0586 defines its generic approach for determining impacts as the following (NRC 2002):

- Environmental impacts associated with the issue have been determined to apply either to all plants, or, for some issues, to plants having a specific size, specific location, or specific type of cooling system or other site characteristics; and
- A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts; and
- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

1.5 Uses of This Evaluation

This evaluation serves as documentation of SCE's review of SONGS 2 & 3 decommissioning activities for environmental impacts and their comparison to existing bounding environmental impacts to support the SONGS 2 & 3 PSDAR. This evaluation can also be used as the foundation of the required future supplement to the SONGS 2 & 3 operational stage ER, which is required to be included in the LTP to be submitted to the NRC within two years of the anticipated license termination date.

1.6 Development of This Evaluation

SCE developed this evaluation to serve the purposes discussed in Section 1.1: first as a means of documenting the environmental evaluation required for the PSDAR; and second as the beginning of the effort to develop the supplement to its operating stage ER required for the LTP. The environmental review documented in this evaluation follows this simple formula:

> Affected environment + decommissioning plans (as currently known) = potential environmental impacts,
>
> *then*
>
> Potential environmental impacts >, <, or = any existing bounding impacts

SCE established the baseline environmental and societal conditions post permanently ceasing operation through site-specific information and vicinity and regional data available from local, state, and federal agencies.

SCE reviewed decommissioning plans as they are currently known in conjunction with NUREG-0586's matrix of decommissioning activities and potential impact areas. Where known, environmental releases, waste volumes, and other environmental interfaces were estimated and surmised. These data were then assessed against the potential for impact and the existing environmental conditions at SONGS to identify impacts and determine a significance level (see Section 1.4).

The potential environmental impact and its significance level were then compared to the existing bounding impact for the resource area. Like NUREG-0586, the analysis assumed that operational mitigation measures would be continued and did not rely on the implementation of new mitigation measures unless specified.

The EISs serving as sources for bounding impacts for comparison to SONGS 2 & 3's decommissioning impacts are the following:

1. NUREG-0586, Supplement 1, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1* (NRC 2002)
2. NUREG-1496, *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities* (NRC 1997)
3. NUREG-0490, *Final Environmental Statement related to the Operation of San Onofre Nuclear Generating Station, Units 2 and 3* (NRC 1981)

NUREG-0586, Supplement 1, presents bounding environmental impacts for the full range of resource areas with few exceptions. The discussion is detailed as to which activities were considered to provide context when reviewing decommissioning of a facility, and the significance of the impacts are judged against the criteria for SMALL, MODERATE, and LARGE impact significance (see Section 1.4 of this evaluation for criteria). NUREG-0586 resolves most of the environmental impacts resulting from decommissioning on a generic basis as having a SMALL impact, but requires site-specific analyses for T & E species and environmental justice. In addition, site-specific analyses are called for whenever decommissioning plans indicate that activities will impact areas beyond the operational portions of a facility. Potentially affected resource areas are aquatic ecology, terrestrial ecology, cultural resources, and offsite land use in support of decommissioning activities.

As a source of bounding impacts for comparison, NUREG-1496 does not specify bounding impacts as SMALL, MODERATE, or LARGE (see Section 1.4). It is focused on generically reviewing the environmental impacts of a reactor site that has already undergone decommissioning activities to reduce radiological levels and establishing support for a residual radiological level for unrestricted release of the reactor property. With this focus, it is not as practical a source of bounding impacts at the PSDAR stage as NUREG-0586.

Also, regarding sources of bounding impacts for comparison, NUREG-0490, the SONGS final environmental statement (FES), addresses decommissioning in Section 9.4, but does not analyze decommissioning activities for environmental impacts and establishes no bounding environmental impacts specific to decommissioning; however, the FES's impacts for construction were applicable for bounding impacts due to dewatering.

Thus, NUREG-0586 was the source for comparison of existing bounding impacts used for this evaluation. The approach used by NUREG-0586 was also used for the EIE analyses. The evaluation approach is discussed for each resource area in Section 4.3.

1.7 Parts of This Evaluation

The organization and format of this document largely mirrors that of NUREG-0586. Chapter 1 serves as the document's introduction. Chapter 2 provides background on the decommissioning regulatory process. Chapter 3 describes the SONGS facility. Chapter 4 has three sections: Section 4.1 explains the environmental impact standards used to define impacts; Section 4.2 discusses the evaluation process; and Section 4.3 presents individual subsections for each of the resource areas potentially impacted by SONGS 2 & 3 decommissioning activities. Chapter 5 addresses a no-action alternative, and Chapter 6 is a summary of the environmental review's findings and conclusions.

CHAPTER 1 REFERENCES

NRC (U.S. Nuclear Regulatory Commission). 1981. *Final Environmental Statement related to the Operation of San Onofre Nuclear Generating Station, Units 2 and 3.* NUREG-0490.

NRC. 1997. *Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities.* NUREG-1496, Vol. 1.

NRC. 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1.* NUREG-0586, Supplement 1, Vol. 1.

NRC. 2003. *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans.* NUREG-1700, Rev. 1.

NRC. 2013. *Standard Format and Content for Post-Shutdown Decommissioning Activities Report*. RG 1.185, Rev. 1.

2. BACKGROUND INFORMATION RELATED TO DECOMMISSIONING REGULATIONS

This section provides background information on the decommissioning regulations, focusing on the regulatory process and environmental review requirements.

2.1 Basis for Current Regulations

The regulations related to the decommissioning of power reactors are included in Title 10, "Energy," Chapter I—Nuclear Regulatory Commission Parts 20, 50, and 51. The subparts related to decommissioning are as follows:

20.1402 "Radiological criteria for unrestricted use"

20.1403 "Criteria for license termination under restricted conditions"

20.1404 "Alternate criteria for license termination"

20.1405 "Public notification and public participation"

20.1406 "Minimization of contamination"

50.75 "Reporting and recordkeeping for decommissioning planning"

50.82 "Termination of license"

50.83 "Release of part of a power reactor facility or site for unrestricted use"

51.53 "Post-construction environmental reports"

51.95 "Post-construction environmental impact statements"

2.2 Summary of Current Regulations

2.2.1 Regulations for Decommissioning Activities

Once the decision is made to permanently cease operations, the licensee must notify the NRC, in writing, within 30 days. The notification must contain the date on which power generation operations ceased or will cease. The licensee must remove the fuel from the reactor and submit a written certification to the NRC confirming this action. [10 CFR 50.82(a)(1)] These actions were completed by SCE in 2013 (SCE 2013a; SCE 2013b; SCE 2013c).

The licensee must submit a PSDAR to the NRC and the affected state(s) no later than two years after the date of permanent cessation of operations. SONGS 2 & 3 permanently ceased operations on June 7, 2013. The PSDAR must describe the planned decommissioning activities, contain a schedule for the accomplishment of significant milestones, provide an estimate of expected cost, and provide documentation that environmental impacts associated with site-specific decommissioning activities have been considered in previously approved EISs. [10 CFR 50.82(a)(4)]

The NRC has issued RG 1.185, *Standard Format and Content for Post-Shutdown Decommissioning Activities Report* (NRC 2013) that establishes a standard format for the PSDAR, describes the type of information the PSDAR must contain, and identifies the factors that could cause the NRC to find the PSDAR deficient. RG 1.185 also discusses the approach to use if it is necessary to change the PSDAR. The guide indicates that the purposes of the PSDAR are as follows:

1) Inform the public of the licensee's planned decommissioning activities.

2) Assist in the scheduling of NRC resources necessary for the appropriate oversight activities.

3) Ensure that the licensee has considered all the costs of the planned decommissioning activities and has considered the funding for the decommissioning process.

4) Ensure that the environmental impacts of the planned decommissioning activities are bounded by those considered in existing environmental impact statements.

If the environmental impacts identified have not been considered in existing environmental assessments, the licensee must comply with 10 CFR 51 and address the impacts in a license amendment request to support the proposed activities. The licensee must also submit a supplement to its ER relating to the additional impacts. (NRC 2000; NRC 2013) For SONGS 2 & 3, this would be a supplement to the *San Onofre Nuclear Generating Station Units 2 & 3 Applicant's Environmental Report Operating License Stage*, submitted to the NRC on November 30, 1976.

After receiving a PSDAR, the NRC publishes a notice of receipt, makes the PSDAR available for public review and comment, and holds a public meeting in the vicinity of the plant to discuss the licensee's plans [10 CFR 50.82(a)(4)(ii)].

NRC approval of the PSDAR is not required. However, should the NRC determine that the informational requirements of the regulations are not met in the PSDAR, the NRC will inform the licensee in writing of the deficiencies and require that they be addressed before the licensee initiates any major decommissioning activities. There is also a 90-day waiting period after submittal of the PSDAR before the licensee may commence major decommissioning activities. [10 CFR 50.82(a)(5)] Major decommissioning activities include the permanent removal of large radioactive components, such as the reactor vessel, steam generators, pressurizers, large-bore reactor coolant system piping, or other comparably radioactive components; permanent changes to the containment structure; and dismantling components resulting in greater than Class C waste. [10 CFR 50.2]

Activities not considered major decommissioning activities may be performed in accordance with the license and technical specifications before the end of the 90-day waiting period.

Examples of these activities are the following (NRC 2000, Section 4.2.7):

- Normal maintenance and repair.
- Removal of certain relatively small radioactive components, such as control-rod drive mechanisms, control rods, pumps, piping, and valves.
- Removal of components (other than those defined above as major components) similar to those removed for maintenance and repair during plant operations.
- Removal of nonradioactive components and of radiation structures not required for safety.
- Site characterization and measurement of contamination levels.

Nevertheless, regulations prohibit licensees from performing any decommissioning activities that foreclose release of the site for possible unrestricted use; result in significant environmental impacts not previously reviewed; or result in there no longer being reasonable assurance that adequate funds will be available for decommissioning [10 CFR 50.82(a)(6)]. The NRC evaluates the licensee's procedures for reviewing changes and conducts periodic inspections during decommissioning activities (NRC 2000).

If, after the PSDAR is submitted, the decommissioning plans and schedule are revised and are no longer consistent with the PSDAR's information and conclusions, the licensee is required to notify the NRC in writing of these changes before proceeding with the modified activities and schedule [10 CFR Part 50.82(a)(7)]. This update to the PSDAR should include a discussion as to whether the changes continue to be bounded by existing EISs. If not, a supplement to the licensee's ER is required (NRC 2013, Section 6).

In advance of the license termination process, under the provisions of 10 CFR 50.83, a licensee can seek to release part of a power reactor facility or site for unrestricted use. The licensee must apply to the NRC for the release or submit a license amendment application. The licensee must evaluate the effect of releasing the property to ensure that the following criteria are met:

- The dose to individual members of the public does not exceed the limits and standards of 10 CFR Part 20, Subpart D.
- There is no reduction in the effectiveness of emergency planning or physical security.
- Effluent releases remain within license conditions.
- The environmental monitoring program and offsite dose calculation manual (ODCM) are revised to account for the changes.
- The siting criteria of 10 CFR Part 100 continue to be met.
- All other applicable statutory and regulatory requirements continue to be met.

2.2.2 Regulations for License Termination

A licensee must apply to the NRC for license termination. The application for license termination must be accompanied or preceded by an LTP [10CFR 50.82(a)(9)]. The LTP must be submitted at least two years before the requested license termination date, and is subject to NRC approval. The LTP is to include the following:

- A site characterization.
- Identification of remaining dismantlement activities.
- Plans for site remediation.
- Detailed plans for the final survey of residual contamination.
- A description of the end-use of the site (if restricted use is proposed).
- An updated site-specific estimate of remaining decommissioning costs.
- A supplement to the ER, describing any new information or significant environmental change associated with the licensee's proposed termination activities.

NRC's standard review plan for the LTP (NRC 2003) calls for the supplement to the ER to include a detailed description of remaining activities, the interaction between those activities and the environment, the likely environmental impact of those activities, and the licensee's determination regarding whether the activities and their impacts are bounded by the impacts predicted by their own site-specific EIS developed in support of licensing the facility, NUREG-0586 as supplemented, or the PSDAR.

After receiving the LTP, the NRC will place a notice of receipt of the plan in the *Federal Register*, make the plan available to the public for comment, and schedule a public meeting near the facility to discuss the plan's contents and the review process. The NRC will also offer an opportunity for a public hearing on the license amendment request associated with the LTP. At this stage, the NRC must prepare a site-specific environmental assessment or EIS. (NRC 2002, Section 2.2.2)

After the approval of the LTP, the NRC will continue its inspections of the site. These inspections will include validation of commitments made in the LTP. Inspections may also include confirmatory surveys to verify that areas of the site have been remediated to within the limits established in the LTP. (NRC 2002, Section 2.2.2)

At the end of the LTP process, the NRC determines if the remaining dismantlement and decontamination have been performed in accordance with the approved LTP, and if the final radiation survey and associated documentation demonstrates that the facility and site are suitable for release. The radiological criteria for license termination are given in 10 CFR Part 20, Subpart E. There are two broad categories of uses for the facility after the license termination: unrestricted use and restricted use. The NRC established a 0.25 millisievert per year (mSv/yr) (25 millirem per year [mrem/yr]) total effective dose equivalent (TEDE) to an average member of the critical group as unrestricted release criteria. The critical group is defined as that group of individuals reasonably expected to receive the highest exposure to the residual radioactivity. The licensee will also need to show that the amounts of residual radioactivity have been reduced to levels that are as low as reasonably achievable (ALARA). In addition to these NRC criteria, state and local jurisdictions may, and have, imposed additional restrictions or requirements on licensees. (NRC 2002, Section 2.2.2)

Restricted use means that there are restrictions on the facility use after license termination. The restrictions, such as those placed in the property's deed, would be designed to provide reasonable assurance that the radiological criteria set will not be exceeded. The licensee must also provide sufficient financial assurance that the restrictions will be carried out. (NRC 2002, Section 2.2.2)

CHAPTER 2 REFERENCES

NRC (U.S. Nuclear Regulatory Commission). 2000. *Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Reactors.* NUREG-1628.

NRC. 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1.* NUREG-0586, Supplement 1, Vol. 1.

NRC. 2003. *Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans.* NUREG 1700, Rev. 1.

NRC. 2013. *Standard Format and Content for Post-Shutdown Decommissioning Activities Report*. RG 1.185, Rev. 1.

SCE (Southern California Edison). 2013a. Correspondence from Peter T. Dietrich, Senior Vice President & Chief Nuclear Officer to USNRC, Certification of Permanent Cessation of Power Operations San Onofre Nuclear Generating Station Units 2 and 3. June 12, 2013.

SCE. 2013b. Correspondence from Peter T. Dietrich, Senior Vice President & Chief Nuclear Officer to USNRC, Permanent Removal of Fuel from the Reactor Vessel San Onofre Nuclear Generating Station Unit 3. June 28, 2013.

SCE. 2013c. Correspondence from Peter T. Dietrich, Senior Vice President & Chief Nuclear Officer to USNRC, Permanent Removal of Fuel from the Reactor Vessel San Onofre Nuclear Generating Station Unit 2. July 22, 2013.

3. DESCRIPTION OF SONGS AND THE DECOMMISSIONING PROCESS

The sections that follow provide background information on the facilities, site, structures, and systems at SONGS, as well as describe major decommissioning activities. Chapter 4 addresses the environmental impacts of decommissioning and contains bounding language on the types of activities that may occur through the decommissioning process. Although reactor operations have ceased, there are many plant systems and components still in service until a final shutdown plan is developed for each. Systems required for the continued safety of the nuclear fuel and personnel safety will be maintained as required. However, the interim conditions are generally not discussed unless they are considered major decommissioning activities, as described below.

This EIE considers major decommissioning activities, and if the interim task is a major activity, it will be assessed under the requirements of 10 CFR 50.82(a)(6). Based on the guidance in NEI 98-02 and 10 CFR 50.82(a)(6), decommissioning activities have to be evaluated under 50.59 and shown that the activities do not:

1) Eliminate the potential for unrestricted release of the property;

2) Result in significant environmental impacts not previously considered in EISs; or

3) Result in there no longer being reasonable assurance that adequate funds will be available for decommissioning.

RG 1.185 on the PSDAR format and content states that the licensee should list and describe the major activities and tasks related to decommissioning or outside the bounds of those considered in the decommissioning GEIS. Also, the description of the licensee's planned decommissioning activities is meant to provide a general, site-specific overview of all the activities occurring from the time of certification of permanent removal of the fuel to the anticipated termination of the license.

3.1 SONGS Facilities

The principal structures of SONGS 2 & 3 consist of two pressurized water reactors with containment structures, turbine buildings, auxiliary buildings, security building, maintenance building, administrative buildings, and cooling system intake and discharge structures. The property upon which the station lies is occupied by SONGS through a grant of easement from the U. S. government. The nearest privately owned land is approximately 2.5 miles (mi) from the site. The closest full-time residence is located approximately a mile west-northwest of SONGS 2 & 3 and associated with San Onofre State Beach (SCE 2012). The principal administrative and main personnel housing areas serving Marine Corps Base Camp Pendleton (MCBCP) are located 12 to 15 mi to the southeast. (SONGS 2013, Section 1.2.1.1)

3.1.1 Site and Vicinity

SONGS 2 & 3 is located on the Pacific coast of southern California in northern San Diego County, and is operated by SCE. The site is entirely within the boundaries of the MCBCP, near the northwest end of its 18-mi shoreline (see Figure 4.3.1-1). Units 2 and 3 occupy 52.8 acres (ac) of the 83.63-ac easement (SONGS 2013, pp 1.1-1 and 2.1-1). The power block for both units and the site switchyard cover 27.7 ac, with the remaining 25.1 ac for parking, access, and miscellaneous structures. Approximately 16 ac of the site were occupied by SONGS Unit 1 (SONGS 2013, p. 1.2-1). SONGS Unit 1 was permanently shut down on November 30, 1992, and defueled as of March 6, 1993. SONGS Unit 1 above-ground structures, systems, or components (SSC) demolition was completed in 2008, although the area has not undergone final status survey for decommissioning. The Unit 1 area is now known as the North Industrial Area (NIA) and includes the onsite independent spent fuel storage installation (ISFSI) for all three units, as shown in Figure 3.1.1-1. Units 2 and 3 are situated southeast of and immediately adjacent to Unit 1 (SONGS 2013, p. 1.1-1). License termination for Unit 1 is not currently anticipated to occur until Units 2 and 3 are decommissioned. The remaining acres of the easement, particularly those located in the northwestern and southeastern portions of the site, have remained undeveloped over the years and are in their natural state, in compliance with the California Coastal Commission (CCC) guarantee agreement (see Section 4.3.1).

3.1.1.1 Vicinity and Regional Features

The city of San Diego is approximately 51 mi south-southeast of SONGS 2 & 3. The nearest developed community is San Clemente, which is 5 mi north-northwest of the site in Orange County. The site is bounded by MCBCP, the San Onofre State Beach, and the Pacific Ocean (see Figure 4.3.1-1). The location of the site in relation to the cities in the vicinity (6-mile radius) and region (50-mile radius) is shown in Figures 4.3.1-2 and 4.3.12-1. The 6-mile vicinity and the 50-mile region are the standard geographic areas used to evaluate the potential environmental impacts described in Chapter 4.

3.1.1.2 Station Features

The land area where SONGS 2 & 3 is located is bounded on the west by the Pacific Ocean and on the east by the eight-lane Interstate Highway 5 (I-5) and the railroad tracks owned by the North County Transit District of San Diego. These tracks pass within 1,000 feet (ft) of the station site. (SONGS 2013, pp 1.2-1 and 2.2-4) The SONGS site is bounded on both the north and south along the coastline by San Onofre State Beach. The coastal side of the plant structures area is protected by a seawall extending approximately 2,200 ft (SONGS 2013, p. 2.1-1). Public access to the beach adjacent to the seawall is provided by an improved walkway. The walkway permits transit between open beach areas up and down the coast from the site (SONGS 2013, p. 2.1-2). Public passage between sections of San Onofre State Beach north and south of the plant site by means of the improved walkway was originally required through a February 16, 1982, amendment to the coastal development permit (CDP) for SONGS 2 & 3 from the CCC. This walkway is open to the public at all times except when closure is necessary for reasons of public safety or plant security (CCC 1982).

The station features separate containments, safety equipment buildings, turbine buildings, diesel generator buildings, intake structures, and fuel handling buildings for Units 2 and 3, and a shared auxiliary building. The ultimate heat sink for all seismic Category I cooling water systems is seawater from the Pacific Ocean supplied to the component cooling water heat exchangers by seawater cooling pumps located within separate intake conduits for each unit. Seawater pumped from the intake by the circulating water pumps serves as the heat sink for heat rejected by the main condensers and the turbine plant cooling water system. The 220-kilovolt (kV) switchyard is located directly northeast of the power block (SONGS 2013, pp. 1.2-2, 1.2-3). Figure 3.1.1-1 shows the general features of the SONGS 2 & 3 site.

3.1.2 Structures at the Facility

The site utilized pressurized water reactors in the nuclear steam supply system (NSSS) and a once-through circulating water system that withdraws cooling water from and discharges to the Pacific Ocean through a diffuser-type system.

The former megawatts (MW) rating for each of SONGS 2 & 3 was 1,070 MW and 1,080 MW, respectively, during full power operations (SCE 2011).

Fuel for SONGS 2 & 3 was made of enriched uranium dioxide pellets stacked in pre-pressurized tubes made from zircaloy-4, with welded end plugs that formed sealed enclosures.

The station includes engineered safety features designed to protect the public and plant personnel in the highly unlikely event of an accidental release of radioactive fission products. These safeguards function to localize, control, mitigate, and terminate such accidents to hold exposure levels below 10CFR100 limits. (SONGS 2013, Section 1.2.4)

3.1.2.1 Containments

Each unit of SONGS 2 & 3 has a separate containment that completely encloses the reactor and reactor coolant system. Each containment is a reinforced concrete structure in the shape of a cylinder with a hemispherical roof and a flat foundation slab. (SONGS 2013, Section 1.2.4.1.1)

The foundation slab is conventionally reinforced with high-strength reinforcing steel. The interior surface of the containment shell is steel-lined for leak tightness. A protective layer of concrete covers the portion of the liner over the foundation slab. The containment structure concrete provides biological shielding for both normal and accident conditions. (SONGS 2013, Section 1.2.4.1.1)

3.1.2.2 Fuel Handling Buildings

Each unit of SONGS 2 & 3 has a separate fuel handling building. Each fuel handling building is a conventional reinforced concrete structure containing the new and spent fuel handling, storage, and shipment facilities, fuel pool water cooling equipment, and a decontamination area. The overall plan dimension of each structure is approximately 134 x 86 ft, with a maximum height of 110 ft. Each structure is of heavy shear wall construction with a concrete-slab, steel-frame, composite-action roof system. Partial soil embedment of about 20 ft is present on three sides of the structure, with no embedment on the fourth side. (SONGS 2013, Section 3.8.4.1.2)

3.1.2.3 Turbine Buildings

A separate turbine generator building is provided for each unit. The turbine generator buildings are located west of the safety equipment buildings. These structures house the turbine pedestals and the turbine-associated mechanical and electrical equipment and piping for each unit. The turbine buildings, including the switchgear lube oil room and chemical feed area room, are both seismic Category II structures. The turbine generators are located on the operating level at an approximate elevation of 72 ft, and provided with formed-metal covering that is exposed to the outdoors. The area beneath the operating level is enclosed with formed steel wall panels finished to withstand the environmental exposure of the location. The superstructure of the turbine buildings is structurally independent of the turbine-generator pedestal. (SONGS 1981, Section 3.8)

3.1.2.4 Auxiliary Building

Units 2 & 3 share an auxiliary building. The auxiliary building is a conventional reinforced concrete structure containing the control area, radwaste area, primary plant makeup, radwaste storage tank area, and multiple pipe-penetration areas. The building is segmented into separate radioactive and non-radioactive areas.

The diverse functional requirements of the various entities housed within the auxiliary building have resulted in structural systems with correspondingly diverse physical characteristics. The control area is a relatively open, steel-framed, beam-column system supporting the floor slabs with a perimeter shear wall and light interior partition walls. The radwaste area consists of heavy shear walls to satisfy the compartmentalization and biological shielding requirements associated with its functional characteristics. The tankage area also incorporates a shear wall design concept. However, the heights of the tank area are greatly increased over those in the adjoining sectors of the building, and the east perimeter wall is partially embedded. Finally, the penetration areas consist of a steel-framed, beam-column system supporting the cantilevered floor slabs and a partial perimeter shear wall. (SONGS 2013, Section 3.8.4.1.1)

3.1.2.5 Diesel Generator Buildings

A separate diesel generator building is provided for each unit. Each diesel generator building is a conventional two-story reinforced concrete structure. The overall plan dimensions of each structure are 91 x 60 ft with a maximum height of 41 ft. The structure system consists of shear walls and concrete slabs, supported by a 5.5-ft thick basemat which is integrated with the equipment foundation blocks. Each structure contains two 4,700-kilowatt (kW) diesel generators, for a total of four diesel generators for both units with complete auxiliary equipment required for independent operation. The diesel generators are located on the lower floor at finished grade elevation and most of the auxiliary equipment is located on the upper floor. The two independent systems are separated by a concrete bearing wall in each building. All of the equipment is protected against tornado missiles by concrete walls and slabs. The resulting structure is regular in shape and exhibits little or no geometric eccentricities. (SONGS 2013, Section 3.8.4.1.6)

3.1.2.6 Intake Structures and Seawater Cooling Conduit

A separate intake structure is provided for each unit. The intake structure is a conventional reinforced concrete buried structure that houses the major components of the circulating water system and the pumps associated with the seawater cooling (SWC) system (component cooling water system) for each unit. The structure contains numerous piers, partition walls, and localized slab elevations. It is situated adjacent to the auxiliary building and the turbine buildings and is embedded in the soil to a varying degree, with the major portion of the structure completely below grade. For each unit, the seawater cooling conduit leads from the intake structure to the plant. It continues through a portion of the turbine building mat and connects to the component cooling water heat exchanger areas of the safety equipment buildings. The seawater cooling conduit is a conventional reinforced concrete structure and houses the component cooling water heat exchanger seawater supply and return lines. (SONGS 2013, Section 3.8.4.1.4)

The intake and outfall of SONGS 2 & 3 are concrete conduits located on the seabed within an easement leased from the California State Lands Commission (CSLC). The intakes are located approximately 3,200 ft offshore in about 30 ft of water, and have terminal risers with velocity caps. Both units have diffuser-type discharges consisting of 63 ports on vertical risers spaced 40 ft apart on each discharge conduit. The Unit 2 diffuser begins approximately 5,900 ft offshore and ends at approximately 8,400 ft; it ranges in water depth from approximately 40 to 50 ft. The Unit 3 diffuser begins approximately 3,600 ft offshore and extends to approximately 6,000 ft at its terminus; it ranges in water depth from approximately 30 to 40 ft. (NRC 1981, Section 3.2.2, SCE 2013a, Chapter 1) The Unit 2 discharge conduit is located about 700 ft up the coast from the Unit 3 discharge conduit (NRC 1981, Section 3.2.2).

3.1.3 Description of Systems

Cooling and Auxiliary Water Systems

Seawater provides the heat sink for the condensers, turbine plant cooling water system, and component cooling water (CCW) systems. The circulating water system serves the cooling needs of the first two systems, while separate seawater coolant pumps supply coolant for the CCW system. (SONGS 2013, Section 10.4.5.2.3)

The cooling and auxiliary water systems will continue to operate through decommissioning for as long as they are needed to remove residual heat from the fuel.

The use of these systems has evolved since operations at SONGS 2 & 3 have permanently ceased and fuel has been removed from the reactors. The use of these systems, particularly the volume of water intake, will continue to evolve as decommissioning progresses. However, the continued operation of these systems is considered in Sections 4.3.2 and 4.3.5 for environmental impacts. The bounding impacts considered in this EIE use permit and regulatory limitations as well as NRC bounding analyses for continuing use of circulating water systems for spent fuel pool cooling, and thus the analysis accounts for the variation anticipated as decommissioning progresses.

3.1.3.1 Circulating Water Systems

The circulating water systems consist of four circulating water pumps per unit, seawater intake and discharge lines, traveling bars and screens, chlorination systems, fish handling systems, screen wash pumps, and associated piping, valves, and instrumentation. The system is shown in the SONGS updated final safety analysis report (UFSAR), Figure 10.1-6. Pacific Ocean water is used to provide cooling to recondense the steam for SONGS 2 & 3. The circulating water systems for SONGS 2 & 3 include nearshore intake structures. The ultimate heat sink for all seismic Category I cooling water systems is seawater from the Pacific Ocean. Each circulating water pump has a rated design capacity of 207,500 gallons per minute (gpm). The pumps are mounted vertically in the intake structure and discharge into four separate lines leading to the main condenser.

For each unit, the circulating water system has no safety function. Portions of the system support the safety functions of the ultimate heat sink and the SWC system. The following design bases apply to the circulating water system for each unit (SONGS 2013, Section 10.4.5.1):

- During operation, the circulating water system supplies cooling water to remove heat from the main condenser and turbine plant cooling water heat exchangers under all conditions of power plant loading and design weather conditions.

- Chemical treatment of the circulating water consists of sodium hypochlorite injection to prevent biological growth.

- As discussed in the SONGS UFSAR, Section 9.2.5, portions of the circulating water system are necessary for availability of the ultimate heat sink.

- The intake structure contains gates to direct seawater flow through the structure for plant operations. As discussed in the SONGS UFSAR, Section 9.2.1, gates 3 and 6 support the safety function of the SWC system.

- Possible flooding as a result of a postulated failure of the circulating water system pressure boundary, including failure of an expansion joint, would not prevent systems important to safety from performing as designed.

Seawater Cooling Systems

Each unit has an independent SWC system. The SWC system, an engineered safety feature support system, provides seawater from the Pacific Ocean to the CCW heat exchangers for cooling. The SWC system for each unit consists of two 100 percent capacity critical trains. Each train contains two pumps; one pump is located in the Unit 2 intake structure and the other is located in the Unit 3 intake structure. A single, active failure of any portion of the SWC system would not preclude the supply of sufficient cooling water to the engineered safety features. The SWC system is shown schematically in the SONGS UFSAR, Figure 9.2-1, Sheet 1, which also shows a diagram of the intake structure and associated piping. (SONGS 2013, Section 9.2.1)

The design bases for the SWC system are as follows:

- The SWC system is designed so that the cooling water flows may return to the ultimate heat sink (Pacific Ocean) through a discharge line common to both component cooling water heat exchangers during normal operation. An emergency discharge line common to Units 2 and 3 is provided in the event of blockage of the normal discharge line. The purpose of the SWC system emergency discharge line is to support SWC system operation should the normal outfall become unavailable for any reason. This includes maintenance on the discharge conduit or gate wells, as well as any scenario beyond the design bases that involves blockage of the normal outfall line, whether or not the blockage is due to seismic effects. Although the normal SWC system outfall is seismic Category II, evaluations have concluded that it will not fail as a SWC discharge path as a result of a design basis earthquake (DBE).

- The SWC system is designed to automatically provide a cooling water supply for the component cooling water system heat exchangers during power generation, normal and emergency shutdown and cool down, and during a design basis loss-of-coolant accident.
- The SWC system is designed so that a single failure of any active component, assuming loss of offsite power, cannot impair the ability of the system to comply with the design basis of the listings above.
- The SWC system is designed to remain functional following a DBE.
- Active components of the SWC system are capable of being inspected (where practicable) and tested during plant power generation operation. Provisions are made for suitable inspection of important components at appropriate times, as described in the SONGS UFSAR, Section 3.9.6.
- The SWC system is designed so that an adequate cooling water supply is available in the event that the intake structure of one unit is undergoing heat treatment and either unit, assuming the loss of offsite power, undergoes a design basis loss-of-coolant accident. Heat treatment is described in the SONGS UFSAR, Section 9.2.1.2.

The SWC system is capable of being manually aligned to back-flush the heat exchanger (SONGS 2013, Section 9.2.1).

Intake and Discharge Structures

The offshore circulating water conduits are of reinforced concrete construction. One intake and one discharge conduit is provided for each generating unit, and each unit's discharge conduit is a different length. The diffuser portion is progressively stepped down in diameter to balance the hydraulics of the flow in the diffusers and to produce a uniform discharge at each nozzle. Further detailed description is available in the SONGS UFSAR, Section 10.4.5.2.2.2. Circulating water system offshore intake structures are designed and constructed to withstand maximum up rush and withdrawal velocities of the current associated with a postulated tsunami.

Traveling bars and traveling screens are used to remove debris from the inlet seawater. The traveling bars are located upstream of the traveling screens. Seawater passes through up to six sets of traveling bars and traveling screens and an additional seventh traveling screen downstream of the fish holding chamber that serves to remove debris from the chamber.

Screen Wash

For each unit, two full-capacity vertical, wet-pit, multi-stage screen wash pumps supply water to the traveling bar and screen wash spray nozzles and traveling bar and screen troughs. Each pump has a design capacity of 2,500 gpm. (SONGS 2013, Section 10.4.5.2.2.5)

Traveling bars and traveling screens are in place to provide a means to prevent debris from entering the each unit's pump suction. As debris accumulates, a preset differential water level across both the bars and screens, initiates the screen wash cycle. During this cycle, the screen wash pump and each set of traveling bars and traveling screens operate in sequence, washing off debris until a normal differential water level is restored. During periods of high debris influx, the screens and pumps can be continually operated in manual to minimize the buildup of debris on the screens. The debris washed off the screens is sluiced to a trash basket by a portion of the screen wash pump discharge. (SONGS 2013, Section 10.4.5.2.2.3)

Fish Handling Systems

For each unit, a fish handling system is provided to safely transport fish located in the screen well back into the ocean via a separate fish return conduit. The fish handling system consists of a fish holding chamber in the onshore intake structure, a fish elevator, a fish sluicing system, and a separate fish return conduit. Fish that have entered the screen well area are guided into the fish collecting chamber. At the bottom of this chamber is a fish elevator. The elevator is a bucket which carries fish, in water, out of the structure and deposits them into a sluicing channel. A common 4-ft inner diameter fish return conduit returns live, entrapped fish to the ocean. The velocity in the fish return conduit is about 5.3 ft per second (ft/s). Only one conduit is required to serve both units since each system operates only a few times per day. The frequency of operation varies depending on seasonal fluctuations. Operation of the fish handling system utilizes local manual control in accordance with approved site procedures. (SONGS 2013, Section 10.4.5.2.3)

Biofouling Control

Two methods are employed to control marine fouling of the circulating water and the seawater side of the CCW system.

Heat treatment is the method used for the control of marine fouling organisms in the circulating water system. It is accomplished by the partial recirculation of cooling water flow through the condenser. Heat treatment of the intake conduit is accomplished by the reversal of flow in the conduits. Additionally, control of marine fouling organisms within the separate fish return conduit of the fish conservation system is also done by heat treatment.

Fouling organism growth is controlled in the onshore portion of the circulating water system by chlorination. Sodium hypochlorite is the chemical of choice. The chlorination injection point is just downstream of the traveling screens. Sodium hypochlorite injection is administratively controlled to prevent chemical injection while the circulating water pumps are not running, during fish handling operations, and during heat treatment. (SONGS 2013, Section 10.4.5.2.3) All applications of sodium hypochlorite are controlled to ensure that the discharges are within the National Pollutant Discharge Elimination System (NPDES) permit limits.

3.1.3.2 Radioactive Waste Treatment Processes (Gaseous, Liquid, and Solid)

The radioactive waste treatment processes will continue to operate through decommissioning for as long as they are needed.

The use of these systems will evolve as decommissioning progresses; their emissions and releases would also vary. However, the continued operation of these systems is considered in Section 4.3.8 for environmental impacts, and emissions experienced during operations are considering bounding. SONGS 2 & 3 have liquid, gaseous, and solid waste processing systems designed to collect and process radioactive waste so that onsite and offsite exposures are kept within the dose objectives of 10 CFR part 50, Appendix I, and within acceptable limits as defined in 10 CFR Part 20 and 10 CFR part 100. (SONGS 2013, Section 1.2.11) Each of the radioactive waste treatment processes are discussed below.

Liquid Waste Processing Systems and Effluent Controls

The following description provides a brief discussion of the liquid waste processing systems and effluent controls used by SONGS 2 & 3.

Liquid Waste Management Systems

The liquid waste system is designed with four subsystems (SONGS 2013, Section 11.2):

- Coolant radwaste system (CRS)
- Coolant and boric acid recycle system (CBARS)
- Miscellaneous liquid waste system (MLWS)
- Mixed waste processing (MWP) unit

The design function of the CRS, CBARS, and MLWS liquid waste systems is to collect and process radioactive liquid wastes generated during plant activities and to reduce their radioactivity and chemical concentrations to levels acceptable for discharge.

The principal design objectives of the CRS, CBARS, and MLWS liquid waste systems are:

- Collection of all liquid wastes generated during plant operation which may contain radioactive nuclides.
- Sufficient processing capability so that liquid waste may be discharged to the environment at concentrations below the regulatory limits of 10 CFR Part 20 and consistent with the ALARA guidelines set forth in 10 CFR Part 50.

Mixed waste is defined as a material that is both hazardous and radioactive per applicable state and federal regulations. Because mixed waste has two distinct traits (radiological and hazardous) that can potentially affect the public and the environment, its processing is duly regulated. The radiological aspect is covered by the existing NRC plant operating license, but a separate permit to cover the hazardous aspect is required by Resource Conservation and

Recovery Act (RCRA). SONGS has obtained hazardous and mixed waste permits. (SONGS 2013, Section 11.2.1.1.2) SONGS 2 & 3 operations and maintenance activities generate mixed waste, primarily lubricating oil contaminated with trace concentrations of radioactive material. Small quantities of mixed waste containing radiologically contaminated paints, solvents, caustics, acids, resins, lead, blast media and Freon™ are also generated.

Features and procedures used to prevent inadvertent releases to the environment from the liquid waste systems include strict administrative procedures, operator training, redundant discharge valves, discharge radiation monitors that provide alarms, and automatic discharge valve closure (SONGS 2013, Section 11.2.1.2.2).

Coolant Radwaste System

The principal designed functions of the CRS are (SONGS 2013, Section 11.2.2.1.2):

- To provide surge capacity for liquids discharged from the chemical and volume control system (CVCS).
- To collect recoverable reactor-coolant-quality water from reactor coolant pump leak-offs, quench tanks, spent fuel pool, refueling water storage tanks, and safety injection tanks.

The system is designed to treat and allow the discharge of controlled quantities of radioactive liquids to the circulating water outfall in such a way that the resulting concentrations will not exceed the limits of 10 CFR Part 20. Additionally, the capability exists to transfer water, from the radwaste primary storage tanks to and from the spent fuel pool purification system or refueling water storage tank (RWST) of both units to facilitate refueling, transshipment, and maintenance operations which require larger surge/make-up capability than that provided by RWST and spent fuel pool of a single unit.

The CRS is designed so that positive operator action is required to initiate a discharge of waste to the environment. Automatic isolation valves, installed in the discharge lines, close in the event of a high radiation level signal or power failure, isolate the discharge line, and stop the discharge. Provisions are in place for operation of only a single radwaste discharge line (Unit 2 or Unit 3) at one time to minimize the potential for operator error and inadvertent release to the environment through the outfall.

Coolant from the primary tanks is pumped through a gas stripper, filters, and purification resins to one of the two radwaste secondary tanks. Once activity in the secondary tanks reaches administrative limits, the contents of the tank(s) may be discharged to the circulating water header. Radwaste secondary tank pumps automatically shut off when a low level occurs. The contents of the secondary tanks may also be transferred to CBARS for future treatment, or to the radwaste building truck bay header, or back to the primary tanks for further processing. (SONGS 2013, Section 11.2.2.1.2)

Coolant and Boric Acid Recycle System

The principal design functions of the CBARS are (SONGS 2013, Section 11.2.2.1.3):

- To process waste coolant collected in the primary and secondary radwaste tanks.
- To treat the process water to a quality that meets reactor coolant water quality specifications.

Coolant wastes from the coolant radwaste system were designed to be able to pass through a filter to the boric acid concentrator. The concentrator, which serves Units 2 and 3, has a capacity of 50 gpm. The concentrator was designed to operate on a batch basis, and flow from the secondary tanks is processed until the desired boric acid concentration is achieved. (SONGS 2013, Section 11.2.2.1.3)

Miscellaneous Liquid Waste System

The principal functions of the MLWS are (SONGS 2013, Section 11.2.2.1.4):

- To collect for processing all radioactive and potentially radioactive liquid wastes not directed to the CRS or other ODCM-credited release point. (These wastes include equipment and floor drains, various liquid relief valve discharges, sumps in the containment, auxiliary, and radwaste buildings, steam generator blowdown demineralizer regeneration wastes, and turbine building sump wastes if contaminated by primary-to-secondary leakage.)
- To maintain the capability to recycle waste effluent for plant use. (The actual amount of water recycled to the plant is a function of waste generation, MLWS equipment capacity/availability, and plant water requirements.) Strict water chemistry control procedures are required to support such recycling.
- To reduce the quantity of wastes that must be shipped offsite.
- To restrict and monitor liquid effluents for discharge to the environment consistent with the limits specified in 10 CFR Part 20 and 10 CFR Part 50, Appendix I, ALARA guidelines.

Miscellaneous liquid wastes are divided into two categories: liquids containing high concentrations of chemicals (such as laboratory samples, ion exchanger regenerant wastes, and decontamination area drains); and liquids containing low concentrations of chemicals (such as resin sluice water). Wastes in the first category are piped into the chemical waste tank, and wastes in the second category are piped into the miscellaneous wastes tank. In addition, liquid waste from the radwaste sump is normally pumped into chemical waste tank.

The MLWS normally collects and processes liquids from the following major sources:

- Relief valve discharges and equipment drains (miscellaneous wastes tank)
- Radioactive chemical laboratory drains (chemical waste tank)
- Floor drains (miscellaneous wastes tank or chemical waste tank)
- Resin sluice water (miscellaneous wastes tank)
- Ion exchanger flush water (miscellaneous wastes tank)
- Back-flushable filter flushing water (miscellaneous wastes tank)

In addition to these major sources, process piping connections exist to allow for routing regenerant wastes from the blowdown demineralizer and condensate polisher demineralizer to the MLWS. When the concentration of radioactivity is less than the ODCM specification limits, wastes will be discharged to the circulating water outfall. However, if processing is required, the waste may be routed through the MLWS. All planned releases of radioactive liquids are performed through ODCM-credited release points.

The condensate from the miscellaneous waste evaporator condenser may be routed through filters and resins as necessary prior to being discharged to the circulating water outfall header. The condensate can also be discharged to the Unit 3 steam generator blowdown bypass line which enters the circulating water outfall via the circulating water weir vent. The blowdown bypass line terminates underwater.

The condensate can also be recycled to supply the nuclear condensate header for resin sluicing, pump flushing, etc. Adherence to strict administrative controls for maintaining water quality in the monitor tanks is a condition for recycling condensate. The bottoms from the evaporator were intended to be sent to the concentrated miscellaneous wastes storage tank. From this tank, the bottoms are normally pumped to the waste solidification station by the truck bay. The miscellaneous waste evaporators are not currently used to routinely process liquid waste.

The MLWS also includes equipment for spent resin transfer and staging. Spent resin is transferred to the spent resin tanks with installed piping and staged until it is processed (solidified or dewatered) for temporary onsite staging or shipment to a licensed burial facility. Spent resin from any of the ion exchangers on the 37-ft level of the radwaste area of the auxiliary building is sluiced with water to the spent resin tanks on the 9-ft level. When the transfer is completed, the resin transfer piping is flushed through a filter to the miscellaneous waste tank.

Resin is pumped from the spent resin tank to the radwaste truck bay header and the radwaste solidification system as slurry. Resin can also be dewatered for temporary onsite storage or shipment to a licensed burial facility, depending on the type and quantity of the entrapped radioisotopes.

New resin can be sluiced to the ion exchangers from the new resin tanks on the 63-ft level. Resin is stored in the shipping packages until needed. New resin can also be added directly from the shipping drums by means of an eductor connected to any individual ion exchanger.

The MLWS provides facilities for receiving and processing back-flush water and crud from the back-flushable filters located in various plant systems. Once the tank fluid contents are mixed, the fluid is filtered before being recirculated back to the tank. After filtration, the liquid in the crud collection tank can be diverted to the miscellaneous waste tank or to the solidification system. When the filter is completely loaded, or when the radiation level at the filter lead shielding cask reaches contact shipping dose limits, the system is shut down and the filter is flushed and disconnected (SONGS 2013, Section 11.2.2.1.4).

Mixed Waste Processing Unit

An MWP unit is installed to process the waste onsite. The MWP unit is designed to process radioactively contaminated oil generated in the power block. The processing unit is designed as a closed loop system located in a dedicated, controlled access area of the south yard facility (SYF). The area is equipped with a berm capable of containing the entire volume of the waste batch being processed and is provided with an automatic fire suppression system. Furthermore, sampling of the waste batch prior to processing ensures that the limits of 10 CFR Part 20 are not exceeded even if a fire occurred. The area ventilation system is equipped with permanent sampling and monitoring instrumentation that enables quantification of any release of airborne radioactive material in accordance with the requirements of the SONGS 2 & 3 ODCM and 10 CFR 50.36a.

The MWP unit is located in a dedicated room in the SYF building located in the southeastern section of the plant site. The area of the SYF used to handle radioactive material and equipment, including the MWP unit room, is maintained under negative pressure by operating the ventilation system at all times when work is performed in the building. The room where the MWP unit is installed is provided with its own spill and fire protection, and the building is equipped with continuous ventilation sampling capabilities for particulate and iodine.

The MWP unit is designed to process contaminated oil only. This batch process involves two major steps:

- Separation of the aqueous phase from the organic phase (oil), and
- Purification of the organic phase.

Purification is accomplished by the MWP unit, which consists of a reservoir (tank), a circulating pump, an in-line heater, a bag filter, a final filter, a water trap, and valves. Filters and resins are used to remove particulate matter and ionic impurities as necessary, chelating the radioactive constitutes and removing particulates by filtration. Chemicals and heat (<160°F) may be added as needed to facilitate chemical reaction and separation of the suspended solids. The aqueous phase (waste water) is separated from the organic phase and returned to the plant system for disposal through an ODCM-credited release point in accordance with the site procedures. (SONGS 2013, Section 11.2.2.1.9)

Chemical and Volume Control System

The CVCS is designed with multiple functions. It maintains reactor coolant chemistry, purity and activity level within prescribed limits during normal operation and shutdown conditions. The CVCS is used to control and continuously measure the reactor coolant system (RCS) boron concentration to obtain optimum control element assembly positioning, to compensate for reactivity changes associated with changes in reactor coolant temperature, core burn-up, and xenon variations, and to provide shutdown margin for maintenance and refueling operations. To mitigate the effects of a main steam line break accident at low power, the CVCS can be used to inject borated water into the RCS upon a safety injection actuation signal.

Steam Generator Blowdown Processing System

During operations, high-conductivity regenerant solutions are produced as a result of blowdown demineralizer regeneration. If significant steam generator tube leaks exist which necessitate that the regenerants be processed, they are processed by the MLWS via the chemical waste tank.

The steam generator blowdown processing system (SGBPS) has provisions to bypass the demineralizers and discharge steam generator blowdown (secondary coolant) directly to the circulating water outfall header. This feature allows uninterrupted blowdown of the steam generators when the SGBPS is inoperative provided the radioactivity is within the discharge limits. When the SGBPS is bypassed, the blowdown is discharged without treatment and without the production demineralizer regenerant solutions. (SONGS 2013, Section 11.2.2.1.5)

In conjunction with the turbine plant chemical addition system, the SGBPS is capable of maintaining the chemical composition of the steam generator secondary water within the NSSS (SCE *n.d.-a*).

Full Flow Condensate Polisher Demineralizer System

During operations, high and low conductivity regenerant solutions are produced as a result of condensate polisher demineralizer regeneration. During normal operation, the full flow condensate polisher demineralizer regenerants are discharged through an ODCM-credited release point to the circulating water system and then to the ocean. However, if significant steam generator tube leaks and/or fuel failure exists, it may be necessary to process the regenerants prior to discharge. System connections and utilities are provided to allow the regenerants to be processed by a mobile radwaste (liquid or solid) treatment unit (supplied by a vendor at the time when abnormal operating conditions warrant its use). Process piping connections also exist for routing the full flow condensate polisher demineralizer regenerants to the MLWS via the chemical waste tank. (SONGS 2013, Section 11.2.2.1.6)

Fuel Pool Cooling Systems

Units 2 and 3 have separate and independent fuel pool cooling systems. Each system is designed to provide continuous cooling for spent fuel assemblies stored in the fuel pool. This permits storage of spent fuel assemblies in the fuel pool from the time the fuel is unloaded from the reactor vessel to such time as it may be shipped offsite for reprocessing or removed for storage elsewhere. Each system is designed to remove the decay heat produced by 1,542 assemblies stored in the pool. (SONGS 2013, Section 9.1.3.1)

Each fuel pool cooling system includes purification equipment designed to remove soluble and insoluble foreign matter from the spent fuel pool water and dust from the pool surface. Filters and resins are used to remove particulate matter and ionic impurities as necessary. This maintains the fuel pool water purity and clarity, permitting visual observation of underwater operations. Each spent fuel pool purification system is provided with a cross tie to the other unit's spent fuel pool purification system and the RWST. (SONGS 2013, Section 9.1.3.1)

Turbine Plant Area Drains and Sumps

The turbine plant area drains and sumps are normally nonradioactive. Wastewater collected in the turbine plant sumps is transferred through a pipe equipped with a continuous in-line radiation monitoring system to an oily waste sump; from there, the oily waste sump fluid is pumped to an oily waste separation device and then to the circulating water system for discharge to the Pacific Ocean in compliance with NPDES permits. The turbine plant sumps are ODCM-credited release points. Piping is also provided to allow for pumping liquid from the turbine plant area sumps to the radwaste area sump. From there, the turbine plant area sump water may be processed by the MLWS via the miscellaneous wastes tank. Processing by the MLWS may be done when the turbine plant area sump water exceeds a predetermined specific activity. (SONGS 2013, Section 11.2.2.1.8)

Liquid Effluent Releases

Controls for collecting, treating, and monitoring the release of radiological liquid effluents are described in the ODCM. Controls are based on (1) concentrations of radioactive materials in liquid effluents specified in 10 CFR 20; and (2) dose to a hypothetical member of the public and ALARA standards in 10 CFR 50, Appendix I. (SCE 2013b, Section 6.4.1 and 6.4.2) Concentrations of radioactive material that may be released in liquid effluents to unrestricted areas are limited to the concentration specified by 10 CFR Part 20 for radionuclides other than dissolved or entrained noble gases. The total concentration of dissolved or entrained noble gases in liquid releases is limited to 2×10^{-4} microcurie/milliliter (µCi/ml) (SCE 2013b, Section 1.1.1). The ODCM dose limits for each reactor unit during a calendar quarter are 1.5 millirem (mrem) to the total body and 5 mrem to any organ. During the calendar year, the ODCM dose limits for radioactive liquid releases for each reactor unit are 3 mrem to the total body and 10 mrem to any organ (SCE 2013b, Section 1.2.1). The radioactive liquid waste sampling and analysis program specifications provided in the ODCM address the liquid release type, sampling frequency, minimum analysis frequency, type of activity analysis, and lower limit of detection.

Release Points

The release of all radioactive liquid discharges is via the Unit 2 or Unit 3 circulating water outfall. As specified in the ODCM, radioactive liquid releases from SONGS 2 & 3 are performed as either a batch release or as continuous releases. Each release point is sampled and analyzed per the ODCM. Once the appropriate setpoint is established for the in-line radiation monitoring instrument, the planned discharge is conducted and the wastewater is released through the circulating water system to the Pacific Ocean. (SONGS 2013, Section 11.2.3.1)

Gaseous Waste Management Systems and Effluent Controls

Radioactive waste gases are collected and processed through the following systems, depending upon their origin. These systems are (SONGS 2013, Section 11.3):

- High-activity reactor coolant gaseous radwaste system (GRS)
- Low-activity vent gas collection system
- Main condenser ejector/evacuation system
- Turbine gland seal system
- Building ventilation systems
- SYF–the radiological work area and separate decontamination unit/shop

Gaseous Waste Management Systems

The gaseous waste management systems collect and process the radioactive noble gases, airborne halogens, and particulates to reduce the anticipated annual releases and personnel exposure in restricted and unrestricted areas to levels as low as is reasonably achievable (SONGS 2013, Section 11.3.1).

The design objectives of the gaseous waste management systems are as follows (SONGS 2013, Section 11.3.1):

- The gaseous waste management systems provided for collection of potentially radioactive gaseous wastes generated when the plant was operational.
- The systems also provide adequate holdup and control of gaseous releases as specified in 10 CFR Part 50, Appendix A, General Design Criterion 60.
- The gaseous waste management systems provide sufficient processing capability such that gaseous effluents may be discharged to the environment at concentrations below the regulatory limits 10 CFR Part 20 and within the ALARA guidelines set forth in 10 CFR Part 50, Appendix I.

The GRS and vent gas collection system are shared systems that receive inputs from both Units 2 & 3, but no equipment is shared between the GRS and vent gas collection system (SONGS 2013, Section 11.3.1.1).

The equipment layout provides design features consistent with the recommendations of NRC RG 8.8 to minimize occupational radiation exposure to plant personnel. Waste gas compressors, surge tank, and gas decay tanks are segregated and shielded in separate compartments. In addition, nitrogen purging removes radioactive gases from components requiring maintenance. This aids in reducing radiation exposure to plant personnel. A redundant compressor minimizes downtime of the system. Piping runs are located in shielded pipe chases. Drain line routings prevent accumulation of drainage inside the piping. Local samples are drawn into a centrally located sampling station, which is provided with a nitrogen purge and process piping shielding to minimize radiation exposure to the operator. (SONGS 2013, Section 11.3.1.1)

Hydrogen Control

The major sources of hydrogen in the GRS are the offgas from the gas stripper, the volume control tank, the reactor coolant drain tank and the quench tank. These sources will produce a gas consisting primarily of hydrogen and nitrogen with trace quantities of oxygen and fission gases. These sources are piped to the waste gas surge tank from which gas is compressed into decay tanks. (SONGS 2013, Section 11.3.1.6)

Gaseous Radwaste System

The GRS comprises a collection header, a waste gas surge tank, two waste gas compressors, and six waste gas decay tanks. One compressor normally is used while the other is on standby. Liquid seals are not incorporated in the system design. (SONGS 2013, Section 11.3.2.1)

Sources for the GRS include gases from:

- Reactor coolant drain tank
- Volume control tank
- Valve leakage
- Gas stripper
- Boric acid concentrator
- Miscellaneous waste evaporator

Only the first two sources (listed above) contribute directly to the surge tank from separate units. The remaining sources are shared by Units 2 and 3. There is no sharing between the GRS and vent gas collection system except for the miscellaneous waste evaporator, which vents to the GRS only if the evaporator is performing the function of the boric acid concentrator. (SONGS 2013, Section 11.3.2.1)

Prior to discharge, the decay tank to be discharged is sampled. The rates of release from the decay tanks into the plant ventilation exhaust are controlled so as not to exceed the limits of 10 CFR Part 20. All releases are conducted in accordance with the ALARA objectives and the numerical objectives of 10 CFR Part 50, Appendix I. (SONGS 2013, Section 11.3.2.1)

Vent Gas Collection System

The vent gas collection system collects various low-activity gases from potentially radioactive liquid storage tanks, thereby minimizing airborne concentrations in the building atmospheres and radiation doses to plant personnel. These gases consist mainly of air collected in the vapor space above storage tanks and ventilation discharges from plant sample hoods. Liquid seals are not incorporated in the system design. (SONGS 2013, Section 11.3.2.2)

The sources for the vent gas collection system include the gases from:

- Miscellaneous waste tank vent
- Chemical waste tank vent
- Miscellaneous waste evaporator condenser
- Miscellaneous waste evaporator condensate monitor tanks
- Concentrated miscellaneous waste storage tank vents
- Concentrated boric acid storage tank vent
- Radwaste area sump
- Boric acid makeup tanks
- Sampling system vent hoods

The vent gas collection system is shared between Units 2 & 3. There is no sharing between the vent gas collection system and GRS except for the miscellaneous waste evaporator, as discussed previously. The gases are collected in the radwaste area vent header before they are then discharged into the continuous exhaust plenum of the plant ventilation system. (SONGS 2013, Section 11.3.2.2) The vent stack is an ODCM-credited release point that is continuously sampled and monitored.

The main condenser evacuation system, turbine gland seal system, and the building ventilation systems make up the rest of the gaseous radwaste management system. They normally provide air handling of nonradioactive gases. The main condenser evacuation system, designed to achieve and maintain a vacuum in the main condenser, removes non-condensable gases and in-leaking air from the steam space of the main condenser shells, and exhausts them to the atmosphere (SONGS 2013, Section 10.4.2.1). The turbine gland sealing system is designed to prevent air leakage into, and steam leakage out of, the casings and valves of the turbine-generator and the steam generator feedwater pump turbines. Condensed steam is returned to the condenser and non-condensable gases are exhausted to the atmosphere (SONGS 2013, Section 10.4.3.1). The building ventilation systems contain dampers, fans, and filters used for heat removal and air purification (SONGS 2013, Section 9.4).

Radioactive Airborne Release Points

Points of ODCM-credited radioactive airborne releases are (SCE 2013b):

- Containment purge vent stack—unit specific (Unit 2 and Unit 3)
- Continuous exhaust plant vent stacks to handle effluents from the following sources: fume hoods, laboratories, waste gas discharge and vent headers (from the waste gas decay tanks), fuel handling, radioactive waste area, and safety equipment and penetration buildings
- Main condenser ejector/evacuation system exhaust—unit specific (Unit 2 and Unit 3)
- SYF – the radiological work area and the decontamination shop

SONGS 2 & 3 Gaseous Effluent Releases

The site maintains gaseous releases within ODCM limits. The gaseous radwaste system is used to reduce radioactive materials in gaseous effluents before discharge to meet the dose design objectives in 10 CFR Part 50, Appendix I. In addition, the limits in the ODCM are designed to provide reasonable assurance that radioactive material discharged in gaseous effluents would not result in the exposure of a member of the public in an unrestricted area in excess of the limits specified in 10 CFR Part 20, Appendix B. The quantities of gaseous effluents released from the site are controlled by the limits defined in the ODCM. The controls are specified for dose rate, dose due to noble gases, and dose due to radioiodine and radionuclides in particulate form. (SCE 2013b, Section 6.4.4, 6.4.5, 6.4.6)

For noble gases, the dose rate limit at or beyond the site boundary is 500 mrem/yr to the total body, and 3,000 mrem/yr to the skin. For radioiodine and particulates with half-lives greater than 8 days, the limit is 1,500 mrem/yr to an organ (SCE 2013b, Section 2.1.1). The limit for air dose due to noble gases released in gaseous effluents to areas at or beyond the site boundary during a calendar quarter is 5 milliradium (mrad) for gamma radiation and 10 mrad for beta radiation. For a calendar year, the limit is 10 mrad for gamma radiation and 20 mrad for beta radiation. (SCE 2013b, 2.2.1a and b) The radioactive gaseous waste sampling and analysis program specifications provided in the ODCM address the gaseous release type, sampling frequency, minimum analysis frequency, type of activity analysis, and lower limit of detection.

Solid Waste Processing

The solid waste management system (SWMS) is designed to provide holdup, transfer, solidification, and packaging for radioactive wastes, and to stage these wastes until they are shipped offsite. The SWMS is located in the radwaste building. (SONGS 2013, Section 11.4)

The SWMS is subdivided into three categories:

- Wet/liquid waste(s) and spent resin fines disposal
- Dry waste disposal
- Filter handling and disposal

If encapsulation or solidification is chosen as the radioactive waste packaging method, a contract for solidification services for SONGS 2 & 3 will be established with a qualified vendor (SONGS 2013, Section 11.4.2.2).

Spent Resin and Resin Fines Disposal

The radwaste transfer system operates on a batch basis to solidify spent resins, and backflushable crud filter tank waste if the disposable crud filter system is not used. Spent resin packaging may either utilize the radwaste solidification system to stabilize the radioactive waste in a liner or process by dewatering in an approved high integrity container (HIC). The solidification system can also be used to encapsulate radioactive cartridge filters and other miscellaneous contaminated objects. (SONGS 2013, Section 11.4.2.3)

Dry Solid Waste Disposal

Potentially radioactive dry wastes are collected at appropriate locations throughout the plant as dictated by the volume of these wastes generated during operation or maintenance. As necessary, these wastes are taken to the radwaste building for packaging where they may be compressed in 55-gallon drums to minimize shipping volume. Additional compressible material is added and the drum contents are recompacted until a drum is filled. The drums are then sealed and stored until shipped offsite. During compaction, the airflow in the vicinity of the compactor is directed by the compactor exhaust fan through a high-efficiency particulate air filter before it is discharged into the room. (SONGS 2013, Section 11.4.3.2) Consistent with industry best practices and RG 8.8, buildings that house radwaste collection and processing systems are ventilated through an ODCM-credited release point.

Large or highly radioactive components and equipment that have been contaminated during reactor operation and that are not amendable to compaction are packaged in shipping containers of an appropriate size and design. (SONGS 2013, Section 11.4.3.2)

Filter Handling and Disposal

The filters are separated into four classifications:

- Backflushable filters
- Disposable filter elements used in the backflushable filter crud collection system and CVCS purification system (F-020 filters)
- Shielded low activity filters with disposable elements
- Unshielded low activity filters with disposable elements

A portion of the filters that process liquids with potentially high-radioactive crud loadings are backflushable and are therefore considered permanent plant equipment which do not require disposal (SONGS 2013, Section 11.4.2.3.3).

The disposable filters utilized in the backflushable filter and collection system are shielded with a removable lead cask. When the filter is loaded with crud (based on radiation levels or differential pressure), the filter is processed. The disposable filter element is removed from the housing and transferred to the solid waste processing area in a lead shield. Disposable filter elements are temporarily stored in the high level storage area if they are not packaged promptly.

Packaging of disposable filters may be by either encapsulation with an approved solidification agent (such as cement), or placement into a HIC. The liner/HIC is then transferred to the multipurpose handling facility (MPHF) for temporary storage and is ultimately shipped to a licensed burial site in a shielded shipping cask.

The shielded low-activity filters are placed in a compartment which has a partial vertical wall to shield personnel during filter element changing. An electric monorail is available for use to transfer the filter element to a container. The container and filter element are appropriately stored until packaged for shipment offsite. Filters may be solidified with other wastes or placed into NRC-approved HICs. Shielded low-activity filters are normally changed on high-differential pressure; however, routine radiation surveys performed allow changing frequencies to be adjusted to minimize person-rem exposure and to ensure the filters are within disposal classification limits. (SONGS 2013, Section 11.4.2.3.3)

South Yard Facility

Radioactive material may be decontaminated, processed, or worked on in the SYF. The SYF is designed to have two potentially radioactive envelopes with separately monitored effluent pathways. The first area is the SYF work area, designed as the radiological controlled area (RCA) portion of the building, where decontaminating and working on radioactive material, including the processing of mixed waste, takes place. The second area is the SYF carbon dioxide (CO_2) decontamination unit, designed specifically as the decon unit release point, which is used to decontaminate plant equipment and components. (SONGS 2013, Section 11.1.8.4)

The SYF includes a CO_2 blast decontamination enclosure. The SYF RCA heating, ventilation, and air conditioning (HVAC) system has the capability for continuous sampling of the ventilation system for particulates and iodine. Sampling is controlled administratively and is required only during times of building occupation. (SONGS 2013, Section 11.5.2.1.4.13)

3.1.3.3 Nonradioactive Waste Systems

The nonradioactive waste systems will continue to operate through decommissioning for as long as they are needed.

The use of these systems will evolve as decommissioning progresses and releases of wastes would also vary. However, the continued operation of these systems is considered in Sections 4.3.3, 4.3.4, and 4.3.17 for environmental impacts. The current permits and regulations impose limitations that are considered bounding for environmental impacts during decommissioning.

Nonradioactive waste is produced from plant maintenance, cleaning and operational processes. The wastes generated includes nonhazardous waste oil and oily debris that result from operation and maintenance of oil-filled equipment, and universal wastes, such as the spent fluorescent bulbs and batteries common to any industrial facility. Hazardous wastes include spent and off-specification (e.g., shelf-life expired) chemicals, laboratory chemical wastes, and occasional project-specific wastes.

Some amount of chemical and biocide wastes are produced from processes used to control the pH (acidity) in the coolant, to control scale, to control corrosion, and to clean and control biological growth in the condenser. These low volume waste streams are typically combined with cooling water discharges in accordance with the site's NPDES permits, CA0108073 for Unit 2 and CA0108181 for Unit 3. (CRWQCB 2005)

Nonradioactive chemicals, paint, oil, fluorescent lamps, and similar items that have either been used or exceeded their useful shelf life are collected in designated storage areas and managed in accordance with SCE appropriate procedures, such as the hazardous waste management program and the hazardous materials/waste/mixed waste temporary storage areas procedures (SCE *n.d.-b*; SCE *n.d.-c*). The wastes are received in various forms and are packaged to meet all regulatory requirements prior to final disposition at an offsite facility licensed to receive and manage the waste. Typical waste streams include waste oil, oily debris, batteries, thermostats, fluorescent lamps, aerosol cans, photochemicals, and hazardous wastes (i.e., paints, asbestos, solvents, lead abatement waste, corrosive liquids, ammonia solutions, mercury and broken lamps, off-specification and expired chemicals) (SONGS 2013, Section 1.2.11.1).

Programs that have been implemented at the facility to reduce waste generation are described in SCE's hazardous waste/mixed waste minimization program (SCE *n.d.-d*). This program also identifies other site-specific procedures to minimize waste generation to the maximum extent practicable.

Sanitary wastewater from all permanent plant locations is collected and the effluent is released to the ocean after processing, while sludge is trucked offsite. Sanitary releases are controlled under the NPDES permits specified above.

Nonradioactive gaseous emissions result primarily from testing of the emergency diesel generators and various other diesel and gasoline-powered equipment and other maintenance operations such as degreasing and maintenance activities involving equipment with halogenated refrigerants. Activities that result in (non-radioactive) airborne emissions are conducted in accordance with procedures and incorporate compliance with air regulations and permit requirements (SCE *n.d.-e*).

3.1.3.4 Electrical Systems

The offsite transmission system, the switchyard, and the onsite distribution system for SONGS are designed to provide electric power to plant electrical equipment under all plant operating conditions and electric power source availability. The electric system that serves SONGS 2 & 3 is electrically independent of SONGS 1 and provides adequate reliable power sources to all SONGS 2 & 3 electrical equipment for startup, normal operation, safe shutdown, and all emergency situations. (SONGS 2013, Section 8.1) Power sources used during emergency situations potentially include emergency diesel generators and battery systems.

Numerous electrical systems may continue to be used during decommissioning operations and the environmental impacts of their operation is considered in Sections 4.3.3, 4.3.4, 4.3.6, and 4.3.16. These systems include those needed to provide uninterrupted power, lighting, and communication. In addition, waste from the systems and its eventual dismantlement at the SONGS 2 & 3 site is also considered in Sections 4.3.17 and 4.3.18.

3.1.3.5 Instrumentation and Control Systems

While most instrumentation and control systems in the plant can be deactivated after permanent shutdown and defueling of the reactor, a few may continue to be used to support decommissioning operations, including:

- The radiation monitoring instrumentation to detect, measure, and record radiation levels during decommissioning operations and alerts plant staff of off-normal readings, and for certain ODCM-credited release points, to terminate the release; and
- The security system, which monitors the plant' protected areas to prevent uncontrolled access.

In most cases, these systems are modified or partially removed during the decommissioning process.

The use of these systems during the decommissioning process does not result in additional impacts to the environment, so they will not be addressed further. (NRC 2002, Section 3.1.3)

3.1.3.6 Miscellaneous Mechanical Systems

A variety of existing plant mechanical systems may continue to be used during plant decommissioning, including:

- The fire protection system
- The HVAC system
- The fuel-handling system
- Various cranes and hoists

The use of these systems generally does not have a direct impact on the environment, so they will not be discussed further. For example, the HVAC system used inside a contaminated area would be exhausted to the gaseous waste management system. (NRC 2002, Section 3.1.3) The Freon™ in these HVAC systems will be handled in accordance with San Diego Air Pollution Control District (SDAPCD) regulations.

3.1.3.7 Spent Fuel Storage Systems

The spent fuel storage facility is part of the fuel handling building, a seismic Category I structure. Spent fuel assemblies are stored under water in spent fuel storage racks in the spent fuel pool. (SONGS 2013, Section 9.1.2.2) A separate fuel-handling building is provided for each reactor unit. The spent fuel storage racks and spent fuel pool provide for storage of new and spent fuel assemblies in appropriate regions of the spent fuel pool, while maintaining a coolable geometry, preventing criticality, and protecting the fuel assemblies from excess mechanical or thermal loadings. The licensing basis of the spent fuel pool meets the requirements of 10 CFR 50.68. (SONGS 2013, Section 9.1.1.1)

Units 2 and 3 have separate and independent fuel pool cooling systems designed to provide continuous cooling for up to 1,542 spent fuel assemblies stored in the fuel pool (SONGS 2013, Section 9.1.3.1). Each spent pool cooling system consists of two loops, the fuel pool cooling loop and the purification loop. The system is controlled manually from the main control panel. (SONGS 2013, Section 9.1.3.2) Once the spent fuel has been removed from the reactor and cooled sufficiently to within acceptable parameters, it may be shipped off site for reprocessing, stored in the ISFSI, or transferred to the U.S. Department of Energy (DOE) for long-term disposition.

The ISFSI is a fenced, protected area located within the area formerly occupied by Unit 1, now known as the NIA. The ISFSI consists of multiple rows of advanced horizontal storage modules (AHSM), each containing a dry shielded canister (DSC) of stainless steel. The ISFSI is currently sized to contain all of the onsite Unit 1 and a portion of the Unit 2 and 3 spent fuel assemblies. Each DSC includes a rigid rack to house the spent fuel assemblies. (SONGS 2013, Section 9.1.5)

Use of the system during operations and during the decommissioning process does not differ, other than the fact that the ISFSI will be expanded to hold more fuel as it is removed from the pool. The potential continued operational impact on the environment during the decommissioning process also does not differ from operations. As required, any ISFSI expansion or relocation within the site will comply with applicable regulations, including the CCC requirements for land use.

3.1.3.8 Packaging, Storage, and Transportation of Radioactive Materials

All radioactive wastes will be prepared for shipment to meet the requirements of the U. S. Department of Transportation (DOT) regulations and the NRC regulations and burial site license requirements, as applicable. (SONGS 2013, Section 11.4.2.4)

Solid radwaste is collected in the auxiliary building. In addition, solid radwaste is temporarily stored in the radwaste staging area, the radwaste truck bay.

After the radioactive waste has been processed and packaged it is sent to the MPHF in preparation of offsite shipment for treatment or burial. The MPHF has an in-process staging area for the accumulation of solid radwaste until it is released for shipment. In addition, the MPHF has the capability to contain a maximum of 18,000 gallons of Class III combustible or non-combustible radioactive liquids in leak-tight containers until it is released for processing or shipment. The MPHF consists of an office building and an RCA that includes a staging building and an equipment pad. The facility is surrounded by a gated chain link fence. The MPHF is located at the southern edge of SONGS owner-controlled area (OCA).

During operations, containers, solidification liners, and HICs are typically shipped promptly after filling, provided the proper shielding and burial facility access was available, without exceeding DOT radiation limits. If 49 CFR Part 173 dose limitations could not be met with the available shielding, the containers (liners and/or HICs) were temporarily stored and allowed to decay until they could meet the NRC and DOT dose limits for shipping. Onsite storage for decay of short-lived radionuclides was accomplished both prior to packaging in the liquid storage tanks and in appropriate onsite areas. (SONGS 2013, Section 11.4.2.4)

Solid radioactive wastes maintained onsite are managed in accordance with all regulatory requirements.

Site radioactive waste shipments are packaged in accordance with NRC and DOT requirements (SONGS 2013, Section 1.2.11.3). The type and quantities of solid radioactive waste generated at and shipped from the site vary from year to year, depending on plant activities and burial site access. Transportation activities throughout the decommissioning process will continue to comply with all applicable regulations. See Sections 3.1.4, 3.2, and 4.3.17 for further discussion of radioactive waste volumes and decommissioning plans related to transportation.

3.1.4 Radioactive Contamination and Radioactive Materials

SCE announced in June of 2013 that it will permanently retire SONGS Units 2 & 3. No new spent fuel and no new fission products will be created. Radioactive solids, liquids and gases will be removed as the decommissioning process progresses, and the radionuclide concentrations will be reduced to allow for termination of the license and the unrestricted release of the site.

The spent fuel contains the largest amount of radioactive material at a permanently shutdown facility followed by the reactor vessel, internals, and bioshield. Systems containing smaller amounts of radioactive material include the steam generators, pressurizer, piping of the primary system and other systems, piping, as well as the radwaste systems. Minor contamination is found in the secondary systems and miscellaneous piping. (NRC 2002, Section 3.1.4)

See Section 3.2 for discussion on the manner in which radioactive material and contamination will be handled during decommissioning and the projected volumes. See Section 4.3.8 for other radiological considerations.

3.2 Decommissioning Plans and Activities for SONGS

SCE will be utilizing decontamination and dismantlement (DECON) for decommissioning SONGS 2 & 3. Decommissioning plans include storage of spent nuclear fuel (SNF) in dry storage in an onsite ISFSI until its ownership is transferred to the DOE and subsequent decommissioning of the ISFSI.

The decommissioning activities are grouped by focus into six license termination periods, seven spent fuel management periods (two of which are ISFSI decontamination and demolition periods), and six site restoration periods as discussed below. The periods run concurrently. (Energy Solutions 2014, Sections 3.0 and 4.0)

Throughout all activities SONGS will continue to meet NRC requirements for radiation monitoring, sampling, and analysis. SONGS will also remain in compliance with the SDAPCD as well as NPDES requirements.

3.2.1 License Termination Periods

These periods focus on decommissioning planning, radiological surveys, design and implementation of site repowering, design and implementation of spent fuel pool support system modifications, decontamination of systems and components, dismantlement and removal of systems and components, waste packaging and shipping, and license termination activities.

Various decommissioning licensing submittals will be prepared, including the PSDAR and revised technical specifications. Decommissioning plans will be developed and work packages prepared for certain radiological areas. A site radiation survey will be performed, and preparation of work packages detailing the work required in radiological areas. Additionally, contracts for specialty services and the procurement of specialized equipment will commence.

SONGS may establish new spent fuel pool support systems in order to remove the existing systems sooner. If this is implemented, the new systems will be fully operational prior to removal of the existing systems, as discussed in the paragraphs that follow. When the spent fuel pool is no longer needed, its systems can be decontaminated, dismantled, and removed.

Temporary radwaste systems may be required to support dismantlement operations and ultimately to process the spent fuel pool water. If the temporary radwaste system is used, it will be installed within the existing plant operations area and put in operation before the existing radwaste system is removed. The temporary radwaste treatment system will include equipment, instrumentation, and controls to ensure that all regulatory requirements for the control of radioactive effluents and NPDES permit conditions will be met.

A temporary circulating water system may be built to support the spent fuel cooling system and rad waste systems. If the temporary circulating water system is used, it will be installed within the existing plant operations area and will not require new land disturbance. Utilization of an existing NPDES outfall is assumed. Furthermore, it is assumed that the source water and infrastructure demands would remain at present levels or the municipal water supply would be utilized at a level not greater than the demand during operations.

Decommissioning plans do not call for aggressive decontamination. Systems and components will have varying degrees of decontamination as determined during decommissioning planning, and once removed will be packaged for shipment with additional shielding added as needed. (Energy Solutions 2014, Section 3.0)

Waste projections were developed as part of the decommissioning cost estimate. Classification of LLRW resulting from decommissioning activities is based on AIF/NESP-036, NUREG/CR-0130, NUREG/CR-0672, and recent industry experience. The estimated curie content of the reactor vessel and internals at shutdown is derived from NUREG/CR-0130 for pressurized water reactors (PWRs) and NUREG/CR-0672 for boiling water reactors (BWRs), and adjusted for the different mass of components and period of decay. (Energy Solutions 2014, Section 3.0) Table 3.2.2-1 presents the projected radioactive waste volumes from decommissioning. The bulk of the LLRW waste volume is anticipated to be generated during the license termination periods of decommissioning.

3.2.2 Spent Fuel Management Periods

When the fuel has undergone radioactive decay long enough to reach acceptable parameters, it will be removed from the spent fuel pool and transferred to the ISFSI. Under the spent fuel management periods, an expansion to the onsite ISFSI will be designed and constructed and spent fuel canisters procured. Activities will include the loading of the spent fuel canisters with spent fuel from the pool and their transfer to the ISFSI. Fuel will be stored in the ISFSI until it is accepted by the DOE. After all fuel has been removed from the ISFSI, the ISFSI and its support structures will be demolished and removed from the site. The ISFSI site will be restored.

3.2.3 Site Restoration Periods

These periods include planning and permitting for demolition activities, demolition of buildings and structures, subsurface structure removal, and site restoration and lease termination. The removal of structures, including subsurface structures, will be in accordance with NRC regulations for unrestricted release of the property at license termination and U.S. Navy requirements for return of the SONGS property. The U.S. Navy's requirements for return of the property are to be established through negotiations. In addition, SCE holds a lease with the CSLC for the offshore land on which the intake and discharge structures are installed. Site restoration will include planning and acquiring approvals from the CSLC for conducting removal activities for the intake and discharge structures.

Chapter 4 considers the range of subsurface removal up to complete removal. Prior to removing foundations from below the water line, dewatering will be conducted as necessary. Water from dewatering will be managed in accordance with the NPDES permits and/or permits from the California Regional Water Quality Control Board (CRWQCB), San Diego region. Liquid wastes will be managed and disposed of in accordance with federal and state regulatory requirements.

Site restoration will have a long duration with intense activity periods prior to and after the years of dry storage. The majority of site structures will be demolished prior to the dry-storage-only years, with peak activity duration of approximately 2 years. Building demolition will be performed using conventional means (with no explosives). Clean debris will be disposed of at a commercial landfill and clean scrap metal will be salvaged. (Energy Solutions 2014, Sections 3.0, 4.0, and 6.0) The estimated clean (nonhazardous, nonradioactive) waste and scrap metal volumes are included in Table 3.2-1.

The ISFSI and its support structures, the seawall and pedestrian walkway and their substructures, the gunite slope protection on the bluffs, and infrastructure such as parking lots and access roads will be needed and thus will remain until the ISFSI can be decommissioned. Some of these structures, other than the ISFSI, could potentially remain, based on lease termination negotiations with the U.S. Navy. In addition, SCE plans to enter into a separate agreement with the U.S. Navy to allow for the continued use of the existing switchyard. With the exception of the switchyard and other structures that are left in place as agreed to by the U.S. Navy, the site will be restored to meet lease termination and CCC requirements.

Table 3.2.2-1: Projected Waste Volumes from Decommissioning

Waste Type	Waste Volume (ft^3)
LLRW	
Class A—Debris	3,233,685
Class A – Oversize	146,943
Class A – Containerized Waste	12,287
Class A – Large Component	108,866
Class A – Mixed Waste	3,012
TOTAL Class A	**3,504,793**
Class B	6,696
Class C	1,546
Greater than Class C	190
Nonhazardous, Nonradioactive	
Clean debris and other clean waste	25,216,569
Scrap metal	12,928,042
Total nonhazardous, nonradioactive	**38,144,611**

(Energy Solutions 2014, Table 6-4)

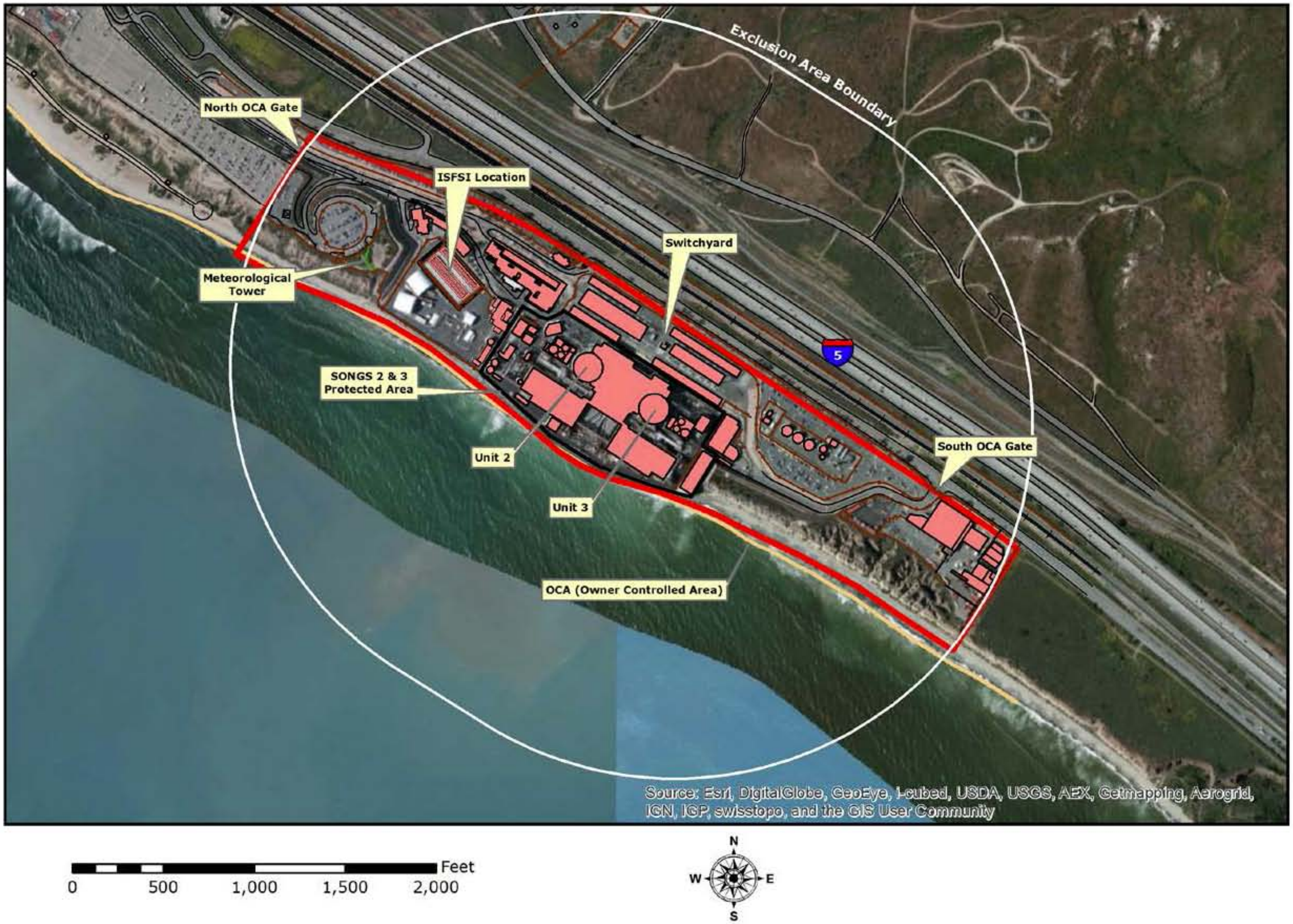

Figure 3.1.1-1: SONGS Site Layout with Exclusion Area Boundary

CHAPTER 3 REFERENCES

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4. ENVIRONMENTAL IMPACTS OF DECOMMISSIONING

This section discusses the environmental impacts of decommissioning SONGS 2 & 3. Section 4.1 defines the terms used to describe environmental impacts of decommissioning activities. Section 4.2 briefly describes the process used to identify the environmental impacts of decommissioning activities. Section 4.3 presents the environmental review for each resource area.

4.1 Definition of Environmental Impact Standards

This EIE used the environmental impact standard criteria generally used by the NRC in EISs, including the decommissioning GEIS, NUREG-0586 (NRC 2002). The significance of each environmental impact is described as SMALL, MODERATE, or LARGE, and these terms are defined below in Section 4.1.1. The decommissioning GEIS categorized the impacts as applicable on a generic or site-specific basis. This evaluation is site-specific; however, the applicability of impacts as analyzed in the decommissioning GEIS is discussed in Section 4.1.2 because the GEIS is used as a source of bounding environmental impacts to compare the results of the EIE.

4.1.1 Terms of Significance of Impacts

SCE followed the same criteria as NRC's decommissioning GEIS, NUREG-0586, in assigning levels of significance for environmental impacts. The definitions of the three levels of significance as used by NRC (2002) are as follows:

SMALL: Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in the EIE, those impacts that do not exceed permissible levels in the NRC's regulations are considered small.

MODERATE: Environmental impacts are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE: Environmental impacts are clearly noticeable and sufficient to destabilize important attributes of the resource.

Using the same definitions as the NRC facilitates the comparison of the SONGS site-specific impact determinations with the bounding environmental impacts found in NUREG-0586 (see Section 1.6).

Each of the following sections pertains to a specific environmental resource and includes a discussion of the evaluation to support the significance level determination. These discussions include standards such as following best management practices (BMPs) and complying with applicable permit conditions, and have been considered in the significance determination. In addition, each section provides a discussion of the applicable state regulations that may apply at the LTP phase.

4.1.2 Terms of Applicability of Impacts

An impact designation could be determined to apply generically across all nuclear plants as the NRC has determined for many impact areas in its decommissioning GEIS, NUREG-0586 (NRC 2002). Site-specific evaluations were performed for all areas of impact in comparison with the generic GEIS. The EIE reviews the SONGS 2 & 3 decommissioning plans for their potential impact on the SONGS site and the surrounding area. However, these analyses draw from NRC's generic analyses and generic determinations of bounding impacts in NUREG-0586. NUREG-0586 defines its generic approach for determining impacts as the following (NRC 2002):

- Environmental impacts associated with the issue have been determined to apply either to all plants, or, for some issues, to plants having a specific size, specific location, or having a specific type of cooling system or other site characteristics.
- A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts.
- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

4.2 Evaluation Process

SCE reviewed the SONGS 2 & 3's planned decommissioning activities (see Section 3.2) and compared these plans to the decommissioning activities that the NRC reviewed in the decommissioning GEIS (NRC 2002, Table E-3). The activities planned for SONGS 2 & 3 are within the activities that the NRC reviewed. SCE then assessed the potential for environmental impacts to each resource area from the decommissioning activities, using the decommissioning GEIS's discussion of the effects on the resource as a guide. For example, in the decommissioning GEIS, the evaluation of land use considers whether a plant would use any land outside of its operational areas for decommissioning as a criterion for evaluation of impacts, indicating that if decommissioning activities were restricted to operational areas, the impact would be SMALL, and if land outside the operational areas were to be used, a site-specific review was needed. SCE followed this approach, beginning with reviewing SCE's plans for the potential use of lands outside the SONGS operational areas.

The decommissioning GEIS suggests the need for a site-specific review for some resources due to the potential for impacts beyond operational areas. Both T & E species and environmental justice are identified as requiring site-specific reviews. In such cases, SCE reviewed the potential impacts of the activity against the environmental conditions existing at SONGS to determine the significance of impacts. The significance was then compared to the bounding environmental impact found in the decommissioning GEIS. In the cases of T & E species and environmental justice, the GEIS did not establish a bounding environmental impact, and an impact determination of SMALL was considered not significant.

4.3 Environmental Impacts from Nuclear Power Facility Decommissioning

The environmental resource areas reviewed by SCE follow those of the decommissioning GEIS and are the following: onsite/offsite land use, water use, water quality, air quality, aquatic ecology, terrestrial ecology, T & E species, radiological, radiological accidents, occupational issues, cost, socioeconomics, environmental justice, cultural, historic, and archeological resources, aesthetic issues, noise, transportation, and irretrievable resources.

Again, following the decommissioning GEIS format, each section identifies the applicable federal and state regulations, discusses the potential impacts for the decommissioning activities, evaluates the impacts, and presents the conclusion. The conclusion is then compared to the bounding environmental impact. All of the conclusions from Section 4.3 are summarized in Chapter 6.

4.3.1 Onsite/Offsite Land Use

The 83.63-acre SONGS site is located on the southern California coast in San Diego County, approximately 51 mi northwest of San Diego and approximately 62 mi southeast of Los Angeles (SCE *n.d.*, p 2.1-1). The site is located entirely within the boundaries of the MCBCP and is under a federal easement and lease agreement until 2024 (SONGS 2013, p 2.1-3; USMC 2012, p 2-32). The site is characterized by industrial land uses, such as warehouses, office structures, and paved areas, as shown in Figure 3.1.1-1. The Pacific Ocean is immediately west, paralleling the site with the San Onofre State Beach to the northwest and southeast along the beach line (see Figure 4.3.1-1) (SCE *n.d.*, p 2.1-2). Public passage between the beach areas of San Onofre State Beach north and south of the plant site is a condition imposed by the CDP as amended on February 16, 1982. This walkway is open to the public at all times except when closure is necessary for reasons of public safety or plant security. (CCC 1982) Land use for Units 2 and 3 was previously discussed in Section 2.1.4 of the ER for the operating license application.

Site Natural Characteristics

The geology of southern California is dominated by major northwest-trending right-lateral faults related to the San Andreas-San Jacinto fault systems. These and other northwest-trending faults have a moderate to high degree of activity. The nearest fault to the site is the Christianitos Fault, which is exposed along the seacliff approximately 1 mi southeast of Units 2 and 3. (SONGS 2013, p. 1.2-2)

The site is on the southern California coast within the Peninsular Range Province, an area characterized by northwesterly trending elongate mountain ranges and valleys (see Figure 4.3.1-2). It is located near the northwest corner of MCBCP, approximately 2 mi southeast of the mouth of San Mateo Creek. The physiography of the area is typical of the region, with a rather narrow, gently sloping, coastal plain extending seaward from the uplands. The plain is terminated at the beach and forms a line of seacliffs, which have been straightened over long distances by marine erosion. Seacliffs in the immediate vicinity of the plant site reach a height of 60 to 100 ft above mean lower low water (mllw), and are separated from the ocean by a narrow band of beach sand. In places, ephemeral streams are actively eroding gullies into the seaward portions of the coastal plain, and several deeply incised barrancas have been formed.

The site is situated on the San Mateo formation of the Pliocene-Pleistocene age, overlying Pleistocene terrace deposits and beach sand. Along the coast, both north and south of the site, Pleistocene wave action has cut an extensive gently seaward sloping bench in the San Mateo formation. (SONGS 2013, p. 1.2-2)

Sparse coastal strand vegetation borders the sandy beach at the base of the San Onofre bluffs. The upland terrace, known as the coastal bluffs, supports a mosaic of coastal sage scrub and grassland vegetation. A series of deeply eroded ravines traverse the site perpendicular to the coast. These ravines have a very sparse vegetative covering which is typical of the local coastal bluffs. (SONGS 2013, p. 1.2-2)

In this section, onsite and offsite land use are discussed within the context of the decommissioning of SONGS 2 & 3.

4.3.1.1 Regulations

Federal

Nuclear power facilities that began initial operation after the promulgation of the National Environmental Policy Act (NEPA) (42 USC 4321 to 4347) or the Endangered Species Act (ESA) of 1973 (16 USC 1531 to 1544) were sited and are operated in compliance with these statutes. Any modifications to the facilities after the effective dates of these acts and others must comply with the requirements of these statutes. The ESA applies to both terrestrial and aquatic biota. Individual states may also have requirements regarding threatened and endangered species; the state-listed species may vary from those on the federal lists. In addition, activities such as decommissioning must take into account and avoid disturbance of historic and archeological sites, and American Indian grave sites as required under the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.). (NRC 2002, Section 4.3.1.1)

SONGS 2 & 3 is also within a designated coastal zone and subject to the National Coastal Zone Management Act (CZMA). The state's federally approved coastal management plan is administered by the CCC in the area where SONGS 2 & 3 is located. Except for San Francisco bay, the commission regulates development within the California coastal zone (defined in the California Coastal Act). In this capacity, the CCC has federal consistency review authority over federally licensed activities in the coastal zone. (CCC 2012)

State: California Coastal Commission

The CCC administers the federal CZMA in California. The California Coastal Act is the state's implementation of the CZMA and is therefore the law that applies to the SONGS site. The CCC is an independent quasi-judicial state agency that regulates the use of land and water in the coastal zone. As defined by the CZMA, the offshore coastal zone includes a 3-mi (or 15,840-ft) wide band of ocean and a varying onshore zone (from several hundred feet in urban areas up to five miles in rural areas). The CZMA gives the CCC regulatory control over all federal activities and federally licensed, permitted or assisted activities, whenever they occur within the coastal zone. Several local jurisdictions have developed area-specific regulations under a local coastal plan. (CCC 2012)

State: California State Lands Commission

The CSLC authority is set forth in Division 6 of the California Public Resources Code (PRC) and it is regulated by the California Code of Regulations, Title 2, sections 1900–2970. It is within the CSLC's authority to lease sovereign lands held in the public trust, including sub-tidal lands located between the mean high tide line out to 3 nautical mi offshore. SCE currently holds an easement lease for the Units 2 & 3 conduits with the CSLC (CSLC 1985).

4.3.1.2 Potential Impacts of Decommissioning Activities on Land Use

Temporary changes in onsite land use could occur at a nuclear reactor facility site during decommissioning. Temporary changes may include addition or expansion of staging and laydown areas or construction of temporary buildings and parking areas. These temporary changes in onsite land use do not change the fundamental purpose or use of the reactor site. The major activities that may influence onsite land use are removal of large components, such as the reactor vessel, pressurizer, and steam generators, structure dismantlement, and LLRW packaging and storage. (NRC 2002, Section 4.3.1.2)

The need for land during decommissioning is affected by the site layout. Most sites have sufficient area existing within the previously disturbed area (whether during construction or operation of the site) and therefore it is not anticipated that additional land needs to be disturbed. The major decommissioning activities expected to temporarily require land include activities such as staging of equipment, packaging for shipment, and removal of large components. In addition, the temporary workers needed to accomplish the major decommissioning activities may require temporary facilities for onsite parking, training, site security access, office space, locker room and showering areas, fabrication shops, mockups, and related needs.

Some activities, such as widening and rebuilding access roads or creating or expanding gravel pits for building roads, may occur offsite. Plants currently undergoing decommissioned have not required additional land offsite for decommissioning activities. (NRC 2002, Section 4.3.1.2)

Changes to land use are considered detectable if changes in the area's general land-use pattern result. The change would be destabilizing if large-scale new development and major changes in the land-use pattern occur. For example, a new local access route through rural land to the plant would represent a detectable, but not destabilizing, change in many localities. (NRC 2002, Section 4.3.1.2)

4.3.1.3 Evaluation

Chapter 3 provides a discussion of the SONGS site and station features (see Figure 3.1.1-1). While the original grant of easement between SCE and the U.S. government is scheduled to expire on May 12, 2024 (SONGS 2013, p 2.1-3), it is anticipated that the easement lease will be extended to support the decommissioning schedule for SONGS.

The operating license stage ER described the SONGS 2 & 3 site, prior to construction of the units, as being about 80 percent in a natural state with the remaining 20 percent disturbed by human activities (SCE *n.d.*, Section 2.2). As seen in Figure 3.1.1-1, the current facility occupies

83.63 ac that are almost entirely paved and developed; however, there are several small strips of intact scrub-shrub habitat surrounding parking lots and between the developed areas of the plant and the coastal bluff. Table 4.3.1-1 describes land use types and the approximate percentage of each category within the SONGS easement, or OCA. Land use is illustrated in Figure 4.3.1-3. The greatest percentage of land cover within the OCA is considered "Developed, High Intensity" at 74.84 percent, with a lesser percentage of the site considered "Developed, Medium Intensity (23.25 percent). As seen in Figure 4.3.1-3, the bluff areas located in the northwest and southeast portion of the OCA were not included in the SONGS land use analysis. The bluffs within the OCA have remained undeveloped in compliance with the CCC guarantee agreement, where SCE guarantees their protection and that they will remain in their natural state. (CCC 1974; MRLC 2013; USDA 2013)

As discussed in Section 3.2, SCE decommissioning plans include building demolition within the OCA. The removal of subsurface structures during the decommissioning period will be in accordance with NRC regulations for unrestricted release of the property at license termination and U.S. Navy requirements for return of the SONGS property, to be established through negotiations. Spent fuel would be transferred into dry cask storage within an expanded ISFSI. Demolition of the ISFSI, termination of SONGS licenses, and site restoration will precede release of the property back to the U.S. Navy. Final decommissioning and termination of the lease with the U.S. Navy are scheduled to take place within the required 60-year timeframe for completion of decommissioning as required in 10 CFR 50.82(a)(3) (NRC 2013a, page 7).

To support dismantlement of structures within the OCA, SCE may opt to utilize leased SONGS parcels outside the OCA on the west side of I-5 for decommissioning activities, e.g. staff parking, temporary non-radiological equipment storage, etc. In addition, the existing rail spur serving the site will be used in support of LLRW shipments. There may be a need to refurbish portions of the rail spur within the OCA. Decommissioning activities are not anticipated to require construction or modification to transportation infrastructure and routes other than the rail spur. All decommissioning activities outside the OCA are expected to be associated with land already under lease by SONGS and consistent with current use.

Outside the OCA on the west side of I-5, SONGS also currently leases from the U.S. Navy two individual parcels separate from the easement, totaling 14.9 ac. Portions of the two parcels have also been developed over the years (see Figure 3.1.1-1). Parcel 8 is the largest of the parcels at 11.4 ac in size; its southeast side borders the OCA. (SONGS 2011a) This area is currently utilized for staff parking (e.g., Parking Lot #4) and other support activities for SONGS 2 & 3. As described in Table 4.3.1-1, 56 percent of Parcel 8 as represented in Figure 4.3.1-3 falls under the "Developed, High Intensity" land cover category, followed by 36 percent of the area in the "Developed, Medium Intensity" category. Of the remaining area in Parcel 8, six percent falls within the "Developed, Low Intensity" category and two percent is considered "Developed, Open Space." (MRLC 2013; USDA 2013)

Parcel 9 is 3.50 ac; its southeastern edge also borders the OCA. It has 40 percent of the area categorized as "Developed, High Intensity" category, followed by 60 percent of the parcel considered to be "Developed, Medium Intensity." (MRLC 2013; USDA 2013)

As discussed in Section 4.3.5, intake and outfall structures on land are within the OCA and will be demolished and removed as discussed in the decommissioning plans. In addition, for Units 2 & 3 intake and discharge conduits, current plans are to seek an easement lease amendment for the abandonment of the conduits with limited removal activities, as done for the disposition of the Unit 1 conduits. If the SLC easement lease for Units 2 & 3 is not amended, the environmental impacts that could result from complete removal of the conduits would be evaluated prior to performing those actions. Should these plans change, SCE will take appropriate action in compliance with all regulatory requirements.

4.3.1.4 Conclusions

The SONGS site is currently used for utility-related industrial land uses with the majority of the property within the OCA having been previously disturbed during construction and operation of the plant. Considering the currently available level of detail for decommissioning activities onsite, it is anticipated that there would be no changes in onsite land use patterns during decommissioning. Post decommissioning, the site will be returned to the Department of the Navy in a restored state. In its GEIS for decommissioning, the NRC generically determined onsite land use impacts to be SMALL (NRC 2002, Section 4.3.1.4), and therefore, in addition to being SMALL, SONGS onsite land use impacts during decommissioning are bounded by those impacts considered in the previously issued GEIS.

The offsite land use at SONGS is anticipated to remain the same and no adverse impacts to offsite land use are anticipated should there be a need to use the existing SONGS rail spur easement and leased parcels located outside the OCA. Therefore, it is anticipated that potential offsite land use impacts will be SMALL. However, as details of SONGS decommissioning activities are developed, or should lands not included in this analysis be utilized in support of decommissioning, SCE will comply with 10 CFR 10.82(a)(7) regarding notification to the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

Because any land use changes during decommissioning are anticipated to be consistent with current use, it is anticipated that SONGS will be in compliance with federal and state regulatory requirements. Aquatic and terrestrial habitats for the site are described in Section 4.3.5 and Section 4.3.6, threatened and endangered species are discussed in Section 4.3.7, and Section 4.3.14 discusses cultural, historic, and archeological resources.

Prior to active dismantlement, SCE will file with CCC an application for a CDP to address decommissioning activities.

Table 4.3.1-1: SONGS Land Use

MRLC Classification	Easement (OCA)[a] (% Land Cover)	Parcel 8 (% Land Cover)	Parcel 9 (% Land Cover)
Open Water	0.32	0.00	0.00
Developed, Open Space	0.00	2.00	0.00
Developed, Low Intensity	1.59	6.00	0.00
Developed, Medium Intensity	23.25	36.00	60.00
Developed, High Intensity	74.84	56.00	40.00
Totals	100.00	100.00	100.00

a. Open space within OCA is undeveloped per the CCC 1974 Guarantee Agreement, and thus not included in the development percentages.

(CCC 1974; MRLC 2013; USDA 2013)

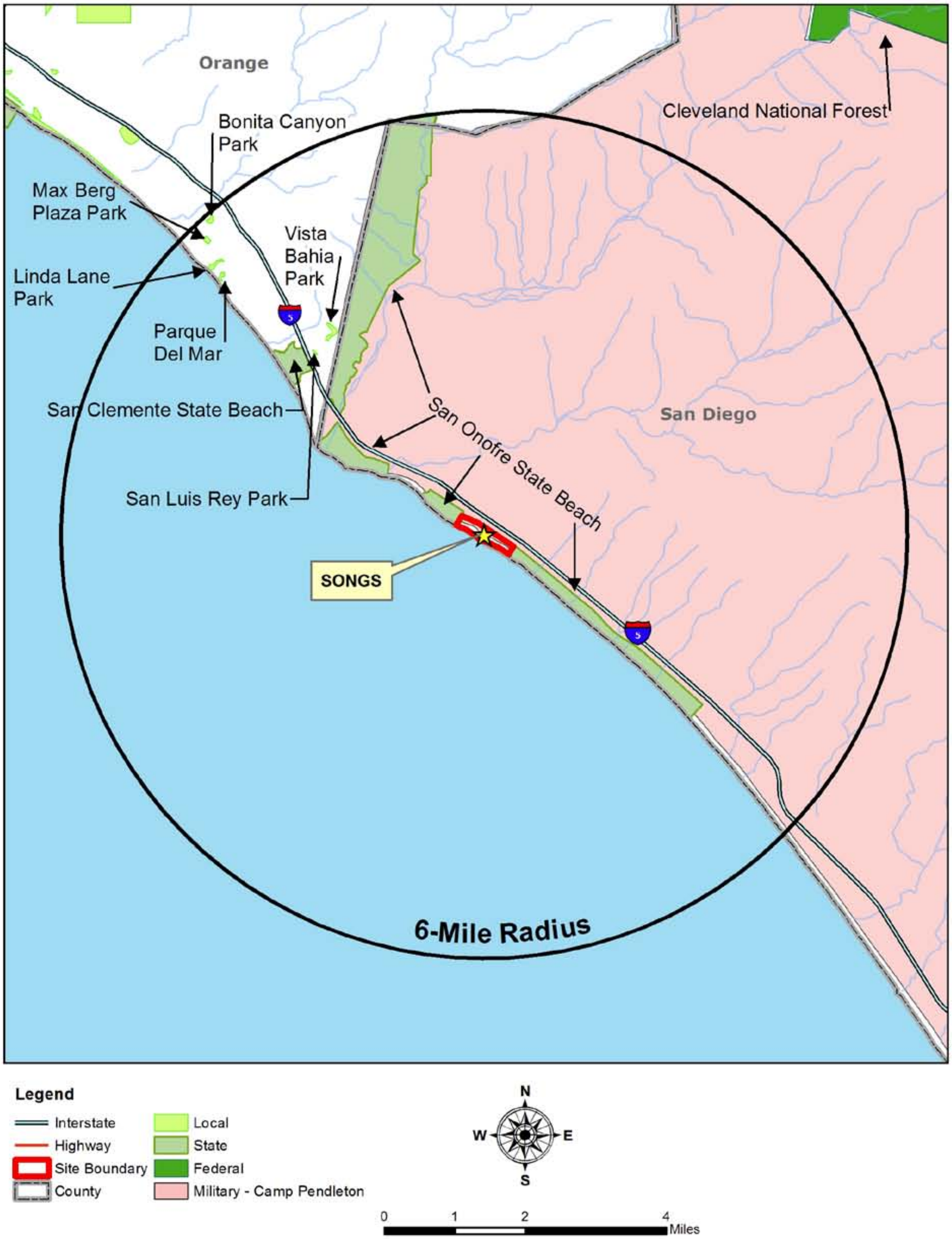

Figure 4.3.1-1: Federal, State, and Local Lands within a 6-Mile Radius of SONGS

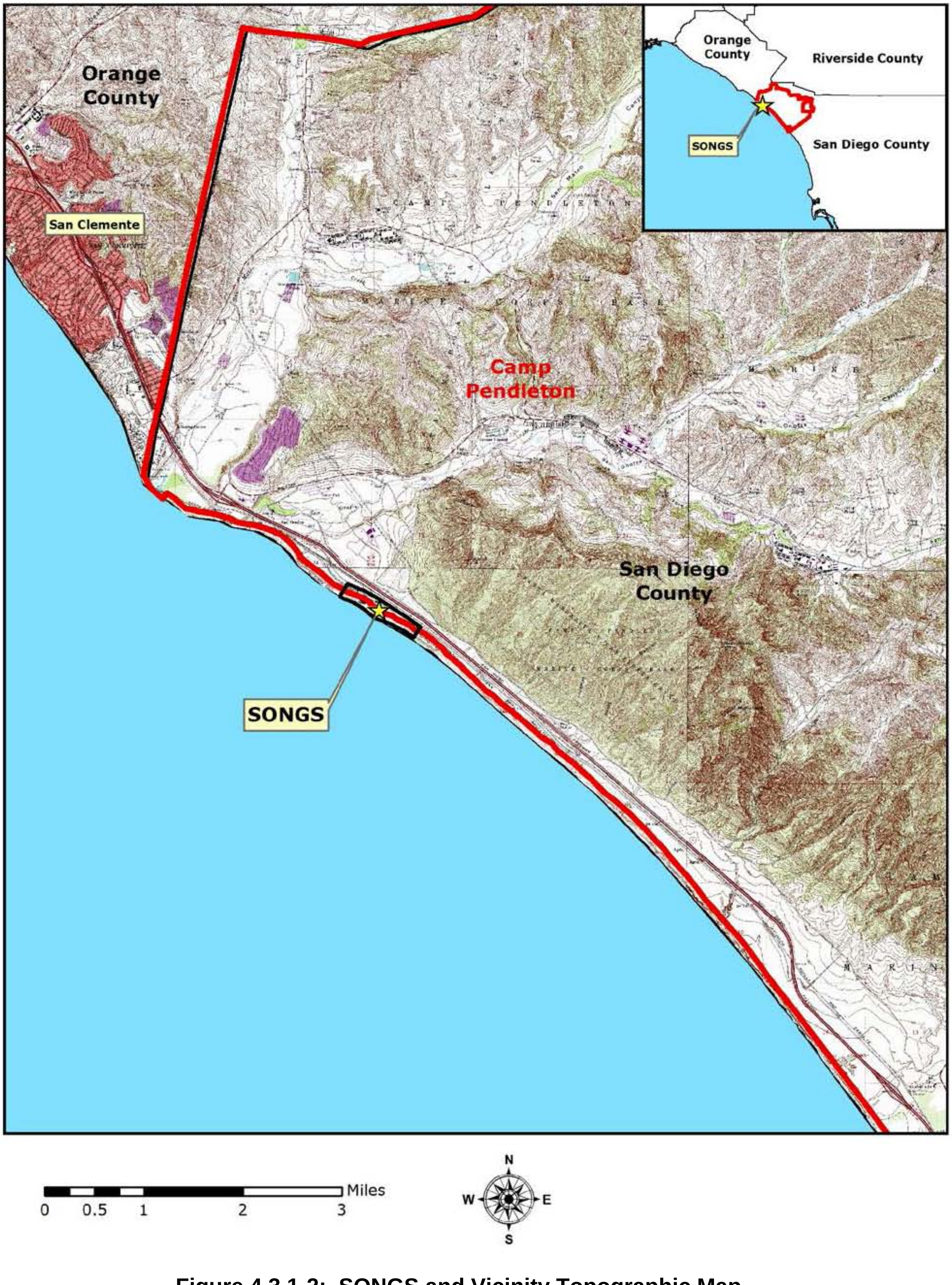

Figure 4.3.1-2: SONGS and Vicinity Topographic Map

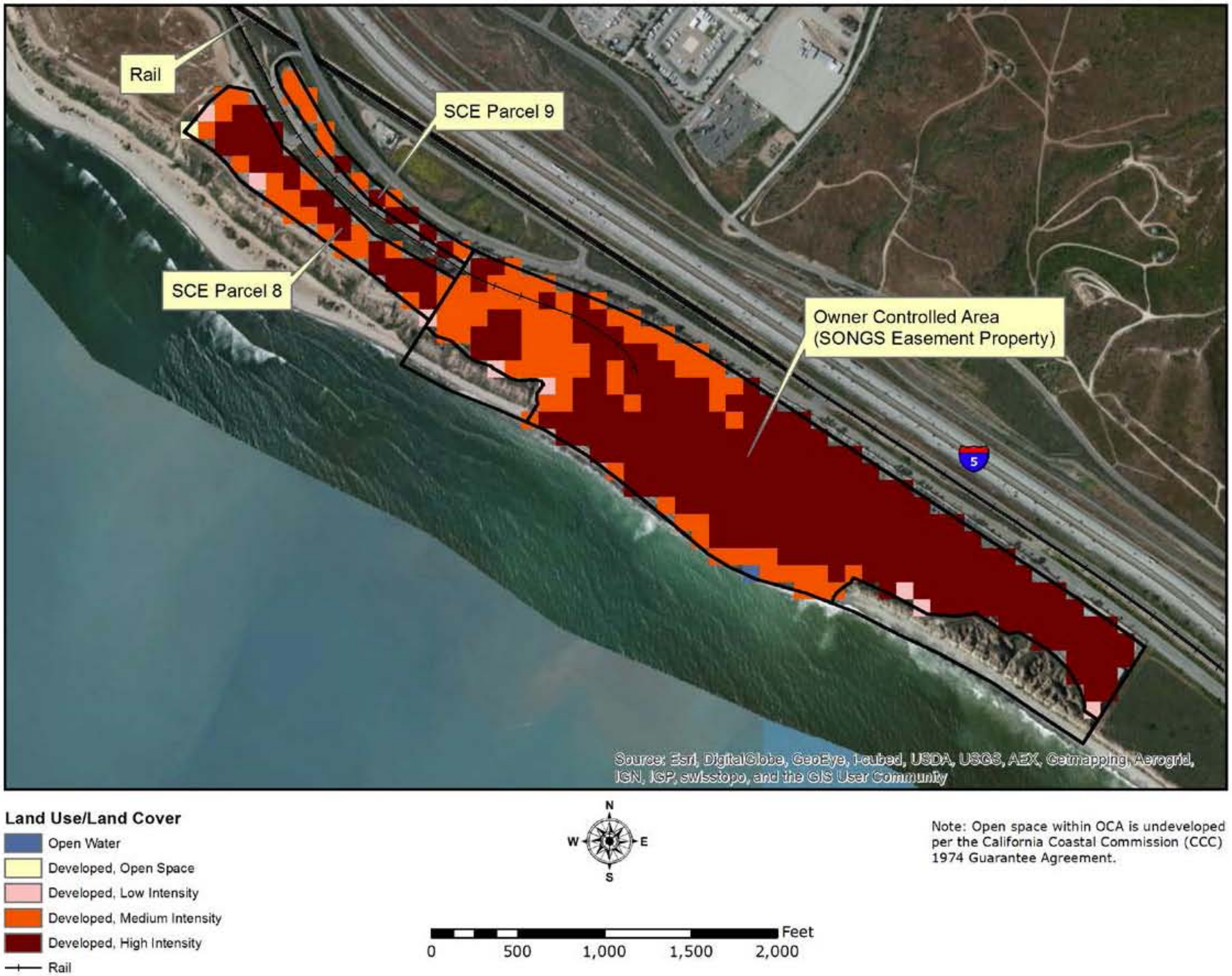

Figure 4.3.1-3: SONGS Land Use

4.3.2 Water Use

Surface Water Hydrology

The SONGS site is located in the Peninsular Range physiographic province in southern California. The Peninsular Range contains significant exposures of sedimentary and igneous units rising up to an elevation of nearly 2,700 ft. (SCE 2004, Section 4.8.1.1) The SONGS site is within the San Juan Watershed. The San Juan Hydrologic Unit (SJHU) covers 496 square mi in San Diego, Orange, and Riverside counties. Approximately 150 square mi (30 percent) of this area is in northwest San Diego County, almost entirely within the MCBCP. There are five hydrologic areas (HAs) in the SJHU, two of which, the San Onofre and San Mateo HAs, are within San Diego County. (PCW 2013) The SONGS site lies within the San Onofre HA.

The San Onofre HA is drained by the San Onofre, Las Flores, and Aliso Canyon basins. The topography of the San Onofre and San Mateo HAs is varied, ranging from coastal plains in the western portion to the Santa Margarita Mountains, which rise over 2,000 ft above mean sea level. (PCW 2013) The San Onofre HA is further subdivided into three hydrologic sub-areas (HSAs): the San Onofre Valley, Las Pulgas, and Stuart HSAs. (CDOC 2013) The SONGS site lies within the San Onofre Valley HSA.

The San Onofre Valley HSA has been further divided into the San Onofre and Coastal Drainage areas. SONGS 2 & 3 is located in the San Onofre drainage area of the San Onofre Valley HSA (Figure 4.3.2-1). (USMC 2012)

The Pacific Ocean is adjacent to the SONGS site. Most of the SONGS site consists of impermeable surfaces, except for minor strips of intact scrub-shrub habitat outside the paved areas and the coastal bluffs. As stated in Section 4.3.1, the bluffs are crossed by ephemeral drainages. Vernal pools are located adjacent to SONGS, northwest of SONGS Parking Lot #4. Storm water onsite is subject to existing programs. (SCE 2004, Section 4.8.1.4)

Groundwater Hydrology

The SONGS 2 & 3 site is on the southern boundary of the San Onofre Valley Groundwater Basin (SVGB), Basin No. 9-3. (MWD 2007) This basin lies within the south coastal hydrologic sub-region of California as defined by the California Department of Water Resources (CDWR) (CDWR 2003), extends inland from the coast about 13 mi, and bisects the Santa Margarita Mountains, which lie inland to the east (Figure 4.3.2-1).

The SVGB lies completely within the boundary of the MCBCP. Water derived from the basin is for municipal and military use. The City of San Clemente has a groundwater well located at least 3 miles from SONGS in an upgradient direction that is used to supplement their supply from the Municipal Water District of Orange County (MWDOC). Military security dictates that detailed information concerning amounts of water withdrawn, water levels, and locations of production wells remains classified. However, general information is available, including a limited amount of well data. SVGB groundwater supplies only a partial quantity of MCBCP’s total consumption and is limited directly by the amount of precipitation and recharge that occurs. CRWQCB, San Diego region, policy requires the maintenance of a seaward gradient of the groundwater table at all times to prevent intrusion of saline water into fresh water aquifers. (SONGS 2013, Section 2.4.13.2)

The average groundwater elevation beneath the site is +5 ft mllw. Fluctuations within the pumped regions of the SVGB have had little impact on the level of groundwater at the SONGS site. Monitoring of groundwater levels at SONGS for a ten-year period between 1963 and 1974 has shown the water table to vary from +2.7 ft to +5.7 ft mllw in the vicinity of the containment structures. (SONGS 2013, Section 2.4.13.2)

Prior to SONGS 2 & 3 construction, tidal effects on the groundwater levels at the site were monitored using piezometers. The results indicated that wells located closer to the ocean are generally more responsive to tidal fluctuations. Amplitudes of the fluctuations in observation wells are proportional to amplitudes of tidal fluctuations. The ratio of observation well to tidal fluctuations ranges from 0.1 to 0.3 for wells located between the containment structures and the shore. Wells that were located a few hundred meters east of the unit's centerline were less responsive. The time lag between tidal highs and lows and the corresponding change in observation wells is generally about one hour. (SONGS 2013, Section 2.4.13.2)

SONGS 2 & 3 acquires potable water through the South Coast Water District, a member agency of the MWDOC. Based on 2007 and 2008 water consumption, SCE averaged approximately 65 ac-ft of potable water per month for normal plant operations at SONGS 2 & 3 (SCE 2009b). The site uses sea water from the Pacific Ocean for its circulating cooling for service water functions. No water is derived from aquifers beneath or in the vicinity of the site for plant-related operational or potable supplies. (SONGS 2007a; SONGS 2013, Section 2.4.13.1)

4.3.2.1 Regulations

10 CFR 51.53(c)(3)(ii)(C)] states that if the applicant's plant uses Ranney wells or pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater use must be provided.

SONGS does not withdraw groundwater for use at the plant, and there are no Ranney wells. Excavation dewatering will require a permit from the CRWQCB, San Diego region. If the well type is a Ranney well, SCE will comply with NRC regulations for assessment of these wells.

The statewide water quality control policy on the use of coastal and estuarine waters for power plant cooling, also known as the once-through cooling (OTC) policy, establishes standards for implementation of the federal Clean Water Act (CWA) section 316(b) concerning cooling water input structures. The OTC policy requires existing power units to reduce intake flow by 93 percent and have a through-screen flow rate not exceeding 0.5 ft/s (Track 1) or to demonstrate that these reductions are not feasible and achieve comparable reductions in impingement and entrainment by operational or structural controls (Track 2). (SWRCB 2013a) Prior to permanently ceasing operations, SONGS was pursuing compliance with the policy through Track 2; however, following cessation of normal operations at SONGS, there has been a significant (approximately 96 percent) reduction in the intake flow rate, as well as a corresponding reduction in the through-screen intake velocity (to approximately 0.1 ft/s). These reductions meet the requirements for Track 1 compliance with the OTC policy. (SCE 2013a)

4.3.2.2 Potential Impacts of Decommissioning Activities on Water Use

Although cessation of plant operations results in a significant decrease in water consumption because recondensing steam is no longer required, a variety of water uses continue, including water for spent fuel cooling, sanitation, and potable water for staff personal use. However, these needs are met by sea water and municipal water supplies and currently, no groundwater or onsite surface water is used. Water uses reviewed for decommissioning in the decommissioning GEIS (NRC 2002) include fuel removal, staffing changes, large component removal, decontamination and dismantlement (using high-pressure water sprays), and structure dismantlement. The GEIS also considered the need for dewatering during decommissioning activities. Currently, decommissioning plans for SONGS do not anticipate other water uses.

4.3.2.3 Evaluation

The operational demand for cooling and makeup water was largely eliminated once SONGS 2 & 3 permanently ceased operation. The normal operation requirements of the circulating water system were 830,000 gpm (SONGS 2013). With the decreased need for cooling, SONGS 2 & 3 has experienced a significant decline in overall water use. As a result of ceasing operations, plant staff decreased. As of June 2013, SONGS onsite staff numbers had decreased to approximately 575 persons (SCE 2013b). Although contractors will be used for the decontamination and dismantlement activities, which will increase staffing levels and the demand for potable water, decommissioning staffing at SONGS is not expected to exceed historical construction or operating staff numbers at the site.

Excavation dewatering will be required for decommissioning during dismantlement and removal of deep subsurface structures that extend below the water table (approximately +5 ft mllw). All buildings are founded below finished plant grade at elevation -30 ft mllw in San Mateo sand. The final depth of removal activities to meet U.S. Navy requirements for return of the SONGS property has not been established to date. However, the extent of excavation for removal would be bounded by that experienced during construction of SONGS 2 & 3.

To construct SONGS 2 & 3, excavation dewatering was required to depress the groundwater below -35 ft mllw. Excavations required for decommissioning activities would not exceed those needed for the initial construction activities; therefore, the dewatering activities required for construction would be bounding. The construction dewatering system typically pumped approximately 15,500 gpm. The maximum estimated water draw-down elevation was between -40.0 to -50.0 ft and was not expected to extend beyond the ring of dewatering wells more than about 1,000 ft. (SONGS 2013, Section 2.5.4.6.3)

4.3.2.4 Conclusions

Excavating dewatering effects will be limited to an area within a 1,000-foot radius of the SONGS 2 & 3 subsurface structures and will not impact any offsite water user. Water uses, including dewatering volumes, are anticipated to be significantly less than water use during operation.

Considering the available information on the potential impacts of decommissioning on water use at SONGS 2 & 3, it is concluded that the impacts will be SMALL. The decommissioning GEIS generically determined water use impacts to be SMALL (NRC 2002, Section 4.3.2.4); therefore, the water use impacts of SONGS during decommissioning are bounded by this previously issued EIS. As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

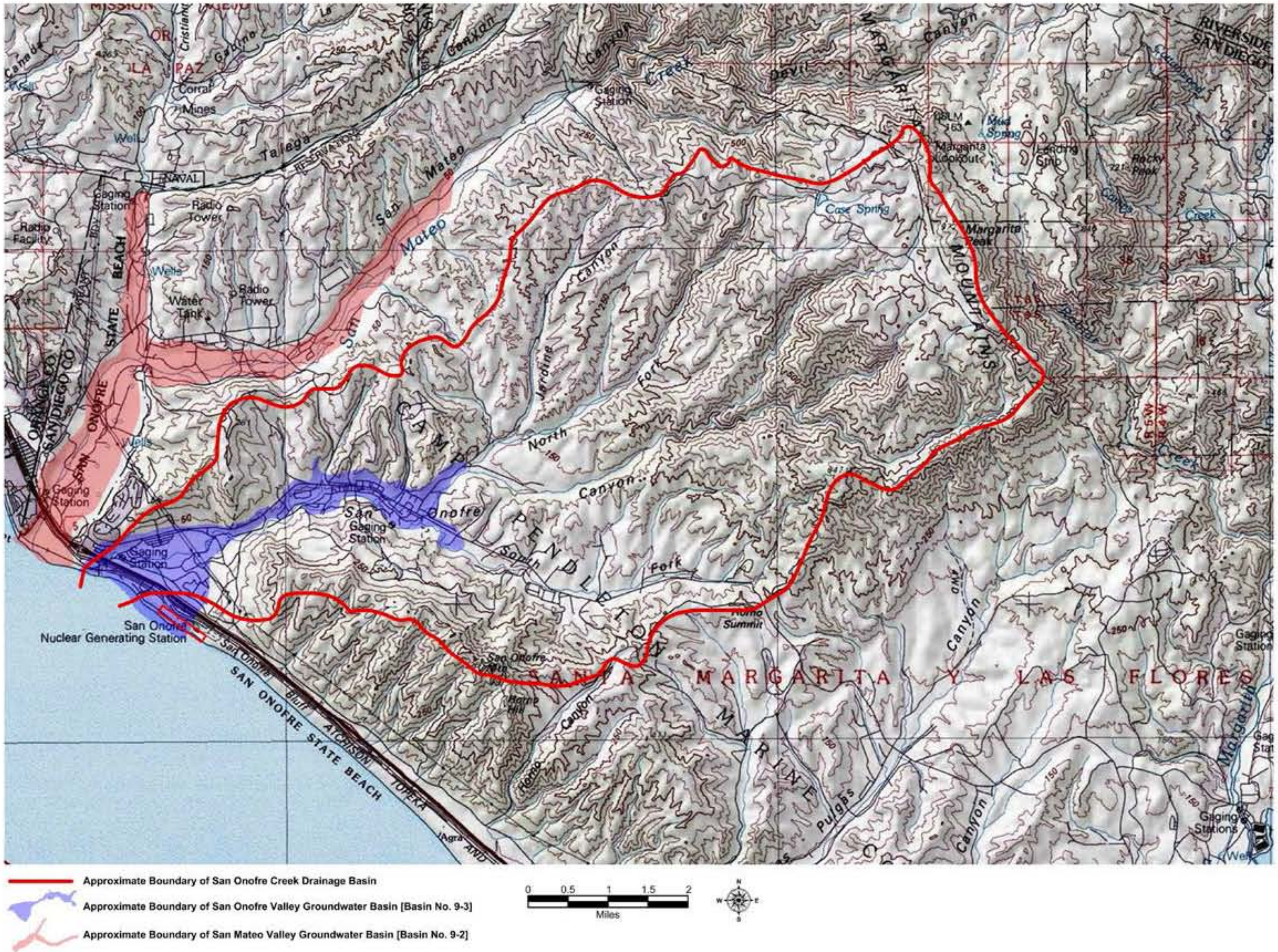

Figure 4.3.2-1: SONGS Area Drainage Basins

4.3.3 Water Quality

There are quality standards for drinking water, protection of aquatic and terrestrial habitats, and release of potential pollutants to surface and groundwater environs. Nuclear reactor facilities are usually located above aquifers or adjacent to important sources of water. Intended and accidental releases of potential pollutants may impact the quality of these waters. This section considers water quality impacts of nonradioactive material for both surface water and groundwater during the decommissioning process. Impacts from releases of radioactive material in liquid effluents are discussed in Section 4.3.8.

Surface Water Quality

Surface water on the SONGS site is limited to precipitation runoff. The Pacific Ocean forms the western boundary of SONGS and is used for cooling water supply and discharge for SONGS 2 & 3. (SCE 2004, Section 4.8.1.1.3; CRWQCB 2006)

Groundwater Quality

As stated in Section 4.3.2, groundwater beneath the SONGS site is part of the SVGB, and groundwater quality at MCBCP is regulated by the U.S. Environmental Protection Agency (EPA) and CRWQCB, San Diego region. (SCE 2004, Section 4.8.1.1.4) According to the San Diego Basin Plan, groundwater west of the eastern boundary of the right-of-way of I-5 does not have beneficial uses for municipal or agricultural purposes. This area is exempt from the sources of drinking water policy (SONGS 2007a). CRWQCB policy requires the maintenance of a seaward gradient of the groundwater table at all times to prevent intrusion of saline water into fresh water aquifers (SONGS 2013, Section 2.4.13.3). The nearest water supply wells are over one mile inland on MCBCP, within the San Onofre Creek watershed (see Figure 4.3.3-1). (CDWR 2013)

In May 2006, the Nuclear Energy Institute (NEI) launched the Ground Water Protection Initiative (GPI) (NEI 07-07) to provide an industry-wide approach to improve utilities' management and response to instances where the inadvertent release of radioactive substances may result in low but detectable levels of licensed material in subsurface soils and water. SCE completed the GPI questionnaire, submitted it to the NRC (SCE 2006), and subsequently initiated a program focused on groundwater monitoring for radionuclides in accordance with the GPI. This SONGS program is discussed in Section 4.3.8. Several onsite monitoring wells (Figure 4.3.8-1) were installed on the SONGS site in December 2007 to support compliance with the NEI initiative and are being monitored per the SONGS GPI program. This GPI program establishes responsibilities and instructions for SONGS to comply with NEI Initiative 07-07. (SONGS 2008a)

4.3.3.1 <u>Regulations</u>

Planned releases of nonradioactive discharges to surface waters are regulated through the NPDES (Section 402 of the Federal Water Pollution Control Act, commonly referred to as the CWA [33 USC 1251 to 1387]) to protect water quality, and, for licensed material, by the NRC. Congress has delegated the responsibility for NPDES implementation to the EPA. When the EPA determines that state programs are equivalent to the federal NPDES program, the NPDES permitting process is delegated to the state. Generally, discharge limits specified by the NPDES permits are revisited every five years when permits are reissued. Ongoing monitoring programs may be required as part of an NPDES permit. (NRC 2002, Section 4.3.3.1) Planned releases from SONGS 2 & 3 are regulated by NPDES permits CA0108073 (Unit 2) and CA0108181 (Unit 3), both issued by the CRWQCB, San Diego region (CRWQCB 2006).

Storm water discharges associated with industrial activities at the SONGS site are regulated and controlled through an industrial storm water general permit (97-03-DWQ [WDID# 9371003198]) issued by the CRWQCB. This permit requires SONGS 2 & 3 to develop, maintain, and implement a storm water pollution prevention plan (SWPPP) for the facility to minimize the discharge of pollutants in storm water runoff; ensure storm water discharges do not result in or significantly contribute to violations of CRWQCB Title 117 (California Surface Water Quality Standards) or CRWQCB Title 118 (Groundwater Quality Standards and Use Classifications); and maintain compliance with other requirements listed in the industrial storm water general permit. SONGS 2 & 3 is in compliance with the terms and conditions of this permit. Should decommissioning activities prompt the need for a storm water construction general permit, SCE would comply with conditions of that type of permit, which also requires the development and implementation of an SWPPP (SWRCB 2013b).

Non-radiological hazardous substance releases are overseen by the State of California for the characterization and remediation of soil and groundwater contamination. The Department of Toxic Substances Control (DTSC) and the CRWQCB, San Diego region, would coordinate regulatory oversight of groundwater remediation.

The EPA's Oil Pollution Prevention Rule became effective January 10, 1974, and was published under the authority of Section 311(j)(1)(C) of the CWA. The regulation was published in 40 CFR Part 112, and facilities subject to the rule must prepare and implement a spill prevention, control, and countermeasure (SPCC) plan to prevent any discharge of oil into or upon navigable waters of the United States or adjoining shorelines. SONGS 2 & 3 are subject to this rule and have a written SPCC plan that identifies and describes the procedures, materials, equipment, and facilities utilized at the station to minimize the frequency and severity of oil spills to meet the requirements of this rule. (SCE 2009c)

The RCRA of 1976 (42 USC 6901 et seq.) addresses the need to investigate and clean up contamination in the event of the release of nonradioactive hazardous material not covered within the limits of the NPDES permits. As with the NPDES permitting process, Congress has delegated the responsibility for RCRA implementation to the EPA. Because NPDES permits regulate only intentional discharges to surface water, any accidental releases of nonradioactive hazardous materials that may impair water quality (surface water or groundwater) are regulated through the RCRA process. RCRA requires responsible parties to clean up environmental contaminants regardless of the time of their release. The degree of investigation and subsequent corrective action necessary to protect human health and the environment vary significantly among facilities. When the EPA determines that state programs are equivalent to the federal RCRA program, the corrective action program is delegated to the state. (NRC 2002, Section 4.3.3.1)

Based on an October 1978 decision by the Atomic Safety and Licensing Board, NRC authority does not extend to matters within the jurisdiction of the EPA. More specifically, the NRC authority is limited for those matters expressly assigned to the EPA by the CWA amendments of

1972. This decision would also apply to decommissioning nuclear reactor facilities. (NRC 2002, Section 4.3.3.1)

4.3.3.2 Potential Impacts of Decommissioning Activities on Water Quality

Major activities that could impact surface and groundwater quality during decommissioning include fuel removal, stabilization, decontamination and dismantlement, and structure dismantlement. Surface waters are most likely to be impacted either by storm water runoff or by releases of substances during decommissioning activities. (NRC 2002, Section 4.3.3.2) Impacts to water quality of decommissioning activities would be considered detectable if such activities result in a significant change in water-supply reliability. For example, storm water erosion at a facility undergoing decommissioning may result in a measurable increase in suspended sediment in an adjacent stream, or disposal of concrete onsite could alter local water chemistry of the groundwater. However, this does not constitute a detectable change in the reliability of the water supply unless the incremental change in sediment concentration precludes permitted or environmental uses. The impacts of decommissioning activities would be considered destabilizing to water quality if they result in a permanent or significant loss of water-supply reliability. For instance, significant increases in erosion might result in a permanent loss of benthic habitat for certain fish species. (NRC 2002, Section 4.3.3.2)

As discussed in Section 4.3.2, SONGS 2 & 3 decommissioning will require dewatering for dismantlement and removal of deep subsurface structures that extend below the water table (approximately +5 ft mllw). This water will require disposal, and SCE will acquire the appropriate permit or modification of its NPDES permits for the discharge.

4.3.3.3 Evaluation

If groundwater is found to be threatened or impacted by a non-radiological hazardous substance release, the California DTSC provides technical oversight for the characterization and remediation of soil and groundwater contamination. The DTSC and the CRWQCB, San Diego region, would coordinate regulatory oversight of groundwater remediation. As discussed above, SONGS has an SPCC plan to protect groundwater from contamination.

Future risks are related to contamination resulting from the decommissioning activities (accidental spills), areas of low concentrations of residual radioactivity or hazardous substances due to legacy activities not previously identified, and migration of the residual radioactivity or hazardous substances in the groundwater to previously uncontaminated areas due to dewatering efforts, and leaching from abandoned in place concrete subsurface structures, if any (see Section 3.2 on removal of subsurface structures).

Groundwater contamination generated during the decommissioning can be minimized by following standard work and BMPs during site activities as well as complying with SPCC plans. The SONGS SPCC plan will be updated as necessary to address decommissioning activities.

Low concentrations of residual radioactivity or hazardous substances due to legacy activities should be unlikely, given the extent of site investigation, spill control, and sampling activities; however, unknown areas may be identified during sub-grade soil excavation and structures removal. These will need to be assessed and controlled as found. Costs may be handled by contingency planning in anticipation of finding unknown areas.

Induced migration of the residual radioactivity or hazardous substances in the groundwater to previously uncontaminated areas due to dewatering efforts can be minimized by planning efforts and assessment of potential issues prior to commencement of the site activities. Planning may include assessment of groundwater flow in the area of excavations, analysis of the radius of influence intersecting known contaminated areas, and possible installation and testing of monitoring wells to provide advance warning of contamination migration prior to it entering construction areas. Also to be considered are engineered groundwater control systems to minimize the dewatering required during deep excavations (sheet pilings, freezing, pumping etc.) or to block/limit flow of contaminated groundwater in shallow excavations. As discussed in Section 4.3.2, the impacts of water draw-down for dewatering activities during construction were indicated to not extend beyond 1,000 ft from the ring of dewatering wells. The decommissioning dewatering activities and their impact are anticipated to be bounded by those of construction of Units 2 & 3.

Potentially, dewatering wells could be installed within 1,000 ft of the shoreline, but compliance with the CRWQCB policy to maintain a seaward gradient would ensure against saltwater intrusion. Previous studies reviewed as part of the SCE's review of drinking water exposure pathway (SONGS 2007a) indicate that even under extreme pumping conditions, a seaward gradient will exist. This SCE review concluded that no drinking water pathway exist for exposure from SONGS operations (SONGS 2007a); furthermore, as discussed above, the nearest drinking water well is more than one mile inland.

If subsurface concrete structures are abandoned in place, the concrete could leach its constituents into the groundwater. As stated above, the groundwater beneath SONGS is not a potable water source and a seaward gradient movement of groundwater is maintained. Therefore, if leaching from any concrete subsurface structures resulted in detectable levels of the constituents of concrete such as calcium compounds or metals or changes in pH levels, the change in groundwater chemistry would not result in impacts to offsite groundwater and the leaching effects would be dissipated upon mingling of the groundwater with the waters of the Pacific Ocean.

Storm water runoff and erosion control are issues faced at many industrial sites, and SONGS 2 & 3's decommissioning activities would include the application of common BMPs, compliance with the SONGS industrial storm water permit, and implementation of the SWPPP, which would be updated as necessary to address decommissioning activities. These measures would ensure that any changes in surface water quality will be non-detectable and non-destabilizing.

4.3.3.4 Conclusions

Due to the implementation of BMPs, compliance with permits, and the unlikelihood of low concentrations of hazardous substances due to legacy activities, the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater are considered SMALL. In its GEIS for decommissioning, the NRC generically determined water quality impacts to be SMALL (NRC 2002, Section 4.3.3.4); therefore, SONGS

2 & 3's water quality impacts during decommissioning are bounded by this previously issued EIS. As the details of SONGS 2 & 3's decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

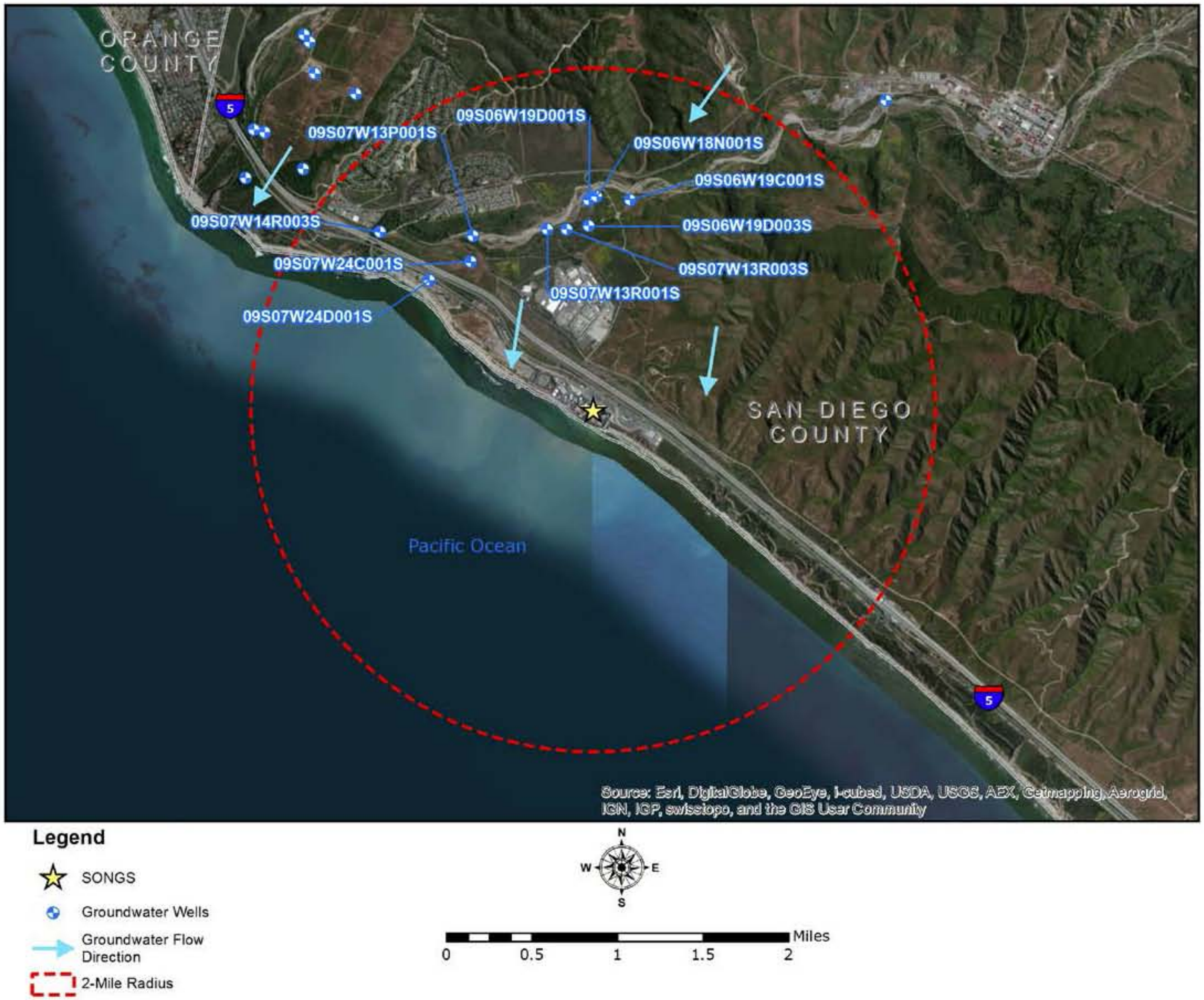

Figure 4.3.3-1: Groundwater Wells Within a 2-Mile Radius of SONGS

4.3.4 Air Quality

Climate and Meteorology

The atmospheric pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low-level inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 mph, smog potential is greatly reduced. (EDAW 2005)

SONGS is located within San Diego County, and within the San Diego air basin (SDAB). In the SDAB, the vertical dispersion of air pollutants is constrained by the presence of persistent temperature inversions. The subsidence inversion within the SDAB generally occurs during warmer months (May through October) as descending air associated with the Pacific high-pressure cell comes into contact with cool marine air. The inversion layer is approximately 2,000 ft above mean sea level (amsl) during the months of May through October. During the winter months (November through April), the temperature inversion rises to approximately 3,000 ft amsl. (EDAW 2005)

Criteria Air Pollutants

With the assistance of the SDAPCD, the California Air Resources Board (CARB) compiles inventories and projections of emissions of the major pollutants and monitors air quality conditions. Air quality conditions are tracked for both “criteria air pollutants” and “toxic air contaminants.” Criteria air pollutants are a group of pollutants for which regulatory agencies have adopted ambient air quality standards and region-wide pollution reduction plans. Criteria air pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter, and lead. Two subsets of particulate matter are inhalable particulate matter less than ten microns in diameter (PM_{10}) and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) (SCE 2005).

Toxic air contaminants (TACs) refer to a category of air pollutants that pose a present or potential hazard to human health, but which tend to have more localized impacts than criteria pollutants. Reactive volatile organic compounds and gases (VOCs) and nitrogen oxides (NO_x) are also regulated as criteria pollutants because they are precursors to ozone formation (SCE 2005). Occupational health impacts that could occur during decommissioning are addressed in Section 4.3.10.

Historically, violations of federal and state ambient air quality standards for ozone, particulate matter, and CO have occurred in San Diego County. Since the early 1970s, substantial progress has been made toward controlling these pollutants (SCE 2005). Although air quality improvements have occurred, violations of ambient air quality standards for particulate matter are persistent. Section 4.3.4.1 and Table 4.3.4-1 describe the state and federal ambient air quality standards currently in effect.

The frequency of the violations for ozone, PM_{10}, and $PM_{2.5}$ are summarized in Table 4.3.4-2.

Existing Emission Inventory

Emission sources in San Diego County are primarily mobile sources, including on-highway motor vehicles passing through on I-5, railroad locomotives, marine vessels, and military equipment and aircraft in routine use at MCBCP. CARB compiles regional emission inventories that include planning and forecast estimates for all groups of sources (SCE 2005). The most current (2008) estimated annual average emissions within the SDAPCD are shown in Table 4.3.4-3.

Relatively minor stationary sources are also in use at SONGS. The most current (2010) annual emissions from operations at SONGS are shown in Table 4.3.4-4.

4.3.4.1 Regulations

Federal and State Ambient Air Quality Standards

Air quality is determined by measuring ambient concentrations of criteria pollutants, which are air pollutants for which acceptable levels of exposure can be determined and for which standards have been set. These standards are set by the federal EPA or CARB for the maximum level of a given air pollutant which can exist in the outdoor air without unacceptable effects on human health or the public welfare. The degree of air quality degradation is then compared to the current National and California Ambient Air Quality Standards (NAAQS and CAAQS). In general, the CAAQS are more stringent than the corresponding NAAQS. The federal and state standards currently in effect are shown in Table 4.3.4-1.

An area is designated in attainment when it is in compliance with the NAAQS and/or CAAQS. Table 4.3.4-5 shows San Diego County's federal and state designations for each of the criteria pollutants.

Federal and State Emissions Rules and Regulations

Limitations are imposed upon sources of air pollutants by rules and regulations promulgated by the federal, state, or local agencies. Mobile sources of air pollutants and exhaust from off-road equipment are controlled by federal and state agencies through emission performance standards and fuel formulation requirements and are exempt from SDAPCD rules and regulations (Regulation XIV, Appendix A – Insignificant Units). Mobile and portable sources, and temporary activities that cause emissions, are managed through a range of local, state, and national programs mentioned below. Operation of emission sources will not interfere with progress in attainment of state and national ambient air quality standards, provided they are compliant with the following programs.

EPA General Conformity Rule: Any project that requires a federal action for approval would need to comply with federal general conformity requirements. The general conformity rule specifies that the project conform to the state implementation plan (SIP) (discussed below). Any federal action causing more than 100 tons per year of NO_x or VOC must undergo a comprehensive analysis of conformity with the SIP. (EDAW 2005)

EPA/CARB Off-Road Mobile Sources Emission Reduction Program: The California Clean Air Act mandates CARB to achieve the maximum degree of emission reductions from all off-road mobile sources to attain the state ambient air quality standards. Off-road mobile sources include construction equipment. Tier 1 standards for large compression-ignition engines used in off-road mobile sources went into effect in California in 1996. These standards and ongoing rulemaking jointly address NO_x emissions and toxic particulate matter from diesel combustion. (EDAW 2005)

CARB Portable Equipment Registration Program: This program allows owners or operators of portable engines and associated equipment to register their units under a statewide portable program to operate their equipment throughout California without having to obtain individual permits from local air districts. Registered engines must comply with technological requirements, which may include injection timing retard, turbochargers, aftercoolers and/or intercoolers, or catalysts. (EDAW 2005)

CARB Diesel Risk Reduction Program: In 2000, CARB established a number of strategies for reducing the exposure of Californians to toxic diesel particulate matter from on-road heavy-duty vehicles and off-road equipment. Through this program, CARB is implementing standards for lower levels of particulate matter emissions (0.15 grams per horsepower-hour for some engine classes) and cleaner diesel fuel (15 parts per million [ppm] of sulfur, by 2006). The aim of these strategies is to provide a 75 percent reduction in diesel particulate matter from these sources when compared to 2000 conditions (CARB 2000).

Local Air Quality Plans and Regulations

San Diego County Air Pollution Control District: The SDAPCD is the agency responsible for protecting the public health and welfare through the administration of federal and state air quality laws and policies within the SDAB. Included in the SDAPCD's tasks are the monitoring of air pollution, the preparation of the San Diego County portion of the SIP, and the promulgation of rules and regulations. The SIP includes strategies and tactics to be used to attain and maintain acceptable air quality in the county; this list is called the regional air quality strategies (RAQS). SDAPCD regulations require that any equipment that emits or controls air contaminants be permitted (permit to construct or permit to operate) prior to construction, installation, or operation. The SDAPCD is responsible for review of applications and for the approval and issuance of these permits (EDAW 2005).

The current RAQS in the SDAB is the 2009 revision, which is an update of the 2004 RAQS. The 2009 RAQS contain an expeditious schedule for adopting every feasible emission control measure under the SDAPCD's purview to comply with the NAAQS and CAAQS ozone standards. Ozone precursors (VOCs) are expected to continue to decrease through 2020 due to ongoing implementation of local, state, and federal regulations primarily associated with declining mobile source emissions (SDAPCD 2009). The air quality data for 2009, 2010, and 2011 demonstrate that the SDAB is currently attaining the 1997 ozone standard (SANDAG 2013). Despite the change in 1997 attainment status, the area still remains nonattainment for the more stringent 2008 ozone standard (EPA 2013a).

SDAPCD Regulation IV – Prohibitions, Rule 50 – Visible Emissions: This rule prohibits any activity causing air contaminant emissions darker than Ringelmann Number 1 (20 percent opacity) for more than an aggregate of three minutes in any consecutive 60-minute time period.

4.3.4.2 Potential Impacts of Decommissioning Activities on Air Quality

Decommissioning activities have the potential to adversely impact air quality. The activities may be direct, such as demolition of buildings, or indirect, such as transportation of decommissioning workers to and from the site. This section discusses the non-radiological impacts of decommissioning on air quality. Radiological impacts on air quality are addressed in Section 4.3.8. Occupational health impacts that could occur during decommissioning are addressed in Section 4.3.10.

Activities that may have an effect on air quality include organizational changes such as fewer employees driving to and from the plant, site stabilization activities (e.g. remediation activities), storage preparation for some decommissioning options, decontamination and dismantlement, structural dismantlement, entombment, and transportation. The potentially adverse impacts identified include (NRC 2002):

1) Degradation of air quality caused by emissions (e.g., NO_x, CO, and hydrocarbons) from internal combustion engines.

2) Increased particle loading of the atmosphere caused by the movement of vehicles and equipment, demolition of structures, dismantlement of systems, and entombment activities.

3) Alteration of other characteristics of the atmosphere (e.g., the ozone layer) by releases of gases used in plant systems (e.g., in fire suppression or refrigeration).

These potential impacts are considered detectable if a decommissioning activity is likely to cause a measurable increase in the concentration of one or more regulated air pollutants that can be directly attributed to the activity. The impact is considered destabilizing if the impact is detectable and causes a change in the attainment status of the region. Air quality impacts of the releases of other gases can be assessed by comparison of the magnitude of potential releases during decommissioning with the magnitude of releases of the same or similar gases from other sources (NRC 2002).

4.3.4.3 Evaluation

The decommissioning activities discussed below have the potential to have a non-radiological impact on air quality. These activities typically take place over a period of years from the time the facility ceases operation until the decommissioning is complete and the license is terminated.

The decommissioning activities and timing are described in Section 3.2. The decommissioning options are more likely to affect the timing of air quality impacts than the magnitude of the impacts. Immediate DECON of the facility results in impacts earlier than the SAFSTOR option, in which most decommissioning activities are postponed to permit residual radioactivity in the plant to decay. (NRC 2002)

Worker Transportation

Air quality impacts from the transportation of workers to and from the site are caused by emissions from the vehicles and by fugitive dust from traffic on paved and unpaved roads. Consequently, the impacts can be estimated directly from the size of the work force. Experience with decommissioning indicates that for most sites, the work force during decommissioning is smaller than those used for construction or refueling outages, and almost always smaller than the work force during facility operation. These decreases are expected to improve air quality rather than degrade it. Consequently, the change in air quality associated with changes in worker transportation during decommissioning should not be detectable or destabilizing at any site (NRC 2002).

Dismantling of Systems and Equipment Removal

Air quality impacts of dismantling systems and equipment removal may be caused by the generation and release of particulate matter associated with the physical activities of dismantling and by the release of gases from the systems (for example, refrigeration and fire-protection systems). The predominant potential pollutant from system dismantling and equipment removal will be particulate matter and fugitive dust. This material will generally be released in and remain within buildings and other structures because most decommissioning activities associated with dismantling systems and equipment removal will be conducted inside the containment, auxiliary, and fuel-handling buildings.

Decommissioning plans do not call for aggressive decontamination. Demolition of structures and removal of equipment and components will have varying degrees of decontamination or none as appropriate for the specific activity and material and will be packaged for shipment with additional shielding added as needed. (Energy Solutions 2014, Section 3.0)

Movement and Open Storage of Material Onsite

Movement of equipment and open storage of materials onsite during decommissioning are similar to activities during construction or demolition of an industrial facility. The air quality impacts of the movement of equipment and open storage of materials onsite are primarily associated with fugitive dust (NRC 2002).

Demolition of Buildings and Structures

The demolition of buildings and other structures at a nuclear power plant is similar to demolition of buildings and structures at industrial facilities. Demolition of buildings and major structures may cause a temporary increase in fugitive dust from the site (NRC 2002).

Shipment of Material and Debris to Offsite Locations

Dismantled equipment, material, and debris from decommissioning are typically removed from the site as decommissioning progresses. The number of shipments required during the decommissioning period depends on the method of transportation and the decommissioning option chosen. Although the number of shipments may be relatively large, the decommissioning period extends over several years. As a result, the number of shipments per day is small (see Section 4.3.17). Therefore, it is unlikely that the emissions from a shipment or a small number of shipments per day would be detectable or destabilize local or regional air quality at any nuclear power plant undergoing decommissioning (NRC 2002).

Operation of Concrete Batch Plants

Currently, there are no concrete batch plants in operation at the SONGS facility. Should one become necessary, unloading, movement, and dispensing of the materials that make concrete could result in fugitive dust in the vicinity. This dust could tend to consist of large particles that would settle out of the air quickly. As a result, dust associated with concrete batch plants would likely be localized. Emissions from combustion of the fuels (NOx, VOC, CO, SO_2, and diesel-related particulate matter) for these activities would occur for the duration of concrete mixing activities. However, with the existing diesel generators no longer operating, combustion emissions could be lower during decommissioning, thus creating a positive effect on local air quality as it relates to SONGS 2 & 3 emissions. Emissions of contaminants that would routinely occur in the exhaust of heavy-duty construction equipment are included by SDAPCD in the region-wide inventory that is the basis for regional attainment and are not expected to impede attainment or maintenance of the ambient air quality standards (SCE 2005). However, it is expected that SCE will use diesel engines that meet 1996 CARB or EPA-certified standards for off-road equipment, maintain construction equipment per manufacturing specifications, and other standard measures to reduce equipment emissions.

In summary, the most likely impact of decommissioning on air quality is degradation of air quality by fugitive dust. Fugitive dust during decommissioning should be less than during plant construction because the size of the disturbed areas is smaller, the period of activity is shorter, and paved roadways may exist. To date, licensees decommissioning nuclear reactor facilities have taken appropriate and reasonable control measures to minimize fugitive dust. Because San Diego County is a nonattainment area for particulate matter, these emissions would temporarily contribute to the existing violations of particulate matter in the region. SCE will include standard dust control measures during decommissioning in accordance with SDAPCD dust abatement requirements. Such measures may include, but are not necessarily limited to, applying sufficient water or non-toxic soil stabilizers on all unpaved work areas, transport routes, parking areas, and staging areas to minimize fugitive dust generation.

4.3.4.4 Conclusions

In its GEIS for decommissioning, the NRC generically determined air quality impacts associated with decommissioning to be SMALL (NRC 2002, Section 4.3.4). The NRC found that the impacts of decommissioning on air quality are neither detectable nor destabilizing because current and commonly used measures are sufficient, and no additional measures are likely to be sufficiently beneficial to be warranted. As stated above, SCE will implement standard mitigating measures to reduce particulate matter and ozone precursor emissions during decommissioning, per the requirements of the SDAPCD. Therefore, air quality impacts related to decommissioning of SONGS 2 & 3 are bounded by the previously issued GEIS. No additional mitigation measures are likely to be sufficiently beneficial to be warranted (NRC 2002, Section 4.3.16).

As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification of the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs. Considering the available information on the potential air quality impacts from decommissioning SONGS 2 & 3, it is concluded that the impacts will be SMALL.

Table 4.3.4-1: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3, 5]	Secondary[3, 6]	Method[7]
Ozone (O_3)	1 hour	0.09 ppm (180 μg/m^3)	Ultraviolet photometry	—	Same as primary standard	Ultraviolet photometry
	8 hour	0.070 ppm (137 μg/m^3)		0.075 ppm (147 μg/m^3)		
Respirable particulate matter (PM_{10})[8]	24 hours	50 μg/m^3	Gravimetric or beta attenuation	150 μg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	20 μg/m^3		—		
Fine particulate matter ($PM_{2.5}$)[8]	24 hours	—	—	35 μg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	12 μg/m^3	Gravimetric or beta attenuation	12.0 μg/m^3	15 μg/m^3	
Carbon monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	Non-dispersive infrared photometry	35 ppm (40 mg/m^3)	—	Non-dispersive infrared photometry
	8 hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen dioxide (NO_2)[9]	1 hour	0.18 ppm (339 μg/m^3)	Gas phase chemiluminescence	100 ppb (188 μg/m^3)	—	Gas phase chemiluminescence
	Annual arithmetic mean	0.030 ppm (57 μg/m^3)		0.053 ppm (100 μg/m^3)	Same as primary standard	
Sulfur dioxide (SO_2)[10]	1 hour	0.25 ppm (655 μg/m^3)	Ultraviolet fluorescence	75 ppb (196 μg/m^3)	—	Ultraviolet flourescence; spectrophotometry (pararosaniline method)
	3 hour	—		—	0.5 ppm (1300 μg/m^3)	
	24 hour	0.04 ppm (105 μg/m^3)		0.14 ppm (for certain areas)[10]	—	
	Annual arithmetic mean	—		0.030 ppm (for certain areas)[10]	—	

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	**Method[4]**	**Primary[3, 5]**	**Secondary[3, 6]**	**Method[7]**
Lead[11, 12]	30-day average	1.5 $\mu g/m^3$	Atomic absorption	—	—	High volume sampler and atomic absorption
	Calendar quarter	—		1.5 $\mu g/m^3$ (for certain areas)	Same as primary standard	
	Rolling 3-month average	—		1.5 $\mu g/m^3$		
Visibility-reducing particles[13]	8 hour	See footnote 13	Beta attenuation and transmittance through filter tape	No national standards.		
Sulfates	24 hour	25 $\mu g/m^3$	Ion chromatography			
Hydrogen sulfide	1 hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet fluorescence			
Vinyl chloride[11]	24 hour	0.01 ppm (26 $\mu g/m^3$)	Gas chromatography			

$\mu g/m^3$ = micrograms per square meter

(CARB 2013a)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.
5. National primary standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National secondary standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 μg/m^3 to 12.0 μg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 μg/m^3, as was the annual secondary standard of 15 μg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 μg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
9. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 parts per billion (ppb). Note that the national 1-hour standard is in units of ppb. California standards are in units of ppm. To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
10. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of ppb. California standards are in units of ppm. To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
11. The CARB has identified lead and vinyl chloride as TACs with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
12. The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
13. In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Table 4.3.4-2: Local Ambient Air Quality Monitoring Data, Years 2009–2012

	Ozone								$PM_{2.5}$				PM_{10}			
	# Days > State 1-Hour Standard				# Days > State 8-Hour Standard				Estimated # Days > National 24-Hour Standard				Estimated # Days > State 24-Hour Standard			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
Monitoring Sites – San Diego County																
MCBCP	0	0	0	0	5	1	2	1	*	*	*	0	*	*	*	*
Escondido – E Valley Parkway	0	2	1	0	9	5	2	2	2.0	2.0	3.0	1.0	5.6	0	0	0
Air Basins – California																
San Diego Air Basin	8	7	5	2	47	21	33	25	3.4	2.0	3.0	1.0	146.4	136.0	138.5	6.1

(CARB 2013b)

Table 4.3.4-3: SDAPCD 2008 Estimated Annual Average Emissions (in tons per day)

Source Category	CO	NO_X	SO_X	$PM_{2.5}$	PM_{10}
Stationary sources	22.23	9.08	0.45	6.13	8.59
Area-wide sources	28.07	2.73	0.22	16.10	94.52
Mobile sources	773.86	167.75	4.08	9.32	11.42
Total for SDAPCD	824.16	179.56	4.75	31.55	114.53

(CARB 2008)

Table 4.3.4-4: Emissions Summary from SONGS 2 & 3

Criteria Pollutant	CO	NO_X	SO_X	$PM_{2.5}$	PM_{10}
Annual emissions[(a)]	7.4	45.6	0.6	2.5	2.5
Hourly emissions[(b)]	56.4	601.5	9.8	18.5	19.9

(SDAPCD 2010a)

a. Measured in tons/year.

b. Measured in pounds/hour.

Table 4.3.4-5: San Diego County Federal and State Attainment Status, 2010

Criteria Pollutant	Federal Designation	State Designation
Ozone (1-hour)	Attainment[a]	Nonattainment
Ozone (8-hour)	Nonattainment	Nonattainment
CO	Attainment	Attainment
PM_{10}	Unclassifiable[b]	Nonattainment
$PM_{2.5}$	Attainment	Nonattainment
NO_2	Attainment	Attainment
SO_X	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	(no federal standard)	Attainment
Hydrogen sulfide	(no federal standard)	Unclassified
Visibility	(no federal standard)	Unclassified

(SDAPCD 2010b)

a. The federal 1-hour standard of 12 pphm was in effect from 1979 through June 15, 2005. The revoked standard is referenced here because it was employed for such a long period and because this benchmark is addressed in state implementation plans.

b. At the time of designation, if the available data do not support a designation of attainment or nonattainment, the area is designated as unclassifiable..

4.3.5 Aquatic Ecology

Aquatic ecology issues incorporate all of the plants, animals, and species assemblages in the rivers, streams, oceans, estuaries, or any other aquatic environments near a nuclear power facility. Aquatic ecology also includes the interaction of those organisms with each other and the environment.

Aquatic ecology impacts due to construction and operation of SONGS 2 & 3 were projected in previous environmental reviews (NRC 1981; SCE *n.d.*). The 1974 CDP to operate SONGS 2 & 3 included a requirement to study the operating impacts to the marine environment by an independent committee and the commitment that SCE would mitigate for the impacts identified by the study. As a result, the CCC, in a 1991 amendment to the CDP, required SCE to implement a mitigation program to offset the projected impacts of the plant on the marine environment. The mitigation projects included the construction of the Wheeler-North Reef, a 175-acre artificial reef offshore of San Clemente, and the San Dieguito Wetlands project, which involved the restoration of 150 acres of coastal wetlands in the San Dieguito River Valley within the cities of Del Mar and San Diego. In two separate permit actions in 1993 and 1997, the CCC required SCE to make a financial contribution to the California Department of Fish and Wildlife's (CDFW's) Ocean Resources Enhancement and Hatchery Program to be used toward an experimental white seabass fish hatchery in Carlsbad, California. (CCC 2013a)

Physical and Chemical Environment

SONGS is located in the northwestern corner of San Diego County and sits adjacent to the Pacific Ocean. The SONGS site is within the SJHU, which covers 496 square mi in San Diego, Orange, and Riverside counties. There are five HAs in the SJHU, and the SONGS site lies within the San Onofre HA. The entire 27,520 ac of the San Onofre Creek HA are contained within the MCBCP base boundary (USMC 2012, Section 3.1.4.1) (see Figure 4.3.3-1). The watershed does not overlap the boundary of the SONGS 2 & 3 site and therefore should not be affected by activities around the plant.

The ocean floor in the vicinity of SONGS is an extensive shelf of soft sediments, consisting of both coarse and fine sands occasionally interrupted by areas of hard substrate (SCE 2008a). According to SCE's Comprehensive Demonstration Study (SCE 2008a), ocean depths in the vicinity of the SONGS vary from about 4 ft along inshore areas to 118 ft at a distance of 2 mi offshore. The ocean floor slopes evenly away from the shore, and ocean depth is about 30 ft at the SONGS 2 & 3 intakes, approximately 3,150 ft offshore. Just west of the SONGS 2 & 3 intakes, the ocean floor drops off steeply, with depths exceeding 200 ft in some areas (SCE 2008a).

Ocean salinity is relatively constant in the vicinity of the SONGS 2 & 3, ranging from 33–34 parts per thousand (ppt) (SCE *n.d.*), with localized temporary variations attributable to run-off and precipitation. SCE (2008a) reported salinities in the area around the SONGS site between 32.1 and 35.3 ppt.

Seawater temperatures in the vicinity of the SONGS site are coolest during winter months (November–March) and warmest in the summer (June–August). Temperatures range from approximately 57° F in January to 68° F in August. The increase in ocean temperatures from January to August is relatively slow, whereas temperatures drop more rapidly from autumn to early winter (SCE 2008a). SCE records temperatures at monitoring stations in compliance with the SONGS NPDES permits and produces an annual report. As reported in the 2012 annual report (SCE 2013a), surface water temperatures were above the historical mean for the temperatures recorded at Dana Point or San Clemente pier between 1955 and 2012 for about six months of the year, below the historical mean for about three months, and fluctuated around the mean for about three months.

Pacific Ocean currents north of the equator generally flow in a clockwise direction so that most waters flow north-to-south down the California coast (Barnes and Hughes 1988). However, because of the shape of the shoreline from Point Conception (approximately 150 mi north of SONGS 2 & 3) southward, circulation adjacent to the SONGS 2 & 3 site is directed by the Southern California Counter Current (Perry et. al. 2009), which creates a dominant southeast-to-northwest current, though more shoreward currents in the vicinity tend to flow in a south and southeast direction (SCE 2008a). Ocean current velocities offshore of SONGS 2 & 3 typically range from 0.1 to 0.7 ft/second in most seasons. Localized eddies and upwelling may be caused by local geomorphology and tidal effects, though the ocean floor surrounding the intake and discharge structures is flat and not affected by currents (SCE 2008a).

Plankton Communities

Plankton communities are composed of both microscopic and macroscopic algae (phytoplankton) and animals (zooplankton), as well as bacteria and various larval forms of free-living and sessile organisms. Similar to terrestrial vascular plants, planktonic algae use energy from the sun and elemental nutrients in the water to transform carbon dioxide into the organic material of their cells. These organisms provide the basis for the food web of aquatic systems and are the principal food of most of the zooplankton and some fish species. The zooplankton community includes ichthyoplankton, which are fish eggs and larvae in the upper reaches of the water column that drift in the ocean currents. Most fish larvae have a temporary free-floating stage prior to developing the ability to effectively swim. Eggs of some fish species float possibly as a dispersal mechanism and to improve the survival rate of the larvae. However, some fish eggs are demersal (i.e., suspended on and or just above the benthos) and some are attached to various substrata. The pelagic (free-floating) eggs are more susceptible to entrainment, as they are moved by currents.

Plankton studies at SONGS (SCE 2008a) were undertaken to determine the composition and abundance of ichthyoplankton (fish eggs and larvae) and shellfish larvae entrained by SONGS 2 & 3. Samples were taken from inside the plant and at various depths near the intakes (offshore samples) every two weeks from March 2006 through April 2007. The most abundant larval fish taxa collected in all offshore samples were northern anchovy (*Engraulis mordax*); California grunion *(Leuresthes tenuis)*; unidentified silversides (Atherinopsidae); and jacksmelt (*Atherinopsis californiensis*). Shoreline surface samples were dominated by grunion, silversides, jacksmelt, and kelpfishes (Clinidae).

Over 15 fish species were identified in offshore surface samples, with grunion, jacksmelt, silversides, and northern anchovy being the dominant species. Total larval fish densities—the number of individuals collected per 1,000 cubic meters (m^3)—were a half to a third of total inshore surface densities. Fish larvae in the offshore water column were dominated by white croaker (*Genyonemus lineatus*) and anchovies (Engraulidae), which were the most abundant. Although the number of species increased in the water column compared with surface samples at the same stations, total larval fish densities were approximately a fourth of the densities measured at the surface. Northern anchovy, unidentified gobies (Gobiidae), white croaker, and bay goby (*Lepidogobius lepidus*) were the most abundant larval taxa in the suprabenthos (just above the ocean floor). Densities of total larvae collected from the offshore suprabenthos were about twice as high as larval densities at the surface and about eight times higher than water column densities. (SCE 2008a)

These findings paralleled those found in an earlier study performed from 1974 through 1976 in the Southern California Bight (Gruber et al. 1982), which found anchovies accounted for 83 percent of all larvae collected. Lavenberg et al. (1986) also found the northern anchovy dominated ichthyoplankton samples taken in nearshore areas of southern California. In addition, more recent findings by Suntsov et al. (2012) support the profile of larvae species and density found during SCE's 2008 study. Suntsov et al. found the southern California Bight to be structured by larval jack silverside, northern anchovy, croakers, combtooth blennies, pipefishes silversides, clinids, labrisomids, and clingfishes (*Gobiesox* spp.).

SCE selected five species of invertebrate larvae for monitoring during the demonstration study: the brown rock crab (*Cancer antennarius*); yellow crab (*C. anthonyi*); red rock crab (*C. productus*); slender crab (*C. gracilis*); and the California spiny lobster (*Panulirus interruptus*). The most abundant selected invertebrate larvae collected offshore during the same studies were slender crab megalops, yellow crab megalops, and brown rock crab megalops (SCE 2008a). Densities were very low compared with fish eggs and larvae, and there was no clear distributional pattern.

Rocky substrate is preferred habitat for giant kelp, and the San Onofre kelp bed is approximately 2,300 ft seaward of the SONGS Unit 3 intake. California spiny lobsters also mate in the vicinity, preferring areas with rocky bottoms in 33−98 ft of water. Female lobsters move inshore to depths of less than 33 ft to extrude and fertilize the eggs (SCE 2008a). After the lobster phyllosoma (free-floating zooplankton) move with the currents for 5 to 10 months, they transform into puerulus larvae, which actively swim towards shore, where they settle in shallow water (SCE 2008a).

Macroinvertebrates

Intertidal habitat in the vicinity of SONGS is comprised primarily of sand and cobble, with occasional rocky areas. Subtidal areas are characterized by softer sand sediments composed of both coarse and fine particles with occasional areas of hard substrate (SCE 2008a). This intertidal habitat supports a diversity of marine worms, crustaceans, and some bivalves and gastropods. Macroinvertebrate groups identified in the offshore benthos between 1963 and

1975 primarily included mollusks and polychaete worms, with some crustaceans, ectoprocts, cnidarians and echinoderms (SCE *n.d.*).

Commercially, Recreationally and Ecologically Important Macroinvertebrates

The CDFW identifies the following commercially important and sport harvest invertebrate species in southern California (CDFW 2004):

- Rock crabs (*Cancer* spp.) whose commercial harvest is most active in southern California.
- Sheep crabs (*Loxorhynchus grandis),* also known as spider crabs.
- Seven species of abalone that feed on giant kelp (*Macrocystis pyrifera)* and bull kelp (*Nereocystis luetkeana)* and are preyed upon by rays and sea otters, although Nature Serve Explorer (NSE 2013a) reports no populations of southern sea otters (*Enhydra lutris nereis*) closer than Ventura County. Most California abalones are found in boulder and rock habitat associated with kelp forests. Abalone abundance is highest where physical conditions allow good kelp growth and where drift kelp is available.
- Red sea urchin (*Strongylocentrotus franciscanus)* are commercially harvested and preyed upon by sea otters.
- Purple sea urchin, (*S. purpuratus)*, not as commercially popular as the red urchin, are a voracious kelp pest and also preyed upon by sea otters.
- Spiny lobster, which occurs in shallow, rocky coastal areas from Point Conception to the U.S.-Mexico border, and off southern California islands and banks. During their first two years, juveniles inhabit surfgrass beds from the lower intertidal to depths of about 16 ft. Juveniles and adults are considered benthic and occur from the intertidal zone to about 262 ft (SCE 2008a).

In addition to the species listed above, two federally endangered macroinvertebrate species are found in the vicinity (6-mi radius) of SONGS within inland vernal pools: the San Diego fairy shrimp (*Branchinecta sandiegoensis*) and the Riverside fairy shrimp (*Streptocephalus woottoni*). The San Diego fairy shrimp was identified in vernal pools adjacent to SONGS leased parcels northwest of the SONGS Parking Lot #4 (SCE 2008b, Figure 3.2-1e). The Riverside fairy shrimp is not known to occur within one mile of the SONGS site (SCE 2014a).

Aquatic Plants

The richest area for marine flora in the immediate vicinity of the plant site is the shallow sub-tidal zone approximately 1,300 ft up the coast from SONGS. This area supports a biological community dominated by surfgrass (*Phyllospadix* sp.) and feather boa kelp (*Egregia menziesii*), a brown alga (SCE 2008a) that can grow as an annual or perennial depending upon the depth of the holdfast (Barnes and Hughes 1988).

Most notably, giant kelp can form dense beds that provide an intricate three-dimensional habitat that attracts numerous invertebrates and fish (Barnes and Hughes 1988). The presence of "kelp forests" can have significant influence on the structure and density of the local fish community (Holbrook et al. 1990).

The closest stand of giant kelp is the San Onofre kelp bed, 656 ft down the coast from the SONGS Unit 2 diffusers at a depth of about 40 to 50 ft. The areal extent of a kelp bed canopy is highly variable. In 1990, canopy measurements of the San Onofre kelp bed varied from zero to 76.3 hectares; however, since 1966, canopy has averaged 11.7 hectares. (SCE 2008a)

The Region 9 Kelp Consortium annually studies the health of giant kelp beds in Orange and San Diego counties. The 2011 report indicated that the San Onofre kelp bed has waxed and waned since 1990, seldom getting larger than 0.10 km^2. The beds became fairly robust by the end of December 2007 and totaled 0.320 km^2 in canopy coverage. The 2010 results were a robust canopy covering 0.458 km^2. Although the bed covered a similar area, it was much thinner in 2011 than observed in 2010. On a regional scale, the 2011 report concluded that the giant kelp survey of 2011 continued to demonstrate that kelp bed dynamics in Region 9 are controlled by the large-scale oceanographic environment and there was no evidence of any adverse effects on the giant kelp resources from any of the region's dischargers. (MBC 2012)

Fish

A variety of habitat types in the region surrounding the SONGS 2 & 3 intakes and discharges create a variety of faunal communities. The fish habitat offshore of SONGS consists of a mixture of sand, cobble, and isolated areas of exposed rock, which are generally less biologically productive than solid substrate outcroppings, but more productive than sandy bottoms. There is a general change in bottom consistency from stable cobble and boulders at the San Mateo Point area, northwest of the plant, to mostly sand with isolated patches of cobble and rock at Don Light, southeast of the SONGS site (SCE 2008a).

The benthic (bottom) community is generally dominated by queenfish (*Seriphus politus*), northern anchovy, white croaker, and speckled sanddab (*Citharichthys stigmaeus*). These species account for 77 percent of the long-term trawl sampling conducted for the NPDES permits monitoring since 1979 (SCE 2008a).

The area of richest marine productivity in the immediate vicinity of the plant site is the shallow sub-tidal zone, approximately 1,300 ft up the coast from SONGS. This area supports a biological community dominated by surfgrass and feather boa kelp. (SCE 2008a)

The nearest area of cobble and boulder (preferred habitat for the attachment of giant kelp) is the San Onofre kelp bed, 656 ft down the coast from the SONGS Unit 2 diffusers at a depth of about 40 to 50 ft. The water column in this kelp forest community contains a variety of fish, including, but not limited to: señorita (*Oxyjulis californica*), salema (*Xenistius californica*), halfmoon (*Medialuna californiensis*), kelp bass (*Paralabrax clathratus*), jack mackerel (*Trachurus symmetricus*), Pacific barracuda (*Sphyraena argentea*), and kelp perch (*Brachyistius frenatus*). The benthic kelp forest community is dominated by the señorita, rock wrasse (*Halichoeres semicinctus*), kelp bass, black perch (*Embiotoca jacksoni*), barred sand bass

(*Paralabrax nebulifer*), pile perch (*Rhacochilus vacca*), white seaperch (*Phanerodon furcatus*), and California sheephead (*Semicossyphus pulcher*). (SCE 2008a)

Although rocky intertidal and subtidal habitats are not present in the immediate vicinity of SONGS, areas of low-relief cobble substrate are present in the vicinities of both the San Onofre and San Mateo kelp beds (SCE 2005). Reef-associated fish communities of the SONGS region include kelp bass, garibaldi (*Hypsypops rubicundu*s), barred sand bass, giant sea bass (*Stereolepis gigas*), kelp blennies (*Gibbonsia* spp.), and sargo (*Anisotremus davidsonii*) (SCE 2008a; CDFW 2009).

During a 2012 demersal fish trawl survey, 5,856 fish were caught, representing 41 species with an overall species diversity of 2.08. Summer sampling resulted in the highest abundance (2,131 fish), while the spring survey recorded the most species (29). Species diversity was highest in the fall (1.81). Ranking first through third in total abundance overall was white croaker, northern anchovy, and Queenfish. Catches at the control points of San Mateo and Don Light alternated as the most, and least, abundant, while those offshore of SONGS were in the middle except in winter. SCE reviewed 17 years of quarterly trawl survey data and determined that there is a high level of similarity amongst the deepest stations while stations along the two shallowest isobaths were segregated. (SCE 2013a)

Commercially, Recreationally and Ecologically Important Fish

San Onofre is considered to be an important barred sand bass fishing area (CDFW 2004). Barred sand bass are a relatively easy catch for marine anglers, and though not considered a quality game fish during the 1930s and early 1940s, they became very popular by the mid-1950s and have consistently ranked among the top ten in the southern California marine sportfish catch since the late 1970s.

Kelp bass, popularly referred to as calico bass, are one of the most important nearshore recreational species of southern California. This species has been targeted by southern California anglers since the early 1900s (CDFW 2004). The most productive fishing areas for kelp bass in recent years have been off the Coronado Islands in Baja California, Mexico; Point Loma and La Jolla in San Diego County; Dana Point and Huntington Beach in Orange County; Horseshoe Kelp in Los Angeles County; and around the Channel Islands.

Ocean whitefish (*Caulolatilus princeps*) are found in loosely aggregated schools near high-relief seafloor structures such as shallow banks, rocky reefs, and kelp beds. Ocean whitefish are diurnally active and range from sand areas during the day and areas of high relief at night (Bellquist et al. 2008). They prefer offshore islands to the mainland coast and are abundant at Santa Rosa, Santa Barbara, Santa Catalina, and San Clemente Islands. They are frequently found in association with members of the rockfish family (Scorpaenidae) and California sheephead (CDFW 2004). The ocean whitefish supports both a recreational and commercial fishery.

Eighteen species of surfperches (family Embiotocidae) are identified in California coastal waters (CDFW 2004):

- Barred surfperch (*Amphistichus argenteus*)
- Black perch (*Embiotoca jacksoni*)
- Calico surfperch (*Amphistichus koelzi*)
- Dwarf perch (*Micrometrus minimus*) (Rarely landed because of its small size.)
- Kelp perch (*Brachyistius frenatus*) (Rarely landed because of its small size.)
- Pile perch (*Rhacochilus vacca*)
- Pink seaperch (*Zalembius rosaceus*) (Rarely landed because of its small size.)
- Rainbow seaperch (*Hypsurus caryi*) (85 percent caught in northern and central CA.)
- Redtail surfperch (*Amphistichus rhodoterus*) (99 percent caught in northern and central CA.)
- Reef perch (*Micrometrus aurora*) (Rarely landed because of its small size.)
- Rubberlip seaperch (*Rhacochilus toxotes*)
- Sharpnose seaperch (*Phanerodon atripes*)
- Shiner perch (*Cymatogaster aggregata*)
- Silver surfperch (*Hyperprosopon ellipticum*)
- Spotfin surfperch (*Hyperprosopon anale*) (Rarely landed because of its small size.)
- Striped seaperch (*Embiotoca lateralis*) (97 percent caught in northern and central CA.)
- Walleye surfperch (*Hyperprosopon argenteum*)
- White seaperch (*Phanerodon furcataus*)

According to the CDFW (2004), there is a significant recreational fishery for many of these species in southern California. Over half of the barred, black, sharpnose and walleye surfperch, and significant percentages of the total calico, pile, rubberlip, silver surfperch and white seaperch caught in California are caught south of Point Conception.

California halibut (*Paralichthys californicus*) is an important flatfish species in both the commercial and recreational fisheries of central and southern California, though landings have dropped substantially over the last 30 years (CDFW 2004). Historically, the fishery has been centered off southern California and Baja California, Mexico, but over the past 20 years, the greatest landings have oscillated between ports in southern and central California. A majority of the halibut landings in central California occurred in the San Francisco area. A limited amount of fishing occurs around the Channel Islands of southern California, which yield substantially larger halibut (average length 27 inches) than those caught in the nearshore mainland fishery, where the average length of those caught is 24 inches and a legal size limit of 24 inches is in place.

Northern anchovies are small, short-lived fish typically found in schools near the surface. They rarely exceed four years of age and seven inches total length, although individuals as old as seven years and as long as nine inches have been recorded. Northern anchovy are distributed from the Queen Charlotte Islands, British Columbia, to Magdalena Bay, Baja California, Mexico. Beginning in 1991, the composition of live bait catches shifted from primarily anchovy to primarily sardine. By 1999, sardines dominated the live bait trade. Non-reduction landings averaged slightly over 2,200 tons per year from 1965 to 1994, and increased to an average of about 4,122 tons per year between 1995 and 1999. (CDFW 2001a)

Sea Turtles

Four species of marine turtles that are federally listed as threatened or endangered have been identified off the coast of southern California: green sea turtle (*Chelonia mydas*); loggerhead turtle (*Caretta caretta*); olive Ridley's turtle (*Lepidochelys olivacea*); and leatherback turtle (*Dermochelys coriacea*). A fifth federally listed marine reptile, the Hawksbill turtle (*Eretmochelys imbricata*), sporadically nests in the southern part of the Baja peninsula and foraging sub-adults and juveniles have been sighted along the coast (NOAA 2013a).

All marine turtles are highly migratory and use a wide range of broadly separated localities and habitats during their lifetimes. In the Pacific, most loggerheads carry out an extensive developmental migration, traveling from nesting areas in Japan and Australia to distant developmental and foraging habitats in the eastern Pacific (Seminoff et al. 2004). The majority of green turtle nesting and mating occurs in the French Frigate Shoals along the northwest Hawaiian Islands (NOAA 2009a). Olive Ridley's turtles occur from southern California to northern Chile in the eastern Pacific. Leatherback turtles are the most migratory and wide-ranging of sea turtle species. Most authors concur that the biggest threats to turtles are human activities, including the harvest of eggs and adults on nesting beaches, juveniles and adults on feeding grounds, and inadvertent capture in fishing gear (NMFS 2006; NOAA 2009a; NOAA 2009b; NOAA 2009c; Seminoff et al. 2004).

No critical habitat for green or leatherback turtles has been designated in the Pacific Ocean (42 FR 43688; 63 FR 46693). Green turtle critical habitat is limited to coastal waters surrounding Culebra Island, Puerto Rico, and leatherback critical habitat is located along the western edge of St. Croix in the U.S. Virgin Islands.

Mammals

Several marine mammals inhabit or are known to visit southern California. Six whales and two pinnipeds (fin-footed mammals) are federally listed as threatened or endangered for California and occur in the state. Blue (*Balaenoptera musculus*), fin (*B. physalus*), sei (*B. borealis*), sperm (*Physeter macrocephalus*), humpback (*Megaptera novaeangliae*), and killer (*Orcinus orca*) whales are known to transit the area from their calving grounds to the south and feeding grounds farther north. The Guadalupe fur seal (*Arctocephalus townsendi*) and the stellar sea lion (*Eumetopias jubatus*) are the only listed pinnipeds for southern California, according to the U.S. Fish and Wildlife Service (USFWS) (USFWS 2013a).

Four pinniped species (not listed as threatened or endangered) also occur in southern California. California sea lions (*Zalophus californianus*), northern fur seals (*Callorhinus ursinus*), northern elephant seals (*Mirounga angustirostris*), and Pacific harbor seals (*Phoca vitulina richardsi*) include southern California as part of their native ranges. While all prefer offshore islands for birthing and rookeries, some have mainland haul-outs. San Miguel Island, off Santa Barbara, appears to be the southernmost extent of the northern fur seal range. The Guadalupe fur seal is only seen occasionally at islands in the Southern California Bight and the Farallon Islands by San Francisco. (CDFW 2001b) However, of the six pinniped species noted in the Southern California Bight, only California sea lions and harbor seals have been identified in the vicinity of the SONGS site (SCE 2008a, pg. 3-18).

Among the marine mammals visiting or living off the southern California coast, the endangered stellar sea lion is the only one with designated critical habitat. The nearest point of this designated area to SONGS is Ano Nuevo Island, off the coast of San Mateo County in central California (NMFS 2007).

4.3.5.1 Regulations

Federal

Federal laws included within an evaluation of aquatic ecology issues include the CWA, the ESA, the Fish and Wildlife Coordination Act (16 USC 661 to 667c), Magnuson-Stevens Fishery Conservation and Management Act, and NEPA. Although some biota may be affected by a number of decommissioning activities, full consideration is usually reserved for the more important aquatic resources, which may be either individual species or habitat-level resources. Some activities, such as removal of in-stream or shoreline structures, may require permits from other agencies.

The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265, 1996) is a national program for the conservation and management of the fishery resources to prevent overfishing, to rebuild overfished stocks, to ensure conservation, to facilitate long-term protection of essential fish habitats (EFHs), and to realize the full potential of the nation's fishery resources. The 1996 amendments to this act set forth a number of mandates for the National Marines Fisheries Service (NMFS), regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The councils, with assistance from the NMFS, are required to delineate EFH in fishery management plans for all managed species. The Pacific Fishery Management Council considers all of MCBCP's nearshore resources as EFH (those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity) for groundfish or coastal pelagic species under either the Pacific Groundfish Management Area or the Pacific Coastal Pelagic Fishery Management Area (all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington). (USMC 2012, Section 4.3.6.1)

Federal: Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) prohibits, with certain exceptions, the “take” of marine mammals in U.S. waters. The Act is enforced by National Marine Fisheries Service (NMFS) and the USFWS. It defines “take” to mean “to hunt, harass, capture, or kill” any marine mammal or attempt to do so. Exceptions to the moratorium can be made through permitting actions for take incidental to commercial fishing and other non-fishing activities. (NMFS *n.d.*) The marine mammals in the vicinity of SONGS are under the jurisdiction of the NMFS. NMFS has issued regulations and guidelines for protection of marine mammals. Appropriate consultation with the NMFS under Section 7 of the ESA will be conducted to ensure protection of marine mammals during decommissioning activities. (The ESA is further discussed in Section 4.3.7.)

Federal: Clean Water Act

As discussed in Section 4.3.2, there has been a significant decrease in the use of seawater since Units 2 and 3 have permanently ceased operation. The continued intake of water and the discharge of wastewater to support the operation of the spent fuel pools at SONGS 2 & 3 are subject to NPDES regulations and permit requirements. In addition to the existing NPDES regulations under the CWA governing discharges, SONGS 2 & 3 are subject to EPA and State of California regulations implementing the CWA §316(b) addressing impingement and entrainment of aquatic organisms resulting from water withdrawals.

State: California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Code section 2050 et seq.) recognizes the importance of endangered and threatened fish, wildlife, and plant species and their habitats. Sections 2052-2098 of the Fish and Game Code “prohibit the ‘taking’ of any endangered, threatened, or rare plant and/or animal species unless specifically permitted for education or management purposes.”

State: California Coastal Act

The California Coastal Act of 1976 provides for the long-term protection of California's coastline to maintain and enhance coastal resources. Section 30230 states the “marine resources shall be maintained, enhanced and where feasible, restored.” The maintenance of the biological productivity and the quality of coastal water to maintain optimum populations of marine organisms is required under section 30231.

State: California Fish and Game Code

There are additional regulations contained in the Fish and Game Code that would apply to decommissioning Units 2 & 3. The following is a summary of applicable regulations.

Section 1700

It is the policy of the State to encourage the conservation, utilization and maintenance of ocean biological resources under their jurisdiction for the public's benefit. The State will also promote the development of local and distant-water fisheries based in California under international law.

Objectives include the maintenance of populations of all species of aquatic organisms to insure their continued existence and support reasonable use.

Sections 1755 and 1801

It is the policy of the State to maintain sufficient populations of all species of wildlife and native plants and the habitat necessary to ensure their continued existence for the beneficial use and enjoyment of the public. In addition, all species of wildlife and native plants will be perpetuated for their intrinsic and ecological values, as well as for their direct benefits to man.

Sections 3511 and 4700

Fully protected birds and/or mammals or parts thereof may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected bird and/or mammal and no such permits or licenses heretofore issued shall have any force or effect for any such purpose.

State: Marine Life Protection Act Initiative

California established marine protected areas to protect or conserve marine life and habitat. The closest marine protected area to SONGS is the Dana Point State Marine Conservation Area, which is north of SONGS. There are no designated marine protection areas along the MCBCP coastline. Take is prohibited in the Dana Point State Marine Conservation Area; expected take is incidental to specified activities permitted by state agencies. (CDFW 2013a)

4.3.5.2 Potential Impacts of Decommissioning Activities on Aquatic Ecological Resources

Table E-3 in Appendix E of the decommissioning GEIS (NRC 2002) identifies decontamination and dismantlement as activities that may affect aquatic ecology. Aquatic ecological resources may be impacted during the decommissioning process via either the direct or the indirect disturbance of plant or animal communities near the plant site. Direct impacts would result from removal of shoreline or in-water structures (i.e., the intake or discharge facilities), while indirect impacts may result from effects such as runoff.

Intake and outfall structures on land are within the OCA. The concrete conduits submerged in the Pacific Ocean for the intake and outfall for SONGS 2 & 3 are subject to the terms of the CSLC easement lease for this offshore land. The easement lease calls for removal of structures, building, pipelines, machinery, and facilities placed or erected by lessee and restoration as nearly as possible to the condition existing prior to their erection or placement (CSLC 1985). However, for the purposes of this analysis, it is assumed that decommissioning will not involve the removal of these conduits, but will instead involve abandonment in place with removal of vertical risers. For Unit 1, the CSLC agreed to an amendment to the Unit 1 easement lease allowing for a similar process. The Unit 1 conduit decommissioning activities to be conducted in accordance with the amended easement lease and approved mitigation plan is to remove the terminal structures to first joint below the seafloor and mammal barriers be installed, remove the manhole risers to the top of the conduits and install mammal barriers over the resulting openings, and remove the marker buoys. The conduits themselves would remain buried under the seafloor. Dredge spoils are to be placed upcurrent and as close to the excavated area as possible. (CSLC 2005) Debris from the conduits would be placed on the barge assisting with the activities and transported to port for recycling (EDAW 2005).

If no disturbances occur beyond the regular operational areas of the site, it is expected that the impact to aquatic resources will be nondetectable, nondestabilizing, and easily mitigated. If a decommissioning activity results in the "removal" of species from an area (e.g., if a commercial or recreational fishery is no longer possible), this may be detectable, and if this is an important local or regional resource, it may be considered destabilizing. (NRC 2002, Section 4.3.5.3)

4.3.5.3 Evaluation

Decommissioning activities are anticipated to take place within the OCA, the northwest parking area, and in the ocean in front of SONGS for the intake and discharge conduit riser removal actions. Intake and outfall structures on land are within the OCA.

No surface water bodies are present on the SONGS site. Adjacent to SONGS is the Pacific Ocean and vernal pools northwest of SONGS Parking Lot #4. SONGS 2 & 3 decommissioning activities would include the application of common BMPs, compliance with the SONGS storm water permit, and implementation of the SWPPP, which would be updated as necessary to address decommissioning activities. These measures would ensure that any changes in surface water quality will be non-detectable and non-destabilizing.

Since permanently ceasing operations at SONGS 2 & 3, SCE has continued water withdrawals from the Pacific Ocean and discharge of wastewater back into the ocean at reduced levels, approximately 96 percent reduction from normal operating flows (SCE 2013a) to support cooling for SONGS 2 & 3 spent fuel pools. As discussed in Section 4.3.2, with this withdrawal reduction and the velocity of the intake, SONGS is able to comply with the Track 1 requirements of the California's OTC policy designed to minimize impingement and entrainment impacts from generating plant's cooling systems. Once the spent fuel has cooled within acceptable parameters, the fuel rods will be transferred to dry cask storage in the onsite ISFSI, and the spent fuel pools and supporting structures will be dismantled. Management of spent fuel is not considered a decommissioning activity and its impacts are out of scope for assessing impacts from decommissioning. SONGS will comply with its NPDES permits, applicable CWA 316(b)-related regulations, as well as the OTC policy addressing reduction of impingement and entrainment impacts for water withdrawals.

The NRC recently reviewed the entrainment and impingement impacts to aquatic resources from withdrawal of cooling systems in its GEIS for License Renewal, NUREG-1437, Rev. 1. Entrainment and impingement impacts are a function of the volume of flow and velocity of the flow. The review generically concluded that the impacts to aquatic resources were SMALL for plants with a closed-cycle cooling system. The flow of closed-cycle plants ranged from 14,000 to 18,000 gpm for a 1,000 MWe plant (NRC 2013g). The 96 percent reduction of the normal operating flow given in Section 4.3.2 as 800,000 gpm or approximately 32,000 gpm for both units is comparable to the flow of closed-cycle cooling. Furthermore, SONGS through-screen intake velocity of approximately 0.1 ft/s (Section 4.3.2) is well below the CWA 316(b) regulatory option for minimizing impingement of a through screen design flow of 0.5 ft/s [40 CFR 125.94(b)(3)(2)].

With the exception of residual heat generated in the spent fuel pool, thermal discharge to the Pacific Ocean ceased when SONGS 2 & 3 shut down permanently. The impact of continued thermal discharge from cooling of spent fuel pools was also reviewed by the NRC in the draft waste confidence GEIS. The draft waste confidence GEIS concluded that impacts would be minor and bounded by the previous license renewal GEIS analysis of discharges from operating plants with cooling towers (NRC 2013b).

As noted above, the San Onofe Kelp Bed lies a few hundred feet south of the discharge conduits. The near elimination of the thermal discharge is a result of permanently ceasing operations rather than due to decommissioning activities, so any impact on the kelp bed potentially attributable to colder water would be out of scope for decommissioning activities. The State Water Resources Control Board (SWRCB 1999) granted a thermal exception to SONGS for its thermal discharge in 1999, concurring with the San Diego RWQCB's modeling of thermal impacts indicating that thermal impacts from the SONGS 2 & 3 discharge on the sensitive kelp bed environment would be insignificant.

The concrete conduits submerged in the Pacific Ocean for the intake and outfall for SONGS 2 & 3 are subject to the terms of the CSLC easement lease for this offshore land. The easement lease calls for removal of structures, building, pipelines, machinery, and facilities placed or erected by lessee and restoration as nearly as possible to the condition existing prior to their erection or placement (CSLC 1985). However, for the purposes of this analysis, it is assumed that decommissioning will not involve the removal of these conduits, but will instead involve abandonment in place with removal of vertical risers. For Unit 1, the CSLC agreed to an amendment to the Unit 1 easement lease allowing for a similar process. SCE plans to pursue an amendment to the CSLC easement lease for SONGS 2 & 3. If the CSLC approves the amendment to allow SCE to abandon the Units 2 and 3 conduits after removing the vertical risers and terminal structures, the environmental impacts are projected to be SMALL as discussed below. Complete removal of the conduits, as is currently required by the CSLC easement lease, is anticipated to have environmental impacts that are greater than SMALL. If the CSLC easement lease is not amended, the environmental impacts from complete removal of the conduits would be evaluated at that time.

The removal of the vertical terminal structures and vertical riser portions of the Unit 1 conduits was reviewed in an environmental impact report (EIR) prepared for the CSLC (EDAW 2005). The comprehensive environmental impact assessment found all impact areas to be insignificant or insignificant with applicable of mitigation measures. The EIR specifically reviewed impacts to marine biological resources, commercial fishing, marine water quality, recreation, nautical transportation among other potential impact areas from the proposed nearshore and offshore activities that would involve limited excavation of the seafloor and placement of spoils that would lead to turbidity, use of barges and boats for offshore and a skid launched from a barge for nearshore activities, divers for dismantlement, etc. Those areas where mitigation measures were required to reduce impacts below significant levels were marine biological resources, commercial fishing, marine water quality, and geology and soils. The mitigation measures were included in the easement lease amendment as conditions. Disposition of the Units 2 & 3 conduits would follow the same process of environmental review and enumeration of required mitigation measures to reduce impact levels to insignificant. Impacts considered insignificant or mitigated to below significant levels as determined by CSLC's environmental assessment would be considered SMALL impacts as the term is used in this EIE analysis.

4.3.5.4 Conclusions

Nearshore and offshore conduit riser removal activities would be conducted under approved CSLC requirements to minimize impacts to SMALL. All applicable BMPs will be employed and all required permits, lease amendments, and other approvals will be obtained to minimize impacts to aquatic resources. SONGS will continue to comply with applicable NDPES regulations, applicable CWA 316(b)-related regulations, and permits for its continued water withdrawals and wastewater discharges. This leads to the conclusion that potential impacts to aquatic ecology would be SMALL, and no additional mitigation measures beyond those anticipated as a condition of the CSLC easement lease amendment are warranted.

In its GEIS for decommissioning, the NRC generically determined aquatic ecology impacts to be SMALL when only aquatic resources within a plant's operational areas is disturbed (NRC 2002, Section 4.3.5.4); therefore, the aquatic ecology impacts during the decommissioning of SONGS 2 & 3 are bounded by this previously issued EIS. As discussed above, the NRC concluded the impacts to aquatic ecology from water withdrawals for flows comparable to closed-cycle cooling would be SMALL, relying on another previously issued GEIS for license renewal.

As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

4.3.6 Terrestrial Ecology

Terrestrial Habitats

SONGS 2 & 3 occupies 83.63 ac along with additional leased parcels totaling 14.9 ac used primarily for parking that are almost entirely paved and developed (see Section 4.3.1). Prior to construction of SONGS 2 & 3, a vegetation survey of the SONGS site was conducted. The results, including a detailed list of plant species, were presented in Appendix A to the SONGS 2 & 3 operating license stage ER as Appendix 2A (SCE *n.d.*). Table 4.3.1-1 describes land use types, acreages, and the approximate percentage of each area within the site. However, there are several small strips of intact scrub-shrub habitat and ornamental vegetation surrounding the parking lots and between developed areas of the plant. The SONGS site also has undeveloped coastal bluffs that are explicitly protected from development under the CCC's CDP for SONGS 2 & 3.

As shown in Figures 3.1.1-1 and 4.3.1-1, SONGS is bordered by rail and roadways that includes a narrow strip of California sagebrush scrub vegetation between the site fence and the road and railroad on its landward side (BonTerra 2012a), the Pacific Ocean, and San Onofre State Beach to the west-northwest and southeast. The northwest portion of the San Onofre State Beach is called the San Onofre surf beach and the southeast portion is called the San Onofre bluffs (CDPR 2010). San Onofre State Beach is leased by the State of California from the Department of the Navy and has 5.5 mi of coastline. The state beach has annual attendance exceeding 2 million. (SOF 2013)

The onsite coastal bluff in the northwest area of SONGS 2 & 3 is approximately 0.15 mi in length (CCC 1974) and is sparsely vegetated, California desert-thorn scrub habitat. The species identified in this area during a 2012 vegetation survey were California box-thorn (*Lycium californicum*), bladderpod (*Peritoma* [*Isomeris*] *arborea*), bluff buckwheat (*Eriogonum parvifolium*), coastal cholla (*Cylindropuntia prolifera*), coastal prickly pear (*Opuntia littoralis*), coastal goldenbush (*Isocoma menziesii* var. *vernonioides*), lemonadeberry (*Rhus integrifolia*), coyote brush (*Baccharis pilularis*), California wishbone bush (*Mirabilis laevis* var. *crassifolia* [*Mirabilis californica*]), and lance-leaved live-forever (*Dudleya lanceolata*). (BonTerra 2012a)

The onsite coastal bluff in the southeast area of SONGS 2 & 3 is approximately 0.31 mi in length and approximately 5 acres in size (CCC 1974). This larger coastal bluff on the southeast side of the plant is dominated by California sagebrush scrub vegetation. The 2012 vegetation survey described this area as dominated by California sagebrush (*Artemisia californica*) with associated species such as black sage (*Salvia mellifera*), giant tickseed (*Leptosyne* [*Coreopsis*] *gigantea*), California buckwheat (*Eriogonum fasciculatum*), coyote brush, California bush sunflower (*Encelia californica*), lemonadeberry, and toyon (*Heteromeles arbutifolia*). (BonTerra 2012a) West of the SONGS site is sandy beach.

The offsite San Onofre bluffs of the San Onofre State Beach southeast of SONGS 2 & 3 are contiguous with the onsite coastal bluffs on the southeast side of the plant. The San Onofre bluffs support two native vegetation associations (Diegan coastal sage scrub and southern foredune) and small areas of disturbed coastal sage scrub habitat that have been trampled or cleared by former activities. The disturbed areas have been invaded with non-native herbaceous species such as mustard (*Brassica* sp.) in substantial amounts with some sage scrub regeneration (Odgen 1994). This portion of the state beach supports a campground and is crossed by six trails from the roadway traversing the area, Old Highway 101, to the beach (CDPR 2013).

Diegan coastal sage scrub is a low, soft-wood, shrub-scrub habitat with plants growing to about three ft high. This is the predominant native vegetation community immediately south of the SONGS site and is considered a “facultatively drought-deciduous” association, in that it is typically found on dry sites, such as steep, south-facing slopes or clay rich soils, and is slow to release stored water. California sagebrush (*Artemisia califrornica*) is the dominant shrub species (just as on the onsite coastal bluff in the southeast area of SONGS 2 & 3), forming a dense, nearly monotypic stand, with occasional coyote brush and bladderpod also occurring. The diminutive stature of this vegetation is due to the wind-pruning effect of the moist, salty sea breezes. (Odgen 1994)

The southern foredunes onsite and offsite southeast of the plant consist of a relatively narrow band of sparsely vegetated habitat between the base of the coastal bluffs and the beach. Dominant shrubs include goldenbush (*Isocoma menziesii* var. *menziesii*); big saltbush (*Atriplex lentiformis* ssp. *lentiformis*); saltgrass (*Distichlis spicata*); sea-rocket (*Cakile maritima*); and hottentot-fig (*Carpobrotus edulis*). (Odgen 1994)

The SONGS site is within MCBCP, which is the largest remaining tract of land in coastal southern California with little development or direct human influence, other than frequent military training operations. MCBCP supports several ecosystems (USMC 2012, Section 3.2.1) including:

1) Estuarine and beach
2) Riparian
3) Shrublands
4) Grasslands
5) Oak Woodlands
6) Wetlands

There are approximately 17 mi of undeveloped, natural coastline within the borders of MCBCP (USMC 2012, Section 3.2.1.1). As shown in Figure 4.3.1-1, beach areas adjacent to SONGS are part of San Onofre State Beach.

Riparian ecosystems on MCBCP contain a wide variety of habitat types, including: woodlands, fresh water marshes, and open water areas. Riparian habitat occurs in the vicinity of the SONGS site along San Mateo Creek (approximately 2.5 mi west of the SONGS site) and San Onofre Creek (approximately 1 mi north of the SONGS site). The arid climate of southern California generally limits vegetation growth, making the habitat characteristics in riparian areas, where the more plentiful water supports winter-deciduous trees such as willows, cottonwoods, alders, and sycamores, even more distinctive. (USMC 2012, Section 3.2.1.2)

Two types of shrublands comprise the majority of habitat in the vicinity (i.e. 6-mi radius) of the SONGS site. A chaparral community is dominated by evergreen species with small, thick, leathery, dark green, sclerophyllous leaves, while coastal sage scrub habitat is dominated by species that lose all or most of their large, grayish-green leaves during summer months. Chaparral types are more common at higher elevations or in otherwise cooler areas with higher annual precipitation and more exposure to wind and moisture coming off the ocean. Diegan coastal sage scrub is usually identified with warmer areas with a clearly-defined dry season and is common in the vicinity of the SONGS site (USMC 2012, Section 3.2.1.3).

Annual grasslands are also common on MCBCP and cover about 30 percent of the base. They are usually located along coastal terraces and cover rolling hills with deeper soils (USMC 2012, Section 3.2.1.3).

Oak woodland and savannah habitat in the vicinity of the SONGS site are only found in areas where trees are protected from the maximum intensity of the sun on north-facing slopes and have more access to water below rock faces or boulders where runoff is concentrated or in areas where deep soils hold more moisture. (USMC 2012, Section 3.2.1.3)

Area wetlands are usually fringe wetlands associated with permanent waterbodies or vernal pools. There are no mapped, federally jurisdictional wetlands within the boundary of the SONGS site. However, vernal pools were identified adjacent to SONGS leased parcels northwest of SONGS Parking Lot #4, and there are numerous wetlands within a 6-mi radius of the SONGS site included in the USFWS wetlands inventory database (USFWS 2007a).

San Onofre Creek, approximately 1 mi north of the SONGS site, supports a riparian area that likely contains hydric soils and vegetation. Additionally, some isolated wetland areas on MCBCP are associated with vernal pools and may be considered jurisdictional. A vernal pool complex has been identified approximately 0.5 mi northwest of the SONGS site (USMC 2012, Section 3.2.1.2).

Observed Wildlife

The onsite and vicinity terrestrial habitats described above support a variety of wildlife. Natural habitat on the SONGS site is limited to small strips of shrub scrub and ornamental vegetation adjacent to the developed areas and the coastal bluff areas northwest and southeast of the plant. (BonTerra 2012a) Due to their size and relative isolation, the small strips are not conducive to use by a diverse wildlife community, although generally, avian species may use them for nesting, and some lizards and small mammals (e.g. rodents) with very small home ranges or adapted to disturbed environments may use these onsite habitats. The coastal bluff areas provide greater opportunity to support wildlife and are contiguous with the natural areas of the San Onofre State Beach. However, the light, noise, and frequent human presence due to the proximity of SONGS structures and activities; the highway, beach road, and railroad; and frequent human presence on the state beach would provide a more disturbed habitat than optimal for many species.

Species that could utilize the SONGS facility include common reptiles such as western redtailed skink (*Eumeces gilberti rubricaudatus*), side-blotched lizard (*Uta stansburiana*), gopher snake (*Pituophis catenifer*), and the western rattlesnake (*Crotalus viridis*). Small mammals are likely common and abundant in the adjacent disturbed communities and may include western harvest mouse (*Reithrodontomys megalotis*), California mouse (*Peromyscus californicus*), deer mouse (*Peromyscus maniculatus*), and the dusky-footed woodrat (*Neotoma fuscipes*). Larger mammals that may occasionally use the site include the: Virginia opossum (*Didelphis virginiana);* desert cottontail (*Sylvilagus audubonni*); California ground squirrel (*Spermophilus beecheyi*); coyote (*Canis latrans*); and striped skunk (*Mephitis mephitis*). (SCE 2005)

Avian species are highly mobile and not subject to barriers such as roads and developed areas that would deter ground-limited organisms. Individuals of several bird species including the: mourning dove (*Zenaida macroura*); Say's phoebe (*Sayornis saya*); California horned lark (*Eremophila alpestris*); western scrub-jay (*Aphelocoma californica*); American crow (*Corvus brachyrhynchos*); Bewick's wren (*Thryomanes bewickii*); and northern mockingbird (*Mimus polyglottos*) (SCE 2005) may utilize scrub habitat or open surfaces for nesting and temporary perching. Raptors such as the sharp-shinned hawk (*Accipiter striatus*); red-tailed hawk (*Buteo jamaicensis*); and American kestrel (*Falco sparverius*) are common and ubiquitous throughout California and also occur in the vicinity of the SONGS facility (SCE 2005). In addition, SONGS location on the western edge of the Pacific migratory bird flyway (Bird Nature 2013) would mean that other avian species could be observed as visitors onsite.

The onsite coastal bluffs are contiguous with area designated by the USFWS as critical habitat for the coastal California gnatcatcher (*Polioptila californica californica*) and the sandy beach at the base of the coastal bluffs is contiguous with the area designated as critical habitat for the Western snowy plover (*Charadrius alexandrinus nivosus*) (72 FR 72010; 77 FR 36727). As discussed in Section 4.3.7, MCBCP land is not included in critical habitat designations. The coastal California gnatcatcher is known to occur in the vicinity and potentially suitable nesting habitat is present onsite. Nesting sites for the Western snowy plover have been observed south of the SONGS site (SCE 2008a, Figure 3.2-1b).

The MCBCP, with its uninterrupted habitats, supports relatively high wildlife species diversity. MCBCP conducts surveys to support its Integrated Natural Resources Management Plan (INRMP) and has documented hundreds of invertebrates and more than 50 mammalian, 30 reptilian, 10 amphibian, 300 avian, and 60 fish species including listed species (USMC 2012, Section 3.2.3).

4.3.6.1 Regulations

Federal

Federal statutes that are directly applicable in an evaluation of terrestrial ecology issues include the ESA of 1973, the Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712), the Bald and Golden Eagle Protection Act, and portions of other statutes, such as the wetlands provisions of the CWA.

Federal: Endangered Species Act

The ESA is intended to protect plant and animal species that are threatened with extinction and to provide a means to conserve the ecosystems on which they rely. Under the ESA, the USFWS is responsible for all terrestrial and freshwater organisms. The ESA prohibits the taking of listed species and the destruction of designated critical habitat for listed species, and applies to federal agencies as well as individuals. However, in general, the prohibitions against take in respect to listed plant species are only applicable to federal agencies or to individuals on federal lands.

Federal: Migratory Bird Treaty Act

The MBTA, initially enacted in 1918, established a federal prohibition, unless otherwise regulated, to pursue, hunt, take, capture, or kill any bird included in the terms of the convention, or any part, nest, or egg of any such bird. The MBTA was amended in 1936 to include species included in a convention for migratory bird protection between the United States and Mexico. Executive Order 13186 (2001) further defined the responsibilities of federal agencies, such as the NRC, to ensure the protection of migratory birds and to consider potential impacts to migratory birds during the preparation of NEPA documents.

Federal: Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, prohibits, without a permit, from “taking” bald eagles, including their parts, nests, or eggs. The act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.”

Federal: Clean Water Act

The continued intake of water and the discharge of wastewater to support the operation of the spent fuel pools at SONGS 2 & 3 are subject to NPDES regulations and permit requirements. In addition to the existing NPDES regulations under the CWA governing discharges, SONGS 2 & 3 are subject to EPA and State of California regulations implementing the CWA 316(b) addressing impingement and entrainment of aquatic organisms resulting from water withdrawals.

State: California Endangered Species Act

The CESA (Fish and Game Code section 2050 et seq.) recognizes the importance of endangered and threatened fish, wildlife, and plant species and their habitats. Sections 2052-2098 of the Fish and Game Code “prohibit the ‘taking’ of any endangered, threatened, or rare plant and/or animal species unless specifically permitted for education or management purposes.”

State: California Coastal Act

The CCA of 1976 provides for the long-term protection of California's coastline to maintain and enhance coastal resources. Section 30230 states the “marine resources shall be maintained, enhanced and where feasible, restored.” The maintenance of the biological productivity and the quality of coastal water to maintain optimum populations of marine organisms is required under Section 30231.

State: California Fish and Game Code

There are additional regulations contained in the Fish and Game Code that would apply to decommissioning Units 2 & 3. The following is a summary of applicable regulations.

Sections 1755 and 1801

It is the policy of the state to maintain sufficient populations of all species of wildlife and native plants and the habitat necessary to ensure their continued existence for the beneficial use and enjoyment of the public. In addition, all species of wildlife and native plants will be perpetuated for their intrinsic and ecological values, as well as for their direct benefits to man.

Sections 3511 and 4700

Fully protected birds and/or mammals or parts thereof may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected bird and/or mammal and no such permits or licenses heretofore issued shall have any force or effect for any such purpose.

4.3.6.2 Potential Impacts of Decommissioning Activities on Terrestrial Ecological Resources

Table E-3 in Appendix E of the GEIS (NRC 2002) identifies stabilization, large-component removal, and decontamination and dismantlement as activities that may affect terrestrial ecology. Terrestrial ecological resources may be impacted during the decommissioning process via direct or indirect disturbance of native plant or animal communities in the vicinity of the plant site. Direct impacts can result from activities such as the clearing of native vegetation or filling of a wetland, none of which is planned for SONGS decommissioning; however, removal of security barriers outside of the plant perimeter fence could require ground disturbance involving natural vegetation. Indirect impacts to terrestrial resources could result from dust generation due to ground disturbance and traffic, noise from dismantlement of facilities and heavy equipment traffic, surface erosion and runoff, emissions from construction equipment, encroachment onto unpaved areas, and migratory bird collisions with crane booms or other construction equipment. Most of these minor, indirect impacts are temporary and will not be significant issues after the completion of decommissioning. The effects of such impacts can also be minimized using standard BMPs and avoidance and minimization measures.

Environmental impacts that are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource are considered SMALL. Impacts to terrestrial resources are considered to be detectable if they result in changes to local species populations or plant or animal communities beyond the typical levels of natural variability (i.e., normal year-to-year variations). The impacts are considered destabilizing if they result in the extirpation of important species or long-term changes in ecological functions (such as flow of energy), species richness, diversity, or proportion of invasive species. (NRC 2002, Section 4.3.6.2)

4.3.6.3 Evaluation

Decommissioning activities are anticipated to take place within the OCA potentially including the beach and shoreline if lease termination requires removal of the seawall and pedestrian walkway, the northwest parking area, and nearshore and offshore in front of SONGS for the limited removal actions of the intake and discharge conduit as discussed in Section 4.3.5. Activities would take place primarily within developed areas and on paved surfaces. If activities are to involve unpaved areas, SCE will comply with Environmental Procedure SO123-IX-2.9, which requires that the SONGS environmental protection group conduct assessments prior to any land disturbance, soil addition, digging, grading, or trenching outside the paved and concreted areas. Removal of concrete barriers installed outside the perimeter of the developed areas could require encroachment on unpaved areas.

SONGS is located within the coastal zone and prior to active dismantlement, SCE will file a CDP application with the CCC. As part of this permitting process, decommissioning activities within the coastal sage habitat areas and coastal bluff will be reviewed by the CCC for potential environmental impact and the need to implement mitigation measures would be conditions of the CCC permit. The need to remove security barriers along the perimeter of the developed plant adjacent to and within the natural area could potentially require ground disturbance in these unpaved areas. Appropriate avoidance and minimization measures will be used to minimize the impact of any ground disturbance.

The decommissioning activities would include dust generation due to structure demolition, noise from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and potentially bird collisions with crane booms or other construction equipment. The decommissioning activities will be conducted in compliance with air quality and noise regulations and SCE will use avoidance and minimization measures to address potential impacts as discussed in Sections 4.3.4 and 4.3.16. Compliance with applicable regulations, air permits, noise restrictions related to daylight working along with the temporary nature of the various decommissioning tasks (e.g., use of cranes) will minimize the impacts to terrestrial species as well as the human community. Decommissioning plans do not include the use of explosives (Section 3.2) whose noise could disturb terrestrial resources.

SCE will also employ other measures to ensure the federally listed coastal California gnatcatcher is not significantly impacted such as planning decommissioning activities to avoid and further minimize potential impacts during the nesting season. For the Unit 1 decommissioning, the CCC, to support issuance of a Unit 1 permit, analyzed the potential for decommissioning activities to impact the coastal California gnatcatcher and determined that there would be no significant impact. Demolition of SONGS 2 & 3 would also be subject to such permitting requirements, and based on the similarities of the decommissioning activities associated with SONGS 2 & 3, it is assumed there will be no significant impact.

As discussed in Section 3.2, the existing seawall and pedestrian walkway and subsurface structures beneath them will be removed (completely or partially) or left in place as required to meet lease termination requirements. Demolition and removal activities, if any, would be conducted during the ISFSI decommissioning timeframe, which would follow the majority of decommissioning activities by many years. Prior to conducting these decommissioning activities, SCE will secure CCC approval whether in concert with the permitting process discussed above or through a subsequent permitting process. SCE will implement appropriate avoidance and minimization measures and any additional mitigation measures proscribed by CCC in its approval.

The conduit riser removal activity, using the planned work activities for Unit 1 as a guide, would not involve beach activity (EDAW 2005), so there would be no temporary impact to terrestrial species foraging along this portion of the beach. If the conduit riser removal activity did require some beach activity such as facilitating equipment mobilization to nearshore risers or staging of equipment or debris, the disruption would be temporary and limited to the small portion of beach in front of SONGS. Such an impact would be minimal and not significant.

4.3.6.4 Conclusions

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

In its GEIS for decommissioning, the NRC generically determined terrestrial ecology impacts to be SMALL when only terrestrial resources within a plant's operational areas is disturbed (NRC 2002, Section 4.3.6.4); therefore, SONGS 2 & 3's terrestrial ecology impacts during decommissioning is bounded by this previously issued EIS.

As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

4.3.7 Threatened and Endangered Species

Species currently protected under the federal ESA and the CESA that have geographic ranges within San Diego and Orange Counties are presented in Table 4.3.7-1. The table also identifies which of these species has been identified on MCBCP and further which species have been observed within the vicinity (6-mi radius) of the SONGS site. The coastal California gnatcatcher is known to occur in the vicinity of SONGS and potentially suitable nesting habitat is present, and another species (Section 4.3.6), the San Diego fairy shrimp, has been identified in vernal pools adjacent to the SONGS leased parcel hosting SONGS Parking Lot #4 (Section 4.3.5). The vernal pools are located on San Onofre State Beach land. The Riverside fairy shrimp is not known to occur within one mile of the SONGS site (SCE 2014a).

Critical Habitats

Critical habitat is specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally described in the *Federal Register*. Within the SONGS site vicinity, the USFWS has critical habitat delineated for the species bulleted below.

- Thread-leaved brodiaea (76 FR 6848)
- San Diego fairy shrimp (72 FR 70648)
- Western snowy plover (*Charadrius alexandrinus nivosus*) (76 FR 16046)
- California coastal gnatcatcher (*Polioptila californica californica*) (72 FR 72010)
- Least Bell's vireo (*Vireo bellii pusillus*) (59 FR 4845)
- Arroyo toad (*Anaxyrus californicus*) (70 FR 19562)
- Steelhead trout (*Oncorhynchus mykiss*) (70 FR 52488)

However, the final designation of critical habitat for each of these species explicitly excludes MCBCP land. A 2004 amendment to the ESA prohibits the designation of military lands as critical habitat if the areas are covered by an approved INRMP (USFWS 2007b). The U.S. Marine Corps published an INRMP for the MCBCP in October 2001 to aid in the management and conservation of natural resources under the base's control. Updates to the INRMP are ongoing, and the latest updates are published online. The most recent updates are from March 2012. (USMC 2012) Through its INRMP, MCBCP regularly surveys areas on base where protected species have been identified and manages the continued use of habitat by protected species.

4.3.7.1 <u>Species of Concern</u>

Threatened or Endangered Species Within the Vicinity of SONGS

Seventeen federally or state-protected species (described below in the subsections on terrestrial species and aquatic species) utilize habitat within the vicinity (6-mile radius) of the SONGS site. In addition, federal candidate species also protected by the state are discussed.

Four federally listed marine reptiles may be within the vicinity of the SONGS site (NOAA 2013b; NOAA 2013c).

Terrestrial Species

Bald eagles (*Haliaeetus leucocephalus*) have been federally delisted, but remain listed as endangered by the state (CDFW 2013b). In 1995 and 1996, but not since, sightings were documented on MCBCP in the Santa Margarita estuary and along Cocklebur Creek (USMC 2012, Section 3.2.4.1).

Coastal California gnatcatchers are federally listed as threatened (USFWS 2013b; USFWS 2013c). They are small, long-tailed invertivores (consume predominantly insects and other invertebrates) with a small slender bill. Breeding males have a black cap, a narrow white ringed eye, and a mostly black tail (NSE 2009a). Coastal California gnatcatchers have been identified as year-round inhabitants on MCBCP in predominantly coastal sage habitat and occasionally chaparral and riparian habitats (USMC 2012, Section 3.2.4.4). The coastal California gnatcatcher is known to occur in the vicinity of SONGS and potentially suitable nesting habitat is present.

Least Bell's vireo is a small diurnal songbird species that is federally and state-listed as endangered (CDFW 2013b). The species is found throughout the MCBCP in riparian habitat (USMC 2012, Section 3.2.4.5). Identified habitat includes dense brush, mesquite, willow-cottonwood forest, streamside thickets, and scrub oak in arid regions, often near water (NSE 2013b). Least Bell's vireo has been identified in the riparian areas along San Onofre Creek, which is approximately 1 mile from the SONGS site. However, riparian habitat does not exist onsite or immediately adjacent to the SONGS site.

Southwestern willow flycatchers (*Empidonax traillii extimus*) are listed as endangered by both the federal and state governments (CDFW 2013b). Its breeding range includes southern California, Arizona, and New Mexico, as well as parts of Nevada, Utah, and Texas (USGS 2009). On MCBCP, southwestern willow flycatchers inhabit riparian woodlands consisting of willow-dominated habitats with a dense understory. They are diurnal and usually nest from June through the end of July (USMC 2012, Section 3.2.4.7). Suitable habitat is not located on the SONGS site.

Western snowy plovers are small shorebirds that are listed as threatened by the federal government (USFWS 2013b; USFWS 2013c). Habitat for western snowy plovers consists of beaches, dry mud or salt flats, and sandy shores of rivers, lakes and ponds. The USFWS has critical habitat mapped about two mi northwest of the SONGS site between the site and San Mateo Point (76 FR 16046) at the northwest boundary of MCBCP. The onsite sandy beach at the base of the coastal bluffs is contiguous with the area designated as critical habitat for the Western snowy plover. Nesting sites for the Western snowy plover have been observed south of the SONGS site outside the vicinity (SCE 2008a, Figure 3.2-1b).

The California least tern (*Sternula antillarum browni*) is a migratory bird that nests colonially on undisturbed, sparsely vegetated and flat areas with loose, sandy, or saltpan substrate. Least terns are opportunistic feeders and forage relatively shallow, nearshore waters and coastal freshwater ponds, channels, and lakes. On MCBCP, California least tern nesting sites are located farther south of the SONGS vicinity (SCE 2008a, Section 3.2.2.3, Figures 3.2-1a, -1b; USMC 2012, Section F.7.2). The onsite sandy beach and nearshore waters are potential suitable resting and foraging habitat for these species (BonTerra 2012a; SCE 2008a, Section 3.2.2.3).

The light-footed clapper rail (*Rallus longirostris levipes*) is a non-migratory, marsh bird found in coastal freshwater and saltwater marshes in southern California and northern Baja California, Mexico (USMC 2012, Section F.10.2). This species nests, forages, and shelters within the marsh, rarely straying outside of its home marsh (USFWS 2009, Section II). The majority of California's population resides in the Upper Newport Bay Ecological Reserve in Orange County. Total sightings on MCBCP have never been greater than three pairs, for any single survey season, from 1983 to 2008, and the 2009 survey discovered the presence of chicks. The sightings occurred in lagoon and marsh areas south of the SONGS vicinity. (USMC 2012, Section F.10.2) SONGS does not have the suitable marsh habitat on or adjacent to the site.

The Pacific pocket mouse (*Perognathus longimembris pacificus*) is listed as endangered by the federal government and as a species of special concern by the state (USMC 2012, Section 3.2.4.9). Preferred habitats include coastal strand, sand dune, ruderal vegetation on river alluvium, and open coastal sage scrub on marine terraces (Ogden 1994). Populations have been identified on MCBCP, northwest of the SONGS site, within the SONGS vicinity (USMC 2012, Section 3.2.4.9), but no Pacific pocket mice have been identified southward or eastward of I-5 (BonTerra 2012b). A 2012 survey for the Pacific pocket mouse outside of the SONGS perimeter fence along the coastal bluff on the southeastern boundary also did not find any Pacific pocket mice. The survey included an examination of the SONGS site and found the undeveloped areas to be heavily disturbed from construction, a strong negative for this species. In addition, the survey found soil conditions to be sub-optimal for the Pacific pocket mouse. (BonTerra 2012b) The species is not anticipated on site.

Stephen's kangaroo rat (*Dipodomys stephensi*) is listed as endangered by the federal government and as threatened by the state (CDFW 2013b). Suitable habitat is characterized as sparse grasslands with a high percentage of bare ground. Although the Stephen's kangaroo rat has been identified in the vicinity of the SONGS site in upland areas (USMC 2012, Section 3.2.4.10), there is no suitable habitat on site (BonTerra 2012a).

Thread-leafed brodiaea is listed by the USFWS as threatened, and as endangered by the CDFW (CDFW 2013c). The plant is a perennial herb with a flowering stem arising from an underground bulb. Thread-leafed brodiaea grows in heavy clay soil, often in association with vernal pools and floodplains (NSE 2009b). The USFWS has designated critical habitat for the species inland of the SONGS site (76 FR 6848), and surveys on MCBCP have revealed thread-leafed brodiaea inland of the SONGS site along San Onofre creek within the vicinity of the SONGS site (USMC 2012, Section 3.2.4.17). A survey conducted in 2012 confirms that the thread-leaved brodiaea is not found on the SONGS site (BonTerra 2012c) and suitable habitat has not been identified for it on site.

Other listed plant species that are known to occur or have historically occurred in the vicinity are San Diego button-celery (*Eryngium aristulatum* var. *parishii*), and spreading navarretia (*Navarretia fossalis*) (BonTerra 2012a). These species have not been identified in the vicinity by surveys that support the MCBCP IRMP (USMC 2012, Sections F.14.2 and F.18.2) and they were not identified onsite or adjacent to SONGS during a 2012 survey to support construction of a perimeter fence (BonTerra 2012a). A federal candidate plant species found on MCBCP is Brand's Star Phacelia (*Phacelia stellaris*); however, this plant occurs on beach habitat and surveys since its first discovery on MCBCP has not found it to occur within the vicinity of SONGS (USMC 2012, Section F.5.2).

Aquatic Species

Arroyo toads are federally listed as endangered and listed by the state as a species of special concern (NSE 2009c; USMC 2012, Section 3.2.4.13). Arroyo toads occupy aquatic, riparian, and upland habitats. They breed and deposit egg masses in shallow, sandy pools, which are usually bordered by sand and gravel flood terraces. Outside of breeding season, the species is essentially terrestrial. They forage along stream terraces and in channel margins. Adults and sub-adults burrow into dry or slightly dry fine sand in upland terraces, along old flood channels, and in soils below a shrub canopy. Studies indicate that the species primarily burrow within the riparian habitat adjacent to an active channel or in a flood prone area; however, individuals have been observed up to 1,100 ft from the active channel. (USFWS 2014) On MCBCP, arroyo toads have been located in drainage basins, including San Onofre Creek basin. The habitat on the SONGS site is predominantly upland, at least a mile from suitable habitat for the toad (USMC 2012, Section 3.2.4.13 and F.1). Arroyo toads have been identified in the vicinity of the SONGS site, but are not expected on site due to the lack of suitable habitat.

Riverside fairy shrimp (*Streptocephalus woottoni*) and San Diego fairy shrimp are federally listed as endangered (USFWS 2013b; USFWS 2013c). Both species share similar habitat characteristics, consisting of vernal pools that are temporary by nature. A base-wide survey identified 111 and 276 vernal pools that contained Riverside and San Diego fairy shrimp, respectively, on MCBCP (USMC 2012, Section 3.2.4.14). Vernal pools have been identified within the vicinity of the SONGS site, but none on site. Vernal pools were identified adjacent to the SONGS leased parcels on the unpaved surface northwest of the SONGS Parking Lot #4. San Diego fairy shrimp were identified in these vernal pools (Section 4.3.5). The Riverside fairy shrimp is not known to occur within one mile of the SONGS site (SCE 2014a).

Steelhead trout are a partially migratory salmonid. They are listed as endangered by the federal government and were historically located in streams and rivers of Los Angeles, Orange and San Diego counties. After one to four years in freshwater, steelhead trout migrate to marine environments (USMC 2012, Section 3.2.4.11). Sexually mature steelheads migrate back to freshwater prior to spawning. The USFWS has San Mateo and San Onofre creeks listed as critical habitat for steelhead trout (70 FR 52488). A single juvenile steelhead was observed in San Mateo Creek on MCBCP (within the vicinity of the SONGS site) in 1999. Ongoing monitoring by USMC has been conducted to determine whether steelhead trout routinely make use of San Mateo Creek and existing pools. As of 2005, no other steelhead trout have been identified on MCBCP. (USMC 2012, Section 3.2.4.11)

Five federally listed marine reptiles may be within the vicinity of the SONGS site (NOAA 2013a; NOAA 2013b; NOAA 2013c). Four marine turtles—the green, the loggerhead, the leatherback and the olive Ridley's—are listed for San Diego County; however, none are considered full-time residents in the vicinity of SONGS, as they are mostly transient and only migrate through the vicinity (Table 4.3.7-1). The NMFS prepared a biological opinion determining that the impacts of the operation of SONGS 2 & 3 is not likely to jeopardize the continued existence of endangered or threatened green, leatherback, loggerhead, or olive Ridley's sea turtles (NMFS 2006b).

The biological opinion required as a condition that SCE notify the NMFS once 50 percent of the estimated incidental take for any of the species had been reached. SCE notified the NMFS in May 2013 that this threshold had been reached for the Olive Ridley sea turtle; there had been two of the estimated three incidental takes occurring the past 7.5 years (SCE 2013i). As discussed in Section 4.3.2, following cessation of normal operations at SONGS, there has been a significant (approximately 96 percent) reduction in the intake flow rate, as well as a corresponding reduction in the through-screen intake velocity (to approximately 0.1 ft/s). These reductions meet the requirements for Track 1 compliance with the OTC policy. (SCE 2013a) A fifth federally listed marine reptile, the Hawksbill turtle (*Eretmochelys imbricata*), sporadically nests in the southern part of the Baja peninsula. Foraging sub-adults and juveniles have been sighted along the California coast (NOAA 2013a).

Other California Natural Diversity Database Species Ranked as Critically Imperiled or Imperiled

Other species of concern for environmental assessment are species included in the California Natural Diversity Database (CNDDB) which have a ranking of S1 or S2. This ranking indicates that the species is critically imperiled (S1) or imperiled (S2) (NSE 2014a). A review of the CNDDB indicated eight species of these ranks have been documented within one mile of the SONGS site (SCE 2014a).

Three of the species are plant species that whose habitat is coastal shrub. These species are Coulter's saltbush (*Atriplex coulteri),* south coast saltscale (*Atriplex pacifica)* (also known as Davidson's saltscale), and Pendleton button-celery (*Eryngium pendletonense)*. Coulter's saltbrush and south coast saltscale are also known to inhabit coastal dunes. Pendleton button-celery can also be found in vernal pools. A fourth plant species, little mousetail (*Myosurus minimus* apus*),* documented within one mile of SONGS, can also be found in vernal pools. (CNPS 2014, NSE 2014b)

The species also include two rodent species, Dulzura pocket mouse (*Chaetodipus californicus femoralis)* and the northwestern San Diego pocket mouse (*Chaetodipus fallax fallax).* These species inhabit coastal sage scrub and chaparral communities (USFWS 1995, ZipcodeZoo 2014), so have the potential to be in the coastal sage habitat adjacent to the SONGS site (see Section 4.3.6).

The burrowing owl (*Athene cunicularia*) is an S2 species documented within one mile of SONGS. This bird species nests in underground burrows and inhabits dry open areas with low vegetation in both urban and suburban areas (Audubon California 2013).

The globose dune beetle (*Coelus globosus)* is the only insect of the eight species. This beetle's habitat includes coastal dunes and sandy beach (NOAA 2014; SBMNH *n.d.*).

4.3.7.2 Regulations

Federal: Endangered Species Act

The ESA is intended to protect plant and animal species that are threatened with extinction and to provide a means to conserve the ecosystems on which they rely. Under the ESA, the USFWS is responsible for all terrestrial and freshwater organisms. Marine and anadromous fish species are the responsibility of the NMFS. The ESA prohibits the taking of listed species, and applies to federal agencies as well as individuals. However, in general, the prohibitions against take in respect to listed plant species and protection of designated critical habitat are only applicable to federal agencies or to individuals on federal lands.

Pursuant to Section 7 of the ESA, federal agencies are required to consult with the USFWS and NMFS prior to taking any action, including licensing actions, which has the potential to adversely impact a listed species and are prohibited from taking any action which has the potential to jeopardize a listed species or result in adverse modification of designated critical habitat. Where there is a potential for an adverse impact to a listed species or designated critical habitat, the action agency must enter into a formal consultation with USFWS and/or NMFS which results in the issuance of a biological opinion. If the action has the potential to result in a take of a listed species, the action agency can obtain an incidental take permit through the formal consultation.

Acknowledging the site- and species-specific nature of threatened and endangered species and the special obligations imposed on the NRC by the ESA, NRC has concluded that the potential impacts to threatened and endangered species may be SMALL, MODERATE, or LARGE. In addition, the NRC has determined that the impact to threatened and endangered species is not a generic issue for the purpose of evaluating potential impacts of decommissioning activities (NRC 2002), and RG 1.185 requires the decommissioning plant to conduct a site-specific analysis (NRC 2013a).

State: California Endangered Species Act

CESA prohibits the taking of any listed threatened or endangered plant or wildlife (not including invertebrates). Section 2081 of CESA authorizes the California Department of Fish and Wildlife to authorize the taking of a state listed species through the issuance of a permit or a Memoranda of Understanding.

State: California Coastal Act

The California Coastal Act of 1976 provides for the long-term protection of California's coastline to maintain and enhance coastal resources. Section 30230 states the "marine resources shall be maintained, enhanced and where feasible, restored." The maintenance of the biological productivity and the quality of coastal water to maintain optimum populations of marine organisms is required under section 30231.

State: California Fish and Game Code

There are additional regulations contained in the Fish and Game Code that would apply to decommissioning Units 2 & 3. The following is a summary of applicable regulations.

Section 1700

It is the policy of the state to encourage the conservation, utilization and maintenance of ocean biological resources under their jurisdiction for the public's benefit. The state will also promote the development of local and distant-water fisheries based in California under international law. Objectives include the maintenance of populations of all species of aquatic organisms to insure their continued existence and support reasonable use.

Sections 1755 and 1801

It is the policy of the state to maintain sufficient populations of all species of wildlife and native plants and the habitat necessary to ensure their continued existence for the beneficial use and enjoyment of the public. In addition, all species of wildlife and native plants will be perpetuated for their intrinsic and ecological values, as well as for their direct benefits to man.

Sections 3511 and 4700

Fully protected birds and/or mammals or parts thereof may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected bird and/or mammal and no such permits or licenses heretofore issued shall have any force or effect for any such purpose.

4.3.7.3 Potential Impacts of Decommissioning Activities on Threatened and Endangered Species

Table E-3 in Appendix E of the decommissioning GEIS indicates that stabilization, large-component removal, and decontamination and dismantlement are activities that may affect threatened or endangered species. The greatest potential for impact to protected species is associated with physical alteration or dismantlement of the facilities, landscape, or aquatic environment. Such species may be impacted during the decommissioning process either through direct take (kill, maim, or unable to reproduce) or via disturbances of native plant or animal communities near the plant site that the species relies on for food or shelter. (NRC 2002) Indirect impacts may result from runoff, sedimentation, dust generation, or noise disturbance.

Impacts to endangered or threatened species are considered detectable if there are changes (attributable to the facility) in the species behavior or in the local population size that are greater than normal year-to-year variation. Impacts would be considered destabilizing if they resulted in direct mortality or major behavioral changes (such as abandonment of most suitable habitat areas in the plant vicinity), or if they otherwise jeopardized the local population. (NRC 2002)

4.3.7.4 Evaluation

As discussed above, several protected species reside within the vicinity of the SONGS 2 & 3. Decommissioning activities that physically alter the land and structures and ones that may result in runoff, sedimentation, dust generation, or noise disturbance have the potential to impact these species. Decommissioning activities are not anticipated to require use of property outside of the OCA and leased parcels and use of existing roadways and rail line to support shipping of decommissioning waste and supplies; therefore, land disturbance outside of these areas is not anticipated. Within the OCA and leased parcels, decommissioning activities would take place primarily on paved areas. An exception potentially would be removal of concrete barriers and security fencing outside the perimeter of the plant. Activities involving unpaved areas would be subject to "Handling and Treatment of Endangered and Threatened Species," SO123-IX-2.9, the SCE procedure that serves to protect threatened and endangered species. The procedure requires that the SONGS environmental protection group conduct assessments prior to any land disturbance, soil addition, digging, grading, or trenching outside the paved and concreted areas; maintenance activities near surface water and wetlands; and trimming or removal of native plants other than landscape maintenance. Protected terrestrial plants have not been identified onsite during previous surveys and therefore, impacts to these species are not anticipated. Disturbance of nearshore and offshore in the area of the intake and outfall conduits have the potential for direct impacts to protected species. Noise, air emissions, run-off, and artificial lighting due to decommissioning activities have the potential to result in indirect impacts on protected species.

The protected marine species within the vicinity potentially impacted by decommissioning activities are the marine turtles noted above. These turtles are migratory, not known to nest in the vicinity, and could avoid the temporary disturbance. The decommissioning activities for the intake and outfall conduits will be conducted using mitigation measures designed to minimize temporary impacts to water quality in the vicinity of the conduits as was required by the CSLC for the Unit 1 conduits decommissioning (EDAW 2005).

The protected shorebirds whose habitat include sandy beach that are discussed above is the Western snowy plover and the California least tern. None of these species has been identified as nesting in the vicinity; however, the critical habitat for the Western snowy plover is contiguous with the sandy beach in front of SONGS. The conduit riser removal activity, using the planned work activities for Unit 1 as a guide, would not involve beach activity (EDAW 2005) so there would be no temporary impact to terrestrial species forging along this portion of the beach. However, if the conduit riser removal activity did require some beach activity, such as facilitating equipment mobilization to nearshore risers or staging of equipment or debris, the disruption would be temporary and limited to the small portion of beach in front of SONGS. If lease termination required the complete or partial removal of the seawall, pedestrian walkway, and substructures along the beach, temporary beach disturbance could temporarily decrease the area available for foraging and resting. Any disturbance of the sandy beach would be temporary, and SCE would implement avoidance measures which would effectively minimize potential impacts.

The decommissioning activities would indirectly impact protected species through dust generation due to structure demolition, noise from dismantlement of facilities and heavy equipment traffic, surface runoff, emissions from construction equipment, and potentially bird collisions with crane booms or other construction equipment. The decommissioning activities will be conducted in compliance with air quality and noise regulations and SCE will use avoidance and minimization measures as discussed in Sections 4.3.4 and 4.3.16. Compliance with applicable regulations, air permits, noise restrictions related to daylight working along with the temporary nature of the various decommissioning tasks (e.g., use of cranes) will minimize the impacts to protected terrestrial species as well as the human community. Decommissioning plans do not include the use of explosives (Section 3.2), whose noise could disturb protected species. These mitigation measures would serve to minimize impacts to protected terrestrial species that inhabit or visit the SONGS site.

SCE will also employ other measures such as planning decommissioning activities to avoid and further minimize potential impacts during the nesting season to ensure species, such as the federally listed coastal California gnatcatcher, are not significantly impacted. Based on SCE's experience with SONGS Unit 1 decommissioning, it is assumed that the CCC will condition the SONGS 2 & 3 CDP to ensure that there are no significant impacts to special-status species. For the Unit 1 decommissioning, the CCC analyzed the potential for decommissioning activities to impact the coastal California gnatcatcher's habitat and determined that there would be no significant impacts (CCC 2000).

The Pacific pocket mouse inhabits the vicinity of SONGS (USMC 2012, Section 3.2.4.9), but trapping surveys in habitat similar to that found on the SONGS site and outside of the SONGS perimeter fence failed to identify the mouse during 1994 (Ogden 1994) and 2012 (BonTerra 2012b); thus they are not anticipated onsite.

Although the Stephen's kangaroo rat has been identified in the vicinity of the SONGS site (USMC 2012), suitable habitat is not located onsite.

Only one of the protected species in the vicinity of SONGS is a plant species, the thread-leaved brodiaea. It was not identified during a 2012 survey of the site (BonTerra 2012c). Because decommissioning activities will be confined to paved areas unless an environmental assessment per SCE procedure SO123-IX-2.9 is conducted prior to the activity, impacts on thread-leaved brodiaea are not anticipated.

The NMFS (NMFS 2006) determined that steelhead trout populations would not be affected by activities at the plant.

The Arroyo toad uses aquatic habitat for breeding and terrestrial, upland habitat of loose soil for foraging, burrowing, and hibernation. The upland habitat is near rivers with sandy banks, willows, cottonwoods, and sycamores in valley-foothill and desert riparian habitats. Found in loose gravelly areas of streams in drier portions of its range (CDFW 2013b). The SONGS site is approximately one mile from the nearest riparian habitat and the species is not known to be present onsite or in adjacent areas.

The eight unlisted state species of concern include four plant species, and impacts to these species will be avoided or minimized by restricting decommissioning activities to paved areas unless an environmental assessment per SCE procedure SO123-IX-2.9 has been conducted. This same approach would also serve to avoid and minimize impacts to the burrowing owl, which uses sandy soil for burrowing. SCE's approach of implementing procedure SO123-IX-2.9 before beginning any activities on unpaved areas would also serve to minimize impacts to the two rodent species by identifying mitigation measures to minimize and avoid impacts to these species.

The insect species, the globose dune beetle, inhabits beach and coastal dune areas. The impacts to these would be primarily indirect through noise or fugitive dust except for temporary beach disturbance if the seawall and pedestrian walkway were removed during the final years of decommissioning, or if the conduit removal process included some temporary beach activities.

4.3.7.5 Conclusions

Decommissioning of SONGS 2 & 3 is not anticipated to adversely impact any federally or state-listed species. As discussed above, decommissioning activities would be limited to paved areas unless an environmental assessment per SCE procedure SO123-IX-2.9 had been conducted, and beach, nearshore, and offshore disturbance to support removal of intake and outfall risers and beach structures. SCE will employ mitigation measures as required by California agencies to minimize impacts to the environment and protect listed and species of concern. In addition, SCE will implement BMPs and conduct assessments as called for in its environmental protection procedure, as well as comply with permit and regulatory requirements to minimize indirect impacts from noise, air emission, dust, and run-off. Therefore, it is reasonable to conclude that impacts to threatened or endangered species from decommissioning would be SMALL and do not warrant additional mitigation measures.

The ESA imposes two basic requirements on the NRC. First, the ESA requires the NRC to ensure that any action authorized, funded, or carried out by NRC is not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction or impairment of any critical habitat for such species. Second, the NRC is required to consult with the Secretary of the Interior (for freshwater and terrestrial species through the USFWS) or the Secretary of Commerce (for marine and some anadromous fish through the NMFS) to determine if any listed species may be affected by a particular action. As stated above and supported in Sections 4.3.5, 4.3.6, and 4.3.7.4, the decommissioning activities, conducted in conjunction with BMPs, compliance with permits and regulatory requirements, as well as lease agreement and mitigation measures required by CSLC for the conduits decommissioning, and CCC requirements for the protection of the coastal California gnatcatcher, are not anticipated to adversely affect any listed species.

Table 4.3.7-1: Threatened or Endangered Species in San Diego and Orange Counties, CA

Scientific Name	Common Name	State Status[(a)]	Federal Status[(b)]	Identified on MCBCP	Identified in Songs Vicinity
AMPHIBIAN SPECIES					
Anaxyrus californicus	Arroyo toad	—	FE	yes	yes
Rana aurora draytonii	California red-legged frog	—	FT	no	no
Rana muscosa	Mountain yellow-legged frog	SE	FE	no	no
AVIAN SPECIES					
Buteo Swainsoni	Swainson’s hawk	ST	—	yes	no
Charadrius alexandrinus nivosus	Western snowy plover	—	FT	yes	yes
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	SE	—	yes	no
Empidonax traillii extimus	Southwestern willow flycatcher	SE	FE	yes	yes
Haliaeetus leucocephalus	Bald eagle	SE	delisted	yes	yes
Passerculus sandwichensis beldingi	Belding's savannah sparrow	SE	—	yes	no
Polioptilacalifornica californica	Coastal California gnatcatcher	—	FT	yes	yes
Rallus longirostris levipes	Light footed clapper rail	SE	FE	yes	no
Rallus longirostris obsoletus	California clapper rail	SE	FE	no	no
Rallus longirostris yumanensis	Yuma clapper rail	ST	FE	No	no
Riparia riparia	Bank swallow	ST	—	yes	no
Sterna antillarum browni	California least tern	SE	FE	yes	no
Synthliboramphus hypoleucus	Xantu's murrelet	ST	Candidate	yes	no
Vireo bellii pusillus	Least Bell's vireo	SE	FE	yes	yes
FISH SPECIES					
Catostomus santaanae	Santa Ana sucker	—	FT	no	no
Cyprinodon macularis	Desert pupfish	SE	FE	no	no
Gasterosteus aculeatus williamsoni	Unarmored three-spine stickleback	SE	FE	no	no

Scientific Name	Common Name	State Status[(a)]	Federal Status[(b)]	Identified on MCBCP	Identified in Songs Vicinity
Orcorhynchus mykiss	Steelhead trout	—	FE	yes	yes
INVERTEBRATE SPECIES					
Branchinecta sandiegoensis	San Diego fairy shrimp	—	FE	yes	yes
Euphydras editha quino	Quino checkerspot butterfly	—	FE	no	no
Lycaena hermes	Hermes copper butterfly	—	candidate	no	no
Pyrgus ruralis lagunae	Laguna mountains skipper	—	FE	no	no
Streptocephalus woottoni	Riverside fairy shrimp	—	FE	yes	yes
MAMMALIAN SPECIES					
Dipodomys meriami parvus	San Bernardino Merriam’s rat	—	FE	no	no
Dipodomys stephensi	Stephen's kangaroo rat	ST	FE	yes	yes
Perognathus longimembris pacificus	Pacific pocket mouse	—	FE	yes	yes
Ovis Canadensis nelson	Peninsular big horned sheep	—	FE	no	no
PLANT SPECIES					
Acanthomintha ilicifolia	San Diego thorn-mint	SE	FT	no	no
Allium munzii	Munz’s onion	ST	FE	no	no
Ambrosia pumila	San Diego ambrosia	—	FE	no	no
Arctostaphylos glandulosa crassifolia	Del Mar manzanita	—	FE	no	no
Baccharis vanessae	Encinitas baccharis	SE	FT	no	no
Berbaris nevinii	Nevin’s barberry	SE	FE	no	no
Brodiaea filifolia	Thread-leafed brodiaea	SE	FT	yes	yes
Caenothus ophiochiuis	Vail lake ceanothus	—	FT	no	no
Calochortus dunnii	Dunn's mariposa lily	SR	—	no	no
Chorizanthe orcuttiana	Orcutt's spineflower	SE	FE	no	no
Cordylanthus maritimus maritimus	Salt marsh bird's beak	SE	FE	no	no

Scientific Name	Common Name	State Status[a]	Federal Status[b]	Identified on MCBCP	Identified in Songs Vicinity
Deinandra conjugens	Otay tarplant	SE	FT	no	no
Delphinium hesperium cuyamacae	Cuyamaca larkspur	SR	—	no	no
Dodecahema leptocerus	Slender-horned spineflower	SE	FE	no	no
Downingia concolor brevior	Cuyamaca Lake downingia	SE	—	no	no
Dudleya brevifolia	Short leaved dudleya	SE	—	no	no
Dudleya stolonifera	Laguna Beach liveforever	—	FT	no	no
Eriastrum densifolium sanctorum	Santa Ana River woollystar	SE	FE	no	no
Eryngium aristulatum	San Diego button-celery	SE	FE	yes	no
Fremontodendron mexicanum	Mexican flannelbush	SR	FE	no	no
Galium angustifolium borregoense	Borrego bedstraw	SR	—	no	no
Hazardia orcuttii	Orcutt's hazardia	ST	candidate	no	no
Limnanthes gracilis parishii	Parish's meadowfoam	SE	—	no	no
Monardella linoides viminea	Willowy monardella	SE	FE	no	no
Nasturtium gambelii	Gambel's watercress	ST	FE	no	no
Navarretia fossalis	Spreading navarretia	—	FT	yes	no
Orcuttia californica	California Orcutt grass	SE	FE	no	no
Ornithostaphylos oppositifolia	Baja California birdbush	SE	—	no	no
Packera ganderi	Gander's ragwort	SR	—	no	no
Phacelia stellaris	Brand's star phacelia	—	candidate	yes	no
Poa atropurpurea	San Bernardino blue grass	—	FE	no	no
Pogogyne abramsii	San Diego mesa mint	SE	FE	no	no
Rosa minutifolia	Small leaved rose	SE	—	no	no
Verbesina dissita	Bigleaf crownbeard	ST	FT	no	no
REPTILIAN SPECIES					
Caretta caretta	Loggerhead sea turtle	—	FE	no	yes

Scientific Name	Common Name	State Status[(a)]	Federal Status[(b)]	Identified on MCBCP	Identified in Songs Vicinity
Chelonia mydas	Green sea turtle	—	FT	no	yes
Coleonyx switaki	Barefoot banded gecko	ST	—	no	no
Dermochelys coriacea	Leatherback sea turtle	—	FE	no	yes
Gopherus agassizii	Desert tortoise	ST	FT	no	no
Lepidochelys olivacea	Olive Ridley's turtle	—	FT	no	yes

(CDFW 2013b; CDFW 2013c; NOAA 2013b; NOAA 2013c; USFWS 2013b; USFWS 2013c; USMC 2012)

a. SE = state endangered; ST = state threatened; SR = state rare; SCD = state candidate for delisting

b. FE = federally endangered; FT = federally threatened

4.3.8 Radiological

Radioactive materials are present in the reactor and support facilities after operations cease and the fuel has been removed from the reactor core. Exposure to these radioactive materials during decommissioning may result in exposure to workers. Members of the public may also potentially be exposed to radioactive materials that are released to the environment during the decommissioning process. This section reviews the potential radiological impacts and dose implications from the decommissioning of SONGS 2 & 3. Section 4.3.9 addresses radiological impact from accidents at the SONGS site during decommissioning and Section 4.3.17 address radiological impacts from the transportation of radiological waste.

4.3.8.1 Regulations

SONGS will continue to comply with NRC regulations and its license conditions during decommissioning. The regulatory standards for radiation exposure to workers and members of the public are found in 10 CFR Part 20. In addition, NRC regulations in 10 CFR Part 20 and in 10 CFR Part 50 limit the amount of radioactive material, from all sources at a nuclear power plant, released into the environment to levels that are ALARA and that ensure adequate protection of health and safety and the environment. Power reactor licensees are required to meet the requirements in 10 CFR 50.36a for effluent releases after permanent cessation of operations. Licensees are also required to keep releases of radioactive materials to unrestricted areas at levels ALARA. (NRC 2002, Section 4.3.8.1)

Occupational doses are limited to a maximum of 0.05 Sv (5 rem) TEDE per year, with separate limits for dose to various tissues and organs.

The regulatory standard for public dose requires that the sum of the external and internal doses (TEDE) for a member of the public not exceed 1 mSv/yr (0.1 rem/yr). The NRC requires that the licensee demonstrate compliance by measurement or calculation, to show (1) that the highest dose to an individual member of the public from sources under the licensee's control does not exceed the regulatory limits; or (2) that the annual average concentrations of radioactive material released in gaseous and liquid effluents do not exceed the levels specified in 10 CFR Part 20, Appendix B, Table II, at the unrestricted area boundary. In addition, NRC regulations require the dose from external sources in an unrestricted area to not exceed 0.02 millisievert (mSv) (0.002 rem) in any given hour or 0.5 mSv (0.05 rem) in 1 yr. For nuclear power plants, the NRC license imposes the limits in 10 CFR 20 Appendix B as instantaneous rather than annual averages.

In addition to NRC limits on effluent releases, the dose to a member of the public due to the operation of a nuclear power facility must comply with EPA standards in 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations." These standards specify limits on the annual dose equivalent from normal operations of uranium fuel-cycle facilities. Doses are limited to a maximum total body dose of 0.25 mSv (25 mrem) from all effluents and direct radiation per year, with separate limits for dose to various tissues and organs. (NRC 2002, Section 4.3.8.1 and Table G-8)

The onsite ISFSI is subject to 10 CFR 72.104 dose limits which require that during operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ. However, as mentioned in Section 1.3, the NRC considers the environmental impacts from spent fuel management in dry storage outside the scope of decommissioning.

4.3.8.2 Potential Radiological Impacts of Decommissioning Activities

Nearly all decommissioning activities have the potential to contribute to radiological impacts (NRC 2002, Table E-3). Many activities that take place during decommissioning are generally similar to those that occur during normal operations and maintenance activities. Those activities include decontamination of piping and surfaces in order to reduce the dose to nearby workers. Removal of piping or other components, such as pumps and valves, and even large components, such as heat exchangers, is performed in operating facilities during maintenance outages. However, some of the activities, such as removal of the reactor vessel or demolition of facilities, are unique to the decommissioning process. (NRC 2002, Section 4.3.8.2) The SONGS 2 & 3 decommissioning activities, further discussed in Section 3.2, are expected to fall within these categories and tasks.

Ongoing Radioactive Effluents

SONGS 2 & 3 will continue to have gaseous and liquid radioactive effluents during decommissioning from decommissioning activities and maintaining the spent fuel pools and other systems operation.

Radiological Waste

Table 4.3.8-1 lists the radiological waste volumes for SONGS 2 & 3 during 2010, 2011, and 2012. Radiological waste will continue to be generated from maintenance of systems, radiological surveys, and monitoring prior to decommissioning, but are expected to remain at low generation rates bounded by those at SONGS 2 & 3 in recent years.

As decommissioning and dismantlement activities begin, large volumes of radiological waste will be generated, the majority of which will have low levels of radioactivity. Table 3.2.2-1 presents the estimated quantities of radiological waste by waste class, including the decommissioning of the dry storage facility. The total estimated radiological waste volume (packaged) is approximately 3.5 million cubic ft (99,000 m^3).

Dry Storage

The current dry storage of spent fuel and the additions to dry storage as the spent fuel is transferred from wet storage will also emit direct radiation that is mitigated by the shielding provided by the dry cask system and the ISFSI. However, as mentioned in Section 1.3, the NRC considers the environmental impacts from spent fuel management in dry storage outside the scope of decommissioning.

Groundwater

The groundwater beneath SONGS is not potable and unlikely to be used as a drinking water source even after the eventual decommissioning of the site (SONGS 2007a). In May 2006, U.S. commercial nuclear power plants developed an industry-wide voluntary GPI to implement measures to minimize the potential for inadvertent releases of radioactive liquids to the environment and to enhance public trust and confidence in the industry (NEI 2007).

In 2006, during removal of structures within the containment sphere as part of the Unit 1 decommissioning, water was identified between the Unit 1 containment sphere and the underlying reinforced concrete foundation. Some sample results had detectable values of tritium. (SCE 2006) An investigation was performed to characterize these low concentrations of tritium and to identify the potential source. The investigation determined that the low concentrations are present in the shallow ground water situated generally between the former Unit 1 containment and fuel handling building, and extend towards the seawall. An extraction plan has been implemented to initiate hydraulic containment of the plume and facilitate monitoring and documentation of any changes in tritium concentration. The water from the extraction wells is managed and discharged through an ODCM-credited release point and accounted for in the liquid effluent releases reported in annual radioactive effluent release reports. (SONGS 2012a, Section K)

As part of SCE's implementation of the industry GPI, SCE has installed additional wells and boreholes to investigate the source of the tritium concentrations found in the water beneath Unit 1 (Figure 4.3.8-1). The network consists of 18 groundwater investigation wells and four extraction wells (GW-NIA-12, -13, -14, and -15) installed as part of the investigation plan.

Results of tritium analysis of onsite groundwater sampled since 2007 have been reported in annual radioactive effluent release reports for SONGS (SONGS 2007b; SONGS 2008b; SONGS 2009; SONGS 2010; SONGS 2011b; SONGS 2012a). Groundwater samples from the majority of the site's onsite monitoring wells have not identified tritium above detectable levels; there have been three wells in which tritium has been detected outside the NIA. The results of the GPI sampling program are provided in Appendix A. Once monitoring results indicate that there is no longer a need to monitor the groundwater, the wells will be appropriately removed or closed and capped.

Even though there is no drinking water pathway at SONGS, samples are taken monthly of off-site drinking water sources in the area as part of the Radiological Environmental Monitoring Program (REMP) program. Water samples are analyzed for a variety of isotopes, including tritium, as specified in the ODCM. Sample data have not detected tritium attributable to plant operations in off-site drinking water supplies. (SONGS 2012b, Appendix K)

Dewatering

In addition to these effluents, as discussed in Section 4.3.3, removal of SONGS 2 & 3 structures below the groundwater elevation will require dewatering. The groundwater removed during dewatering will be managed and accounted for as required to comply with NRC regulations, NUREG-1575, and license conditions.

4.3.8.3 Evaluation

Occupational Dose

SCE reviewed decommissioning activities related to stabilizing systems for wet storage of spent nuclear, transfer of spent fuel into dry storage, and decommissioning, dismantlement, removal of the SONGS 2 & 3 structures, and packaging and loading radiological waste for transport. SCE would expect the SONGS occupational dose to be bounded by NRC's estimate for occupational dose from decommissioning a pressurized water reactor (PWR) dose. SCE's review took into account that major components of SONGS 2 & 3 which often contribute to area dose rates are relatively new (steam generators and reactor vessel heads) and the implementation of operational dose reduction efforts (i.e., zinc injection). SCE plans to develop a more detailed estimate to support development and evaluation of decontamination work plans. (SCE 2014b)

The NRC considered estimates for occupational dose in its 1988 review of decommissioning impacts, NUREG-0586 (NRC 1988, Table 4.3-2). In its 2002 Supplement 1 to NUREG-0586, the NRC reviewed data available from decommissioning experience subsequent to the 1988 review. Because the range of cumulative occupational doses reported by reactors undergoing decommissioning was similar to the range of estimates for reference plants presented in the 1988 GEIS, the NRC did not update its estimates for occupational dose. (NRC 2002, Section 4.3.8.3)

As presented in Section 4.3.8.2, the regulatory standard for worker exposure is a dose limit per worker rather than a cumulative dose. Under NEPA, radiological impacts are considered undetectable and non-destabilizing if doses remain within regulatory limits. The decommissioning activities will involve radiological surveys prior to decontamination activities and decommissioning activities will be conducted with ongoing monitoring and radiation protection for personnel. The activities that have potential radiological impacts will be conducted following approved procedures to keep doses ALARA and well within regulatory limits.

Public Dose

NRC also considered public dose estimates for DECON from reference PWR and BWR reactors in its 1988 review. The public dose estimate for the reference PWR was estimated to be 21 person-rem. These estimates were attributable to public exposure resulting from truck shipments of radiological waste. The public dose resulting from decontamination activities was estimated to be negligible. (NRC 1988, Tables 4.3-2 and 5.3-2)

In its 2002 Supplement 1 to NUREG-0586, the NRC again considered the potential for public dose. However, in this review, the NRC considered public impacts from decommissioning activities onsite and public impacts from transportation of radiological waste separately. (NRC 2002, Sections 4.3.8 and 4.3.17)

To determine the relative significance of the estimated public dose resulting from decommissioning, NRC compared dose projections for decommissioning with the historical (baseline) doses experienced at PWRs and BWRs during normal operations. The NRC found that the levels of radionuclide discharges from facilities undergoing decommissioning were decreased from those of operating plants because the major sources generating radioactive gaseous and liquid effluents are absent in facilities that have been shut down. However, the decommissioning facilities continued to report low levels of radionuclide discharges from the residual radioactive materials remaining in the facilities. Table 4.8.3-2 presents the SONGS (Units 1, 2, and 3) effluents from three operating years (2007, 2008, and 2009), from 2010 and 2011, when the units were undergoing the steam generator replacements, and from 2012, when neither unit operated more than one month. The effluent releases that the NRC considered in NUREG-0586, Supplement 1, are presented in Table 4.3.8-2 for comparison. All SONGS annual radioactive releases and resulting doses generated by SONGS were well below the applicable limits for both gaseous and liquid effluents (SONGS 2007b; SONGS 2008b; SONGS 2009; SONGS 2010; SONGS 2011b; SONGS 2012a).

The NRC estimated public doses from the effluents reported by the decommissioning plants and compared the dose with those of operating plants. The NRC concluded that reactors undergoing decommissioning could reasonably be expected to have radioactive discharges and public doses comparable to or substantially less than the levels experienced during normal operation of those facilities. Collective doses to members of the public within 50 mi (80 km) were lower than 0.01 person-Sv (1 person-rem) per year at all decommissioning facilities for which data were available, and, in most cases, they were comparable to or lower than the doses from operating facilities. Dose to a maximally exposed individual was less than 0.01 mSv/yr (1 mrem/yr) at both operating and decommissioning facilities, which is well within the regulatory standards in 10 CFR Part 20 and Part 50. (NRC 2002, Section 4.3.8.3) Thus, this 2002 review was in agreement with the 1988 reference plant estimate of negligible public dose from onsite decommissioning activities.

SCE does not have a site-specific population dose estimate for decommissioning at the present time. SCE intends to keep the public doses attributable to SONGS 2 & 3 decommissioning within the PWR reference plant range estimated by the NRC and to keep the dose ALARA (NRC 1988; SCE 2013c). As mentioned above, in 1988, NRC estimated the public dose from onsite decommissioning activities to be negligible and affirmed this in 2002. Further, in the 2002 review, NRC concluded that reactors undergoing decommissioning could reasonably be expected to have radioactive discharges and public doses comparable to or substantially less than the levels experienced during normal operation of those facilities (NRC 2002, Section 4.3.8.3).

The SONGS REMP results for 2011 demonstrated that the radiological environmental impact of the operation of SONGS through 2011 has been negligible, and the resulting dose to a member of the general public is negligible and the results a year later in 2012 were the same (SONGS 2011c; SONGS 2012b). This is in agreement with the FES for SONGS 2 & 3, which estimated the collective dose for the 2000 population within 50 mi (80 km) of SONGS to be 21 person-rem from gaseous effluents and 0.17 person-mSV (0.17 person-rem) from liquid effluents. The background dose was estimated to be 7,000 person-SV (700,000 person-rem). The FES estimated the annual total body dose to the maximally exposed individual to be 0.028 mSV (2.8 mrem) per unit for gaseous releases and 0.00064 mSV (0.064 mrem) for liquid releases. (NRC 1981, Table 5.3)

The public dose from the radiological waste is discussed in Section 4.3.8.2; the radiological impacts from the transportation of radiological waste are discussed in Section 4.3.17.

As mentioned above, the spent nuclear fuel will be transferred into dry storage at SONGS. The dry storage facility is known as the ISFSI. SONGS currently has about 800 Unit 2 & 3 and about 400 Unit 1 fuel assemblies in dry cask storage (SCE 2013d) in the ISFSI. The ISFSI will be expanded as needed to accommodate the spent nuclear fuel being transferred to dry cask storage. SCE estimates that there are 2,776 fuel assemblies in the SONGS 2 & 3 spent fuel pools (SCE 2013d). SCE monitors the public exposure from the ISFSI in its REMP. The closest publicly accessible location is along the San Onofre Beach access road, outside the plant's perimeter. Assuming a maximum occupancy of 300 hours per year, the dose to a member of the general public is < 1 mrem [0.001 mSv (0.001 rem)] per year at this location. (SONGS 2012b, Appendix J). The expansion of the ISFSI could result in an increase in public dose at this location; however, if so, the increase in public dose will remain well under the public dose limit of 1 mSv/yr (0.1 rem/yr). The NRC considered the dose from spent fuel management outside the scope of its decommissioning GEIS (NRC 2002, Section 1.3 and 4.3.8.3).

Within the past several years, there have been numerous events at power reactor sites which involved unintended or inadvertent release of liquids containing radioactive material into the groundwater. In 2006, the NRC's executive director for operations chartered a task force to conduct a lessons-learned review of these incidents. This NRC task force and the GPI discussed above are working to enhance and improve groundwater protection at nuclear power plants. On September 1, 2006, the NRC task force issued its report: *Liquid Radioactive Release Lessons Learned Task Force Report*. (NEI 2007) The most significant conclusion dealt with the potential health impacts on the public from the inadvertent releases. Although there were multiple events where radioactive liquid was released to the groundwater inadvertently, based on the data available, the task force did not identify any instances where public health and safety was adversely impacted. (NEI 2007)

As mentioned above, in response to the voluntary industry GPI, SONGS installed 9 groundwater monitoring wells, 9 investigation wells, and four extraction wells on site, which are shown in Figure 4.3.8-1. Additional investigation wells and boreholes have been installed during the investigation of the area formerly occupied by Unit 1 and currently referred to as the NIA, and dewatering wells were used to support removal of Unit 1 structures. Groundwater sample data indicated the presence of low but detectable levels of tritium in shallow ground water in the area formerly occupied by Unit 1, attributable to legacy activities. The concentrations of tritium are below all regulatory limits (SONGS 2012a, Section K); full results of the SONGS GPI sampling program are provided in Appendix A. There was one instance when gamma activity was above detectable limits (~2,700 picocuries per liter on 10/16/2007 from well U1 DW6, a dewatering well to support Unit 1 decommissioning). (SONGS 2007b; SONGS 2008b; SONGS 2009; SONGS 2010; SONGS 2011b; SONGS 2012a)

The wells sampled and showing detectable levels of tritium are not drinking water wells. The closest two drinking water wells to SONGS are MCBCP wells #52028 and #52023, both located a little over a mile north of SONGS (Figure 4.3.3-1). The groundwater gradient flows northeast to southwest, effectively from these wells to SONGS and then to the ocean. Therefore, there is no groundwater pathway for drinking water contamination from SONGS. Additionally, these drinking water wells have been sampled monthly and have shown no detectable tritium or plant related isotopes. (SONGS 2012b, Appendix K)

As mentioned above, the removal of structures below the water table will require dewatering. The water from dewatering will be managed according to applicable permits and discharges will be made in accordance with discharge limits in the NDPES and any other applicable permits and NRC effluent and dose limitations. The influence of the dewatering on the groundwater quality beneath SONGS is also discussed in Section 4.8.3.3. The dewatering process will be subject to work procedures and practices to keep exposure levels to workers ALARA.

4.3.8.4 Conclusions

SCE will continue to monitor effluents, comply with all applicable regulatory limits, implement the GPI, continue its REMP to assess the impacts to the environment from these effluents annually, and keep worker exposure levels ALARA. As presented above in Section 4.3.8.3, SCE estimates that SONGS 2 & 3 decommissioning activities would result in occupational and public doses within or below NRC estimates.

In its GEIS for decommissioning, the NRC generically determined radiological impacts to be SMALL (NRC 2002, Section 4.3.8.4); therefore, the radiological impacts of SONGS during decommissioning are bounded by this previously issued EIS. As the details of SONGS 2 & 3 decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

Table 4.3.8-1: Radiological Waste Shipments

	2010	2011	2012	Average
Radwaste shipments[a]	29	115	32	59
Radwaste volume (m^3) (packaged)	408	1544	957	970
Activity (curies)	0.443	486	115	200

a. (SONGS 2010; SONGS 2011b; SONGS 2012a)

Table 4.3.8-2: SONGS Station Radioactive Effluents (in Ci)

Source	Gaseous Path Total	Liquid Path Total
2002 GEIS Operating Reactors[b] Effluents	1.5E+02	6.7E+02
2002 GEIS Decommissioning Reactors[b] Effluents	4.0E+01	1.4E+00
SONGS Station[a] Effluents 2007	1.88E+02	1.82E+03
SONGS Station[a] Effluents 2008	1.62E+02	1.04E+03
SONGS Station[a] Effluents 2009	1.92E+02	1.06E+03
SONGS Station[a] Effluents 2010	2.08E+02	8.69E+02
SONGS Station[a] Effluents 2011	2.12E+02	1.16E+03
SONGS Station[a] Effluents 2012	2.03E+02	9.77E+02

a. (SONGS 2007b; SONGS 2008b; SONGS 2009; SONGS 2010; SONGS 2011b; SONGS 2012a)

b. (NRC 2002), Table G-15)

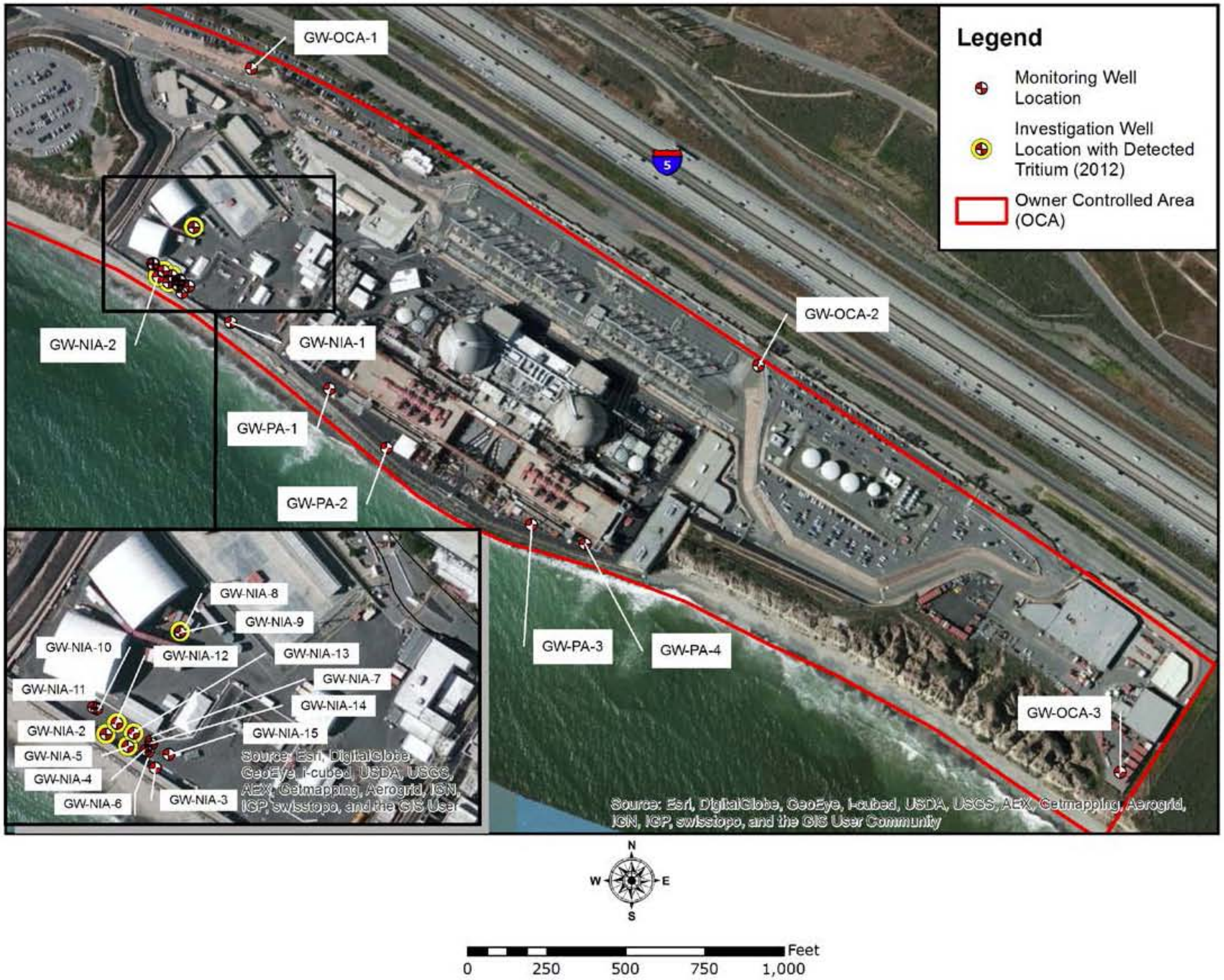

Figure 4.3.8-1: SONGS Onsite Groundwater Wells

4.3.9 Radiological Accidents

Once the reactor permanently shuts down, the potential for a radiological accident that results in public exposure is greatly reduced; however, the potential for accidents with consequences offsite remains.

Postulated radiological accidents considered in licensing nuclear power plants are classified as design basis accidents (DBAs) and beyond design basis (severe) accidents. The NRC examined decommissioning activities to identify postulated accidents that could occur during decommissioning. The only DBAs or severe accidents (beyond design basis) applicable to a decommissioning plant are those involving the spent fuel pool. (NRC 2002, Section 4.3.9)

As stated in NUREG-0586, the NRC relies in part on the waste confidence rule for determining the acceptability of environmental impacts from the storage and maintenance of fuel in the spent fuel pool. The waste confidence rule concerns the continued storage of spent nuclear fuel after the licensed life of reactor operation until the DOE, or its successor agent, takes possession of the spent fuel. The NRC's 2010 Waste Confidence Decision and Rule were challenged in court. On June 8, 2012, the U. S. Court of Appeals for the D.C. Circuit found that some aspects of the 2010 decision did not satisfy the NRC's NEPA obligations and vacated both the decision and the rule [New York v. NRC, 681 F.3d 471 (D.C. Cir. 2012)]. In response to the court's actions, the NRC is developing a generic EIS to support a final waste confidence decision and temporary storage rule. In their staff requirements memorandum, NRC commissioners directed the NRC staff to develop a schedule for September 2014 finalization of a generic EIS, waste confidence decision, and temporary storage rule. (NRC 2013c)

As explained in NUREG-0586 Supplement 1 (NRC 2002), in addition to relying on the waste confidence rule, staff elected to independently analyze potential impacts of non-spent-fuel-related radiological accidents resulting from decommissioning and of spent-fuel-related radiological accidents resulting from decommissioning (NRC 2002, Section 4.3.9 and Appendix I). Staff reviewed the potential accidents associated with spent fuel storage during decommissioning, the likelihood of the accidents, and the potential consequence of accidents. NRC staff analysis was based on information from licensees analyzing accidents from decommissioning activities and completed a technical review of spent fuel pool accident risk at decommissioning nuclear power facilities. Given that emergency plans and procedures will remain in place to protect health and safety while the possibly of significant radiological accidents associated with spent fuel exists and the very low likelihood that a significant accident will occur, the GEIS concludes the potential impact of radiological accidents associated with decommissioning to be SMALL.

As noted in Section 1.3, the NRC considers the environmental impacts from spent fuel management in dry storage outside the scope of decommissioning. Therefore, accidents involving the SONGS ISFSI are not addressed in this evaluation.

4.3.9.1 Regulations

Federal: NRC

The regulatory standards for radiation exposure to workers and members of the public are found in 10 CFR Part 20. Occupational doses are limited to a maximum of 0.05 Sv (5 rem) TEDE per year, with separate limits for dose to various tissues and organs. The regulatory standard for a member of the public is that TEDE not exceed 1 mSv/yr (0.1 rem/yr).

Regulations governing accidents that must be addressed by nuclear power facilities, both operating and shutdown, are found in 10 CFR Parts 50, 52, and 100. Radiological accidents considered in licensing nuclear power plants are DBAs and severe accidents. An analysis of these accidents is required in the plant's final safety analysis report (FSAR), which is part of the licensing basis for the plant. The types of accidents considered in the FSAR that are applicable to decommissioning activities or events that could occur while the facility is undergoing decommissioning include the following:

- Cask or heavy load-handling accident with a subsequent drop into spent fuel pool.
- Loss of cooling for the spent fuel pool or loss of water from the spent fuel pool.
- Materials handling event (non-fuel).
- Radioactive liquid waste releases.
- Accidents from handling spent resin.
- Fire.
- Explosions.
- External events.
- Transportation accidents.

SCE addresses accidents in Chapter 15 of its FSAR (SONGS 2013). SCE will update the FSAR to reflect decommissioning activities so that the licensing basis remains current. As required by 10 CFR 50.71(e)(4), subsequent revisions updating the licensing basis must be filed with the NRC at least every 24 months by nuclear power facilities that have submitted certifications for permanently ceasing operations and for permanent removal of fuel. NRC Regulatory Guide 1.184, "Decommissioning of Nuclear Power Reactors," lists accident analysis as an FSAR section that should continue to be updated periodically, directing the licensee to update the FSAR accident analysis in the following technical regulation (NRC 2013d):

> *8.2.7 Accident Analysis*
>
> *The licensee should evaluate any new or different design-basis accidents identified during a 10 CFR 50.59 evaluation of a planned change and include*

them in FSAR updates if appropriate (for example, consideration of accidents involving a newly installed gas pipeline within or near the facility). Conversely, as decommissioning progresses, any design-basis accidents that are no longer possible may be removed from the FSAR or comparable document (e.g., the design basis of a facility that has transferred its spent fuel from the spent fuel pool to an independent spent fuel storage installation would be significantly changed, and the FSAR should be updated to reflect this).

In addition, Appendix E to 10 CFR Part 50 requires each licensee to develop emergency plans and implementing procedures to protect public health and safety in the event of an accident. These plans and procedures are maintained up to date during the period of operation of the plant and until such time after the cessation of plant operations that the NRC grants relief from the emergency planning requirements. (NRC 2002, Section 4.3.9.1)

Federal: EPA

The EPA also has applicable standards regarding radiological accidents. EPA's protective action guides for radiological incidents call for action to protect the public such as sheltering-in-place or evacuation at 10 mSv (1 rem) projected effective dose equivalent from external radiation exposure (i.e., groundshine and cloudshine) and the committed effective dose equivalent from inhaled radioactive material (EPA 1992). The EPA reviewed its protective action guides and has published a draft updated manual; however, the protective action guide regarding the initiation of evacuation or sheltering-in-place in the early phrase of a radiological incident was not changed (EPA 2013b).

State: California Office of Emergency Services

The California Office of Emergency Services (OES) consists of regional operations, local emergency agencies, mutual aid, fire and rescue, hazardous materials, law enforcement, threat response and reporting suspicious activity. The OES works with, coordinates and responds to multiple types of emergency response situations.

State: California Department of Public Health

The Radiologic Health Branch (RHB) is within the Food, Drug, and Radiation Safety Division of the Department of Public Health. The RHB enforces the laws and regulations indicated below designed to protect the public, radiation workers, and the environment. RHB is responsible for providing public health functions associated with administering a radiation control program. This includes licensing of radioactive materials, registration of X-ray-producing machines, certification of medical and industrial X-ray and radioactive material users, inspection of facilities using radiation, investigation of radiation incidents, and surveillance of radioactive contamination in the environment.

RHB administers and enforces the following laws and implementing regulations:

- Radiation Control Law (Health & Safety Code Sec. 114960 et seq.)
- Radiologic Technology Act (Health & Safety Code Sec. 27(f))

- Nuclear Medicine Technology Certification (Health & Safety Code Secs. 107150 through 107175)

Regulations implementing the above laws are in Title 17, California Code of Regulations, Division 1, Chapter 5, Subchapters 4.0, 4.5, and 4.7.

4.3.9.2 Potential for Radiological Accidents as a Result of Decommissioning Activities

Many activities that occur during decommissioning are similar to activities that commonly take place during maintenance outages at operating plants such as decontamination and equipment removal. However, during decommissioning such activities may be more extensive than similar activities during reactor operations. Consequently, potential accidents associated with these activities may have a higher probability during decommissioning. Accidents that occur during these activities may result in injury and localized contamination; however, they are not likely to result in contamination offsite. (NRC 2002, Section 4.3.9.2)

Once the reactor fuel has been moved to the spent fuel pool, the only DBAs discussed in the plant's FSAR that are applicable are those associated with the spent fuel pool. These accidents are generally related to fuel handling or dropping a heavy object into the spent fuel pool. As long as the integrity of the spent fuel pool and its supporting systems is maintained, the potential impacts of accidents are bounded by the impacts of those for the spent fuel pool DBAs. (NRC 2002, Section 4.3.9.2)

In the unlikely event that an accident were to lead to a loss of integrity of the spent fuel pool and its supporting systems, the consequences of losing the heat-removal capability or water (coolant) in a spent fuel pool depends on the amount of time since the fuel was last used for power operation. If fuel was recently used for power operation, there may be enough decay heat to cause the water in the spent fuel pool coolant to heat up to the boiling point if forced cooling were lost. Operators are alerted to a loss of level condition by alarms and would take prompt action. If plant operators took no action, boiling would cause the level in the spent fuel pool to decrease over time. The pool level would decrease at a very slow rate (about one foot every several hours to weeks, depending on the age of the stored fuel). (NRC 2000, Section 5.8.4)

Operators have redundant sources of make-up water to add to the pool to maintain the water level. SCE maintains a highly trained workforce with comprehensive programs and procedures to correctly operate and maintain the plant, including the spent fuel pool. The operational and emergency procedures allow personnel to routinely monitor the spent fuel pool level and take actions to prevent any accident or emergency conditions and provide guidance in emergency situations. There is adequate time, multiple water sources, and available redundant equipment needed to ensure the safety of the workers and the public. The potential for a significant spent fuel pool accident is very small.

To ensure that the systems and equipment needed for the spent fuel pool and responding to event or emergency conditions, regulations at 10 CFR 50.65 (a)(1) also require licensees to monitor the performance or condition of structures, systems, or components associated with the storage, control, and maintenance of spent fuel. The structures, systems, or components are to be maintained in a safe condition and in a manner sufficient to provide reasonable assurance that they are capable of fulfilling their intended functions. (NRC 2013d)

The only severe accident of concern during decommissioning is one in which the fuel in the spent fuel pool becomes uncovered and results in a zircaloy fire. (NRC 2002, Section 4.3.9) The resulting fire could carry radioactive particles offsite and the consequences could be significant. However, the NRC staff considers this a very low probability accident because of training, emergency equipment, and design features required for spent fuel storage pools that minimize the possibility of losing all of the spent fuel pool coolant. (NRC 2000, Section 5.8.4; NRC 2002, Section 4.3.9.3) The NRC determined the potential impacts of such accidents to be SMALL (NRC 2002, Section 4.3.9.4).

4.3.9.3 Evaluation

NRC's decommissioning GEIS considered the impacts of accidents where onsite and offsite doses remain below those allowable for the workers or the public to be undetectable. Furthermore, the NRC found that the accidents that are likely to be undetectable include temporary loss of services, certain decontamination-related accidents, such as liquid spills or leaks during in-situ decontamination, and, in some cases, the temporary loss of offsite power or compressed air. (NRC 2002, Section 4.3.9.2)

The NRC considered the impacts of accidents that could result in offsite doses that exceed EPA's protective action guides to be destabilizing (NRC 2002, Section 4.3.9.2). NRC found that the only accidents likely to have destabilizing impacts are those that involve pool drainage that leads to a zirconium fire (NRC 2002, Section 4.3.9.2). The NRC determined that the risk of such an accident is low because of the very low likelihood of a zirconium fire, even though the consequences of a zirconium fire could be serious (NRC 2002, Section 4.3.9.3). The NRC concluded that the impacts of spent fuel storage are SMALL (NRC 2002, Section 4.3.9.4).

The ability of the plant to withstand these accidents was demonstrated to be acceptable before issuance of the operating license through the safety analysis and documented in the FSAR. As discussed above, SCE is required to update the FSAR for decommissioning activities including the accident analysis. The licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant.

The environmental impacts of DBAs, including those associated with the spent fuel pool, were evaluated during the initial licensing process and documented in the FES. The results of that analysis was that from atmospheric releases there is less than 1 chance in 100,000 per year that one or more persons may receive doses equal to or greater than any of the dose levels reviewed, the lowest of which was 0.25 Sv (25 rem) whole body, the lower limit for clinically observable physiological effects in nearly all individuals. The NRC also calculated the annual average value of environmental risk due to accidents to be 1.7 person-Sv (170 person-rem) to the population within 50 mi (80 km) indicating a latent cancer fatality risk of 0.022 based on latent cancer risk factors in use at that time. The NRC found the risk from accidents to be comparable to that of normal operational releases. NRC's overall assessment of environmental risk of accidents, assuming protective action, was that it is roughly comparable to the risk for normal operational releases although accidents have a potential for acute fatalities and economic costs that cannot arise from normal operations. The risk of acute fatalities from potential accidents at SONGS 2 & 3 is small in comparison with the risk of acute fatalities from other human activities in a comparably-sized population. (NRC 1981, Section 7.1)

4.3.9.4 Conclusions

In its GEIS, the NRC, after reviewing existing information from licensees' documents analyzing accidents from decommissioning activities and from a technical review of spent fuel pool accident risk at decommissioning nuclear power facilities, generically determined that the potential impacts of non-spent-fuel related radiological accidents resulting from decommissioning and of spent-fuel-related radiological accidents resulting from decommissioning to be SMALL. This analysis was based on the current design basis and maintaining an acceptable design and performance criteria throughout the life of the plant.

These same conditions are applicable to SONGS as a licensed plant maintaining its license basis and safety analysis along with the environmental impact assessment of radiological accident risk as document in the FES. Therefore, the radiological accident impacts of SONGS during decommissioning are bounded by NRC's decommissioning GEIS. As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

4.3.10 Occupational Issues

Occupational issues are those related to human health and safety of workers. This section addresses non-radiological occupational impacts. Radiological impacts are discussed in Section 4.3.8.

4.3.10.1 Regulations

The Occupational Safety and Health Act of 1970 (29 USC 651 et seq.) was enacted to safeguard the health of the worker. Regulations implementing the act are found in 29 CFR Part 1910. Specific safety and health regulations for construction are included in 29 CFR Part 1926. These regulations are administered by the Occupational Safety and Health Administration (OSHA).

State: California Department of Industrial Relations

The Division of Occupational Safety and Health, better known as Cal/OSHA, protects workers from health and industrial safety hazards on the job in almost every workplace in California through its research and standards, enforcement, and consultation programs. Cal/OSHA oversees programs promoting public safety on elevators, amusement rides, and ski lifts. In addition, the division oversees programs promoting the safe use of pressure vessels (e.g., boilers and tanks).

4.3.10.2 Potential Impacts of Decommissioning Activities on Occupational Issues

As SONGS decommissioning changes from an electrical generation type industry to a more construction-type industry, nearly all decommissioning activities have the potential for occupational health impacts. Typical hazards of concern can be grouped into the following categories: physical, chemical, ergonomic, biological, and radiological. The NRC considers the impacts of decommissioning activities on occupational issues detectable if the accident or injury rate during decommissioning exceeds average U.S. industrial accident rates and considers the impacts destabilizing if decommissioning activities must be halted to address worker safety and the decommissioning schedule is threatened. (NRC 2002, Section 4.3.10.2)

4.3.10.3 Evaluation

SONGS 2 & 3 decommissioning activities will pose physical, chemical, ergonomic, and perhaps biological hazards. SONGS currently has an industrial safety program and safety personnel to promote safe work practices and respond to occupational injuries and illnesses. The program addresses hearing protection, confined space entry, personal protective equipment, electrical safety, fall protection, hazardous waste, chemical handling, heat stress, ergonomics, and other safety hazards. The maintenance and technical training manager is responsible for ensuring workers are trained on these safety procedures. Implementation and compliance with safety policy and procedures includes, but is not limited to, planning safety into work and issuing safe work packages, conducting periodic safety inspections to evaluate workplace hazards, holding pre-job briefings, personal protective equipment, and additional safety practices. (SONGS *n.d.*) This safety program will continue to be in effect during decommissioning activities.

Historically, actual injury and fatality rates at nuclear reactor facilities have been lower than the average U.S. industrial rates. Occupational injury and fatality risks are reduced by strict adherence to NRC and OSHA safety standards, practices, and procedures. In the decommissioning GEIS, the NRC discussed a plant's injury rate as a means of gauging decommissioning activities' impact on occupational issues. (NRC 2002, Section 4.3.10.3) For this evaluation, SCE reviewed the occurrence of injuries at the SONGS for the past five years (2008–2012). During this time frame, steam generators were removed and replaced at Units 2 and 3. These activities are reflective of the heavy dismantlement activities anticipated for the decommissioning of SONGS 2&3. An average occupational injury rate of 0.9 percent was calculated from data on occupational injuries and hours worked for years 2008–2012 (SCE 2013f). The SONGS rate of 0.9 percent falls well below that of the 2011 heavy construction industry sector's non-fatal occupational illnesses and injuries average incident rate of 3.5 and between the 2011 power generation industry as a whole and the nuclear power industry average incidence rates of 2.6 and 0.4, respectively (BLS 2012).

4.3.10.4 Conclusions

SCE will continue to implement its industrial safety program, train its employees on safety procedures, conduct safety inspections, hold pre-job briefings, and other safety-reinforcing practices. For SONGS, the average incidence rate of 0.9 falls well below that of the 2011 heavy construction industry sector's average incident rate of 3.5 and compares favorably with the U.S. 2011 incidence rate for the electrical power generation industry sector of 2.6 (BLS 2012). Because the industrial safety program will be continued and would be expected to continue to be effective in preventing occupational injuries and illnesses, decommissioning activities are expected to have a SMALL impact on occupational issues. In its GEIS for decommissioning, the NRC generically determined occupational issues impacts to be SMALL (NRC 2002, Section 4.3.10.4); therefore, the occupational issues impact of SONGS during decommissioning is bounded by this previously issued EIS. As the details of SONGS 2 & 3 decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification of the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

4.3.11 Cost

A decommissioning cost assessment is not a requirement; however, an accurate decommissioning cost estimate is necessary for a safe and timely plant decommissioning. As instructed in RG 1.185, SCE will evaluate cost as required in the PSDAR Section 3.

4.3.11.1 4.3.11.1 Regulations

See Section 4.3.11, above.

4.3.11.2 4.3.11.2 Potential Impacts of Decommissioning Activities on Cost

See Section 4.3.11, above.

4.3.11.3 4.3.11.3 Evaluation

See Section 4.3.11, above.

4.3.11.4 4.3.11.4 Conclusions

See Section 4.3.11, above.

4.3.12 Socioeconomics

There are two primary pathways through which nuclear power plant activities have the potential to create socioeconomic impacts on the area surrounding the plant. The first is through expenditures in the local community by the plant work force and direct purchases of goods and services required for plant activities. The second pathway for socioeconomic impact is through the effects on local government tax revenues and services. When a nuclear power plant is closed and decommissioned, most of the important socioeconomic impacts will be associated with the plant closure rather than with the decommissioning process. (NRC 2002, Section 4.3.12)

In December 2008, SONGS onsite staff numbers totaled 2,282 persons, with the greatest majority of staff living in San Diego County (1,050 staff persons or 46 percent) and Orange County (776 staff persons or 34 percent). The remaining 456, or 20 percent of SONGS employees, lived in outlying counties or other states, including some who lived in Nevada, Arizona, Idaho, Virginia and Oregon. (SCE 2009d) As of June 2013, SONGS onsite staff numbers had decreased to approximately 575 persons (SCE 2013b). Staff numbers are anticipated to be reduced to 400 onsite staff by September 2014 (SCE 2013b; SCE 2013g).

In this section, socioeconomics are discussed within the context of the decommissioning of SONGS 2 & 3. For the purposes of this analysis, SONGS staffing distribution patterns established in 2008 will be used to evaluate potential socioeconomic impacts in surrounding counties. Because Orange and San Diego counties are where the greatest percentage of SONGS staff lives, they will be analyzed individually for impacts where appropriate data are available.

4.3.12.1 Regulation

There are no federal or state regulations pertaining to any particular level of socioeconomic impacts, as there are for some environmental effects. Socioeconomic impacts are an element of NEPA documentation that must be addressed and mitigated, if warranted. (NRC 2002, Section 4.3.12.1)

4.3.12.2 Potential Impacts of Decommissioning Activities on Socioeconomics

All of the socioeconomic impacts of decommissioning are related to organizational or staffing changes and decreasing tax revenues. The impacts of decommissioning were assessed, recognizing that the potentially large impacts of plant closure may occur simultaneously with those of the actual decommissioning activities. However, as indicated in Section 1.3 (of NUREG-0586, Supplement 1), impacts related to the decision to permanently cease operations are outside the scope of this evaluation. (NRC 2002, Section 4.3.12.2)

Socioeconomic changes related to direct expenditures in the local community are considered not detectable if there is little or no impact on housing values, education and other public services, and local government finances, are not distinguishable from normal background variation due to other causes. Impacts on housing are considered not detectable when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and little or no housing construction or conversion occurs. Detectable impacts result when there is a discernible increase or reduction in housing availability, rental rates and housing values exceed the inflation rate elsewhere in the state, or more than minor housing conversions and additions or abandonments occur. Destabilizing impacts occur when project-related demand results in a very large excess of housing or very limited housing availability, where there are considerable increases or decreases in rental rates and housing values, or when substantial conversion or abandonment of housing units occurs. (NRC 2002, Section 4.3.12.2)

Socioeconomic changes related to tax revenues and services (education, transportation, public safety, social services, public utilities, and tourism and recreation) are considered not detectable if the existing infrastructure (facilities, programs, and staff) could accommodate changes in demand related to plant closure and decommissioning without a noticeable effect on the level of service. Detectable impacts arise when the changes in demand for service or use of the infrastructure is sizeable and would noticeably decrease the level of service or require additional resources to maintain the level of service. Destabilizing impacts would result when new local government programs, upgraded or new facilities, or substantial numbers of additional staff and unsupportable levels of resources are required because of facility-related demand. (NRC 2002, Section 4.3.12.2)

4.3.12.3 Evaluation

Regional Population

NUREG-1437, the GEIS, presents a population characterization method based on two factors: “sparseness” and “proximity” (NRC 1996, Section C.1.4). “Sparseness” measures population density and city size within 20 miles of a site and categorizes the demographic information as follows.

Demographic Categories Based on Sparseness

		Category
Most sparse	1.	Less than 40 persons per square mile and no community with 25,000 or more persons within 20 miles.
	2.	40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles.
	3.	60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles.
Least sparse	4.	Greater than or equal to 120 persons per square mile within 20 miles.

(NRC 1996)

“Proximity” measures population density and city size within 50 miles and categorizes the demographic information as follows.

Demographic Categories Based on Proximity

		Category
Not close proximity	1.	No city with 100,000 or more persons and less than 50 persons per square mile within 50 miles.
	2.	No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 miles.
	3.	One or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 miles.
Close proximity	4.	Greater than or equal to 190 persons per square mile within 50 miles.

(NRC 1996)

The GEIS then uses the following matrix to rank the population in the vicinity of the plant as low, medium, or high.

GEIS Sparseness and Proximity Matrix

		Proximity			
		1	**2**	**3**	**4**
Sparseness	**1**	1.1	1.2	1.3	1.4
	2	2.1	2.2	2.3	2.4
	3	3.1	3.2	3.3	3.4
	4	4.1	4.2	4.3	4.4

Low Population Area

Medium Population Area

High Population Area

The 2010 census population and TIGER/Line data from the U.S. Census Bureau (USCB) were used to determine demographic characteristics in the vicinity of the site. The data were processed at the state, county, and census block levels using ArcGIS (USCB 2013a; USCB 2013b). Census data include people living in group quarters such as institutionalized and non-institutionalized populations. Examples of institutional populations living in group quarters are correctional institutions (i.e., prisons, jails, and detention centers), nursing homes, mental (psychiatric) hospitals, hospitals or wards for the chronically ill, and juvenile institutions. Examples of non-institutional populations living in group quarters are group homes, college dormitories, military quarters, soup kitchens, shelters for abused women (shelters against domestic violence or family crisis centers), and shelters for children who are runaways, neglected, or without conventional housing.

The 2010 census data indicate that approximately 766,816 people live within a 20-mile radius of the SONGS site, which equates to a population density of 610 persons per square mile (USCB 2013a; USCB 2013b, ENERCON 2013, page 7 of 43). According to the GEIS sparseness index, the site is classified as Category 4, least sparse, with greater than or equal to 120 persons per square mile within 20 miles.

The 2010 census data indicate that approximately 8,477,791 people live within a 50-mile radius of the site, which equates to a population density of 1,079 persons per square mile (USCB 2013a; USCB 2013b; ENERCON 2013, page 7 of 43). According to the GEIS proximity index, the site is classified as Category 4, greater than or equal to 190 persons per square mile within 50 miles.

According to the GEIS sparseness and proximity matrix, the combination of "sparseness" Category 4 and "proximity" Category 4 results in the conclusion that the site is located in a "high" population area.

Five counties within the state of California fall within the 50-mile radius: Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties (see Figure 4.3.12-1). For each of the five counties, population estimates are projected to increase over the next 60 years (ENERCON 2013). By 2073, the end of the decommissioning 60-year time frame (as required in 10 CFR 50.82(a)(3)) for SONGS 2 & 3 (RG1.1185, page 7), the total projected population for the 50-mile radius, including transients, is estimated to be 12,819,597 persons. The total projected population (including transients) for the five counties that fall wholly or partially within the 50-mile radius is estimated to reach approximately 29,230,955 persons in 2073. (NRC 2013b, page 7; ENERCON 2013) The 2010–2073 annual average growth rate for all five counties within the radius is 0.51 (ENERCON 2013).[1]

The SONGS site is located in the northwest corner of San Diego County. San Diego County had a 2010 population of 3,095,313 persons. (USCB 2013c) The city of San Diego, located in San Diego County, is approximately 51 miles south-southeast from SONGS. It is the largest city in the 50-mile radius, with a 2010 USCB population of 1,307,402 people. The city of San Diego's population was estimated to increase to 1,338,348 in 2012. (USCB 2013d) Orange County had a population of 3,010,232 in 2010 (USCB 2013c). The city of San Clemente in Orange County is 5 miles north-northwest of SONGS and is the city closest to the site. The city of San Clemente had a 2010 population of 63,522 persons, which is estimated to increase to 64,882 in 2012 (USCB 2013d).

As of September 1, 2013, the SONGS staff has been reduced by 1,707 jobs since 2008. Assuming an equal geographic distribution of staff throughout time, it is estimated that approximately 785 persons from San Diego County were impacted and 581 persons from Orange County were impacted, and 341 persons from outlying counties or other states were impacted when staff downsized to 575 persons. Comparing these estimates to the total population of the counties, it is estimated that the staff reduction impacts to San Diego County and Orange County are 0.03 percent and 0.02 percent, respectively. When comparing the SONGS staff reduction to the workforce of these counties (see area employment and income), the staff reduction impacts to San Diego County and Orange County were approximately 0.04

[1] Population projection information presented in this evaluation differs from the KLD Engineering 2013 population update analysis used for development of the evacuation time estimate study due to different population projection inputs and methodologies.

percent and 0.03 percent, respectively. Because the SONGS staff reduction results in less than three percent change, no impacts are anticipated from staff work force changes to the local population. Staffing estimates developed as part of decommissioning cost projections indicate a peak workforce of approximately 560 (Energy Solutions 2014, Tables 6-2 and 6-3). Any additional staff changes that may occur during decommissioning or post decommissioning are not anticipated to exceed historical operational staffing numbers, nor should any further loss of staff result in less than a three percent change in population in a single year due to the large and growing population in the two counties.

Area Employment and Income

The estimated employed population of San Diego County in 2011 was 1,832,553, which was down from the 2008 total of 1,890,429. The leading occupation in 2011 was the government and government enterprises sector with 18 percent, or 333,408 persons employed. This was followed by the professional, scientific, and technical services sector with 10 percent, or 191,463 persons employed. The annual payroll in San Diego County was approximately $147 billion in 2011, and the average wage per job was $53,990. (BEA 2013) In 2011, per capita personal income was $46,800. While the annual unemployment rate for the county increased from 6.0 percent in 2008 to 10.0 percent in 2011, it has shown a continuous drop since then and was 7.8 percent in July 2013. (BEA 2013; BLS 2013)

The estimated employed population of Orange County in 2011 was 1,897,610, which was down from the 2008 total of 1,985,870. Although no particular occupation sector showed employment dominance, the leading occupation in 2011 was the professional, scientific, and technical services sector with 9.7 percent, or 183,806 persons employed. This was followed by the retail trade sector with 9 percent, or 175,688 persons employed. The annual payroll in Orange County was approximately $154 billion in 2011, and average wage per job was $55,526. (BEA 2013) In 2011, per capita personal income was $50,440. Like San Diego County, the annual unemployment rate for Orange County increased from 5.3 percent in 2008 to 8.8 percent in 2011, but then decreased again to 6.5 percent in July 2013. (BEA 2013; BLS 2013)

San Diego and Orange county economic employment trends followed the state pattern of increasing growth in 2008, falling employment opportunities in 2009 and 2010, and increasing again to the 2011 estimates, which were higher than the preceding two years but not quite at 2008 levels (BEA 2013). San Diego and Orange counties' unemployment rates were both lower than the state unemployment rates for the same time period. Unemployment rates for the state and counties have continued to decrease since 2011, but have not achieved the lower level established in 2008. (BLS 2013) According to California data, economic conditions throughout the state are improving and this illustrates a recovering job market that may help in mitigating any potential socioeconomic impacts due to loss of jobs at SONGS.

Housing

Between 2000 and 2010, the population increased from 2,813,833 to 3,095,313 (10 percent) in San Diego County and 2,846,289 to 3,010,232 (5.8 percent) in Orange County (USCB 2009a; USCB 2013c). During the same time period, the amount of available housing followed the population growth trend, and the number of housing units also increased from 1,040,149 to

1,164,786 (12 percent) in San Diego County, and by 969,484 to 1,048,907 (8.2 percent) in Orange County (USCB 2009b; USCB 2012). With an increase in available housing balanced against a growing population, vacancy rates only grew by 2.3 percent in San Diego and 1.8 percent in Orange County between 2000 and 2010 (USCB 2009b; USCB 2012). This would indicate that enough housing was available in the two counties to accommodate population growth, and a stable housing market exists.

Between 2000 and 2010, median home values for San Diego County increased by 79.1 percent from $227,200 to $407,000. Median rent grew by 64.1 percent, from $761 to $1,249 a month. In the same time period for Orange County, median home values increased by 95.6 percent from $270,000 to $528,200. Median rent grew by 51.9 percent from $923 to $1,402 a month. The cost of housing in the two counties is comparable with other counties in the 50-mile radius. (USCB 2009b; USCB 2012)

Because SONGS is located in highly populated area and both counties show an increase in population, there are no anticipated impacts to housing from staff change at the plant due to decommissioning.

Taxes

SCE's operating income is subject to the California corporate franchise tax. The calculation of ratemaking income taxes is based on federal and state tax laws, California Public Utilities Commission (CPUC) decisions, and established CPUC policy and practice specific to SCE's operations (DRA 2008, p 12-2). SCE pays franchise fees to 241 taxing jurisdictions. Franchise fees are payments made to counties and incorporated cities pursuant to local ordinances granting a franchise to the utility to place utility facilities in public rights of way (DRA 2008, page 12-8).

SCE also pays property, sales and use, and other taxes to San Diego County based on SONGS 2 & 3. These payments are distributed to county programs, schools, cities, special districts, and county agencies within San Diego County. The two largest programs receiving funds from county property tax collections are public protection and public assistance at 31 percent and 33 percent, respectively (SDC 2013a, page 9).

Property taxes account for 15 percent of San Diego's income (SDC 2013a, page 9). SCE was the second largest property tax payer to San Diego County in fiscal year 2011-2012 (SDC 2013b). In fiscal year 2012, SCE had a secured taxable assessed value in San Diego County of approximately $2.2 billion (SDC 2013c, page 168). The total assessed value of taxable property in San Diego County (secured real property) was $387 billion (SDC 2013c, 166). Of this, SONGS contributed $737.5 million toward SCE total assessment of $17.083 billion, or 4.3 percent of the total in 2011-2012 (SCE 2013h). In 2008, the total property tax collections for San Diego County were $3,835,511,407 (SDC 2009a). Of this amount, SCE's property tax payments for 2008-2009 were $19,100,180.12, or approximately 0.5 percent (SDC 2009b). In 2012, the total property tax collections for San Diego County were $3,819,892,000 (SDC 2013c). Of this amount, SCE's property tax payments were $29,326,274.24, or approximately 0.8 percent (SDC 2013b). Because SCE's contribution to the county property tax collections has been consistently less than one percent, no impacts are anticipated due to any potential changes in property tax payments associated with the SONGS. The property tax payments for SONGS throughout the years of decommissioning were assumed to be $1.5 million for decommissioning costing projections (Energy Solutions 2014, Section 5.0). NUREG-0586, Supplement 1 indicates that any changes in tax revenues less than 10 percent are considered not detectable and would result in little or no change to local property tax rates. (NRC 2002)

Sales and use taxes are paid on purchases made by SONGS 2 & 3. When a transaction is regarded as a sale of tangible personal property, California sales tax applies to the gross receipts from the furnishings thereof, without any deduction on account of the work, labor, skill throughout, time spent, or other expense of producing the property. (BOE 2009, page 2) SCE paid a total of $9,452,214 in sales and use taxes in 2012 on behalf of SONGS 2 & 3 (SCE 2013h). These taxes are paid to the county of San Diego and other local jurisdictions. In 2012, sales and use taxes account for one percent of San Diego's annual income. (SDC 2013a, page 9)

4.3.12.4 Conclusions

It is anticipated that there would be little or no socioeconomic impact in the local community due to the closure of SONGS 2 & 3 or because of changes in staffing levels at the plant. The population in the 50-mile radius is expected to continue growing throughout the decommissioning time period, and the economy and job market shows signs it will continue to improve. The housing market is stable, with adequate units to meet the housing demand due to population growth. While SCE has a strong tax presence in San Diego County, the SONGS property assessment is a relatively small portion of San Diego's total tax collections. SCE's tax obligations will be reduced due to SONGS decommissioning, but SCE and SONGS will continue to contribute to county tax revenues throughout the decommissioning time period and there would be no negative impact to services in the community.

Considering the available information on decommissioning onsite, it is anticipated that there would be no changes or impacts to the local community and socioeconomic conditions would be bounded. In its GEIS for decommissioning, the NRC generically determined socioeconomic impacts to be SMALL (NRC 2002, Section 4.3.12.4), and therefore, SONGS socioeconomic impacts during decommissioning is bounded by this previously issued EIS.

Figure 4.3.12-1: SONGS and 50-Mile Radius

4.3.13 Environmental Justice

The NRC performs environmental justice analyses utilizing a 50-mile radius around the plant as the environmental impact area. LIC-203, Revision 3, defines a geographic area for comparison as either a 50-mile radius centered on the nuclear plant or other appropriate units of geographic analysis representative of the general population (e.g., state or county). For this assessment, the 50-mile radius was selected as the environmental impact area, and because the entire region within 50 mi of SONGS is located within the state of California, the state was selected as the geographic area for comparison.

LIC 203, Revision 3, indicates that the most recent USCB decennial census data be used for the low-income and minority environmental justice analyses. While minority data are available as part of the 2010 census, low-income data are collected separately from the decennial census and are available as 5-year averages. To complete this evaluation, the 2006–2010 low-income data and 2010 minority population data for California were obtained from the USCB website and processed using ArcGIS 10.1 software. All census data were downloaded in USCB block group level geography so that the environmental justice evaluations were consistent between the minority and low-income analyses.

4.3.13.1 Regulations

An evaluation of environmental justice is performed to determine if minority and/or low-income populations bear a disproportionate share of negative environmental consequences. Executive Order 12898, dated February 16, 1994 (59 FR 7629), directs federal executive agencies consider environmental justice under NEPA. NUREG 0586, Supplement 1 notes: "although NRC is an independent agency, the Commission has committed to undertake environmental justice reviews . . ."

4.3.13.2 Potential Impacts of Decommissioning Activities on Environmental Justice

Decommissioning activities that may potentially affect identified minority and low-income populations are related to staffing changes and offsite transportation. However, the assessment of environmental justice is related to most of the other specific issues discussed throughout this EIE (e.g. water use, air quality, etc.). Any decommissioning activity that results in a disproportionate share of negative environmental impacts to identified minority or low-income populations has the potential to be an adverse environmental justice impact.

As noted in NUREG-0586, Volume 1, detectability and destabilization, as they relate to environmental justice evaluations, must be defined in proportion to the minority and low-income populations that reside in proximity to the power plant.

4.3.13.3 Evaluation

Minority Populations

NRC procedural guidance defines a "minority" population as Black or African American, American Indian or Alaskan Native, Asian, Native Hawaiian or Pacific Islander, other, two or more races, the aggregate of all minority races, Hispanic or Latino ethnicity, and the aggregate of all minority races and Hispanic ethnicity (NRC 2013e, pages D-4 and D-5). The guidance indicates that a minority population is considered present if either of the following conditions exists:

1) The minority population in the census block group exceeds 50 percent; or

2) The minority population percentage is more than 20 percentage points greater in the census block group than the minority percentage of the geographic area chosen for the comparative analysis (e.g., individual state).

To establish minimum thresholds for each minority category, the non-white minority population total for the state was divided by the total population of the state. As described in the second criterion, 20 percent was added to the minority percentage values for each geographic area. The lower of the two NRC conditions for a minority population was selected as defining a minority area (i.e., census block group minority population exceeds 50 percent, or minority population is more than 20 percent greater than the minority population of the geographic area). Any census block group with a percentage exceeding this value was considered a minority population. Minority percentages for California are shown in Table 4.3.13-1.

For example, a minority category of "Aggregate of All Races" is created when the populations of all the 2010 U.S. Census minority categories are summed. The 2010 "Aggregate of All Races" category, when compared to the total population, indicates 42.4 percent of the population in the state is minorities (Table 4.3.13-1). (USCB 2013c) Using the second criterion listed above for identification of a minority population, any census block group with a combined minority population equal to or greater than 62.4 percent would be considered a minority population. Because 62.4 percent exceeds the criterion of 50 percent, the first criterion (50 percent) would be used in identifying minority block groups within the SONGS 50-mile radius.

Although the Hispanic ethnicity is not considered a race by the USCB, Hispanics are represented in the census-defined race categories. Because Hispanics can be represented in any race category, some white Hispanics not otherwise considered minorities become classified as a minority when categorized in the "Aggregate and Hispanic" category. Also, Hispanics of non-white racial background are included in both the race categories and the Hispanic category, and thereby counted twice. The "Aggregate and Hispanic" category, however, results in the greatest chance of consideration of populations within a block group to be classified as minority.

The number of census block groups contributing to the minority population count was evaluated using the criteria shown in Table 4.3.13-1 and summarized in Table 4.3.13-3. The results of the evaluation are census block groups identified as having a minority population(s). The resulting maps (Figures 4.3.13-1, 4.3.13-2, 4.3.13-3, 4.3.13-4, 4.3.13-5, 4.3.13-6, 4.3.13-7, 4.3.13-8, and 4.3.13-9) depict the location of minority population census block groups identified according to each race or aggregate category. (USCB 2013a; USCB 2013b)

The percentage of census block groups exceeding the "Aggregate of All Races" minority population criterion was 30.2 percent based on total number of block groups with population within the 50-mile radius. For the "Aggregate and Hispanic" category, 66 percent of the block groups contained minority populations. The number of identified minority block groups was significantly reduced when races were analyzed individually. (USCB 2013a)

The identified minority population closest to SONGS is located in San Clemente, CA, approximately 5 mi northwest of the site in Block Group 60590421082. This census block group contained a total of 678 people, with over 50 percent of the population falling under the “Aggregate and Hispanic” category. (USCB 2013a; ESRI 2013b)

When individual race or ethnicity categories were analyzed, no block groups were located within a 6-mile radius that met the criteria for a minority population. The nearest block group from the individual category assessment was Block Group 60590423104. Located approximately 10 mi from SONGS in San Juan Capistrano, CA, this block group had a total population of 2,303 persons, with over 50 percent of the population falling within the “Hispanic or Latino” category. (USCB 2013a; ESRI 2013b)

Low-Income Populations

NRC guidance defines “low-income” using USCB statistical poverty thresholds for individuals or families (NRC 2013e, page D-5). As addressed above with minority populations, the state of California was used as the geographic area for comparison in this analysis.

The guidance indicates that a low-income population is considered present if either of the two following conditions exists:

1) The low-income population in the census block group exceeds 50 percent; or

2) The percentage of households below the poverty level in a block group is significantly greater (typically at least 20 percentage points) than the low-income population percentage of the geographic area chosen for the comparative analysis (e.g., individual state).

The latest data provided in block group geography corresponding to the low-income population are available from the USCB in the 2006–2010 American Community Survey. To establish minimum thresholds for the *individual* low-income category, the population with an income below the poverty level for the state of California was divided by the total population for whom poverty status is determined in the state. To establish minimum thresholds for the *family* low-income category, the family population count with an income below the poverty level for the state of California was divided by the total family population count in the state. As described in the second criterion, 20 percent was added to the low-income values for individuals and families. Neither category of low-income Individuals or low-income families fell under the first criterion of exceeding 50 percent.

When the 2006–2010 census data category “income in the past 12 months below poverty level” (individual) is compared to “total population for whom poverty status is determined,” 13.7 percent of the population in the state of California were identified as having an income below poverty level (Table 4.3.13-2). (USCB 2013c)

According to the USCB, the state of California had an estimated 8,495,322 families. When the 2006–2010 census data family category “income in the past 12 months below poverty level” is compared to “total” family count, 2.4 percent of the families in the state had an income below poverty level (Table 4.3.13-2). (USCB 2013c)

Following the second criteria, any census block group within the 50-mile radius of SONGS with a low-income population equal to or greater than 33.7 percent of the total block group population would be considered a “low-income population” (individual). Within the 50-mile radius of SONGS, 266 of the total 5,046 census block groups (5.3 percent) have low-income individual population percentages which meet or exceed the percentages in Table 4.3.13-2. These census block groups are illustrated in Figure 4.3.13-10. (USCB 2013b; USCB 2013e)

Any census block group within the 50-mile radius of SONGS with a low-income population equal to or greater than 22.4 percent of the total block group population would be considered a “low-income population” (family). Within the 50-mile radius of SONGS, 262 of the total 5,046 census block groups (5.2 percent) have low-income individual population percentages which meet or exceed the percentages in Table 4.3.13-2. These census block groups are illustrated in Figure 4.3.13-11. (USCB 2013b; USCB 2013e)

The closest low-income block group (60590423123) that meets the guidance criteria for individuals or families is located approximately 11 mi northwest of SONGS in San Juan Capistrano, CA. No low-income populations were identified in the 6-mile vicinity of SONGS during the environmental justice review (USCB 2013e).

4.3.13.4 Conclusions

Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant and appreciably exceeds the risk or exposure rate for the general population or for another appropriate comparison group. In addition, a disproportionately high environmental impact that is significant refers to an impact or risk of an impact on the natural or physical environment in a low-income or minority community that appreciably exceeds the environmental impact on the larger community. Such effects may include ecological, cultural, human health, economic, or social impacts. (NRC 2013e, page D-1)

In its GEIS for decommissioning, the NRC concluded that adverse environmental justice impacts and associated significance of the impacts must be determined on a site-specific basis. As described throughout Chapter 4 of the EIE, SCE has determined that no significant offsite environmental impacts will be created by SONGS 2 & 3 decommissioning activities. Environmental impacts specific to SONGS staffing are discussed in Section 4.3.12, where it was determined that SONGS location and staffing distribution within a high population area moderates any negative issues that may arise due to staffing changes. Potential offsite transportation issues are discussed in Section 4.3.17. Based on NUREG 0586 conclusions, transportation impacts from decommissioning are not detectable or destabilizing, and any potential transportation impacts are determined to be SMALL. As LIC-203 recognizes (NRC 2013e, page D-2), if no significant offsite impacts occur in connection with the proposed action, then no member of the public would be substantially affected. Therefore, there can be no disproportionately high and adverse impact or effects on members of the public, including minority and low-income populations, resulting from the decommissioning of SONGS 2 & 3. As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

Table 4.3.13-1: Minority Populations Evaluated Against Criterion

	Geographic Area	California[a]	
	Total Population[a]	37,253,956	
Census Categories	**State Population by Census Category[a]**	**Percent[b]**	**Criteria**
White	21,453,934	57.6	50
Black	2,299,072	6.2	26.2
American Indian	362,801	1	21
Asian	4,861,007	13	33
Native Hawaiian\other Pacific Islander	144,386	0.39	20.39
Other	6,317,372	17	37
Two or more races	1,815,384	4.9	24.9
Aggregate of all races	15,800,022	42.4	50
Hispanic or Latino	14,013,719	37.6	50
Aggregate and Hispanic	29,813,741	80	50

a. (USCB 2013c)

b. Percent values were calculated by dividing each census category's population by the California total population values.

Table 4.3.13-2: Low-Income Populations Evaluated Against Criterion

	California		
(Income) Total Population[a]	35,877,036		
(Income) Total Families[a]	8,495,322		
Census Category	**State Population by Census Category**	**Percent[b]**	**Criteria**
Low Income - Number of Persons Below Poverty Level (DP-3)	4,919,945	13.7	33.7
Low Income - Number of Families Below Poverty Level (DP-3)	867,772	2.4	22.4

a. (USCB 2013c)

b. Percent values were calculated by dividing each census category's population by the California total population values.

Table 4.3.13-3: Minority and Low-Income Block Group Counts

Individual State Method (California)		
Total Number of Block Groups with Population within 50-mi radius	5,046	
Census Categories	**Number of Block Groups with Identified Minority[a] or Low Income[b] Category**	**Percent of Block Groups within 50 mi**
Black	43	0.9
American Indian	5	0.1
Asian	480	9.5
Native Hawaiian\other Pacific Islander	0	0
Other	485	9.6
Two or more races	0	0
Aggregate of all races	1,523	30.2
Hispanic or Latino	1,489	29.5
Aggregate and Hispanic	3,329	66
Low income (individuals)	266	5.3
Low income (families)	262	5.2

a. (USCB 2013a)
b. (USCB 2013e)

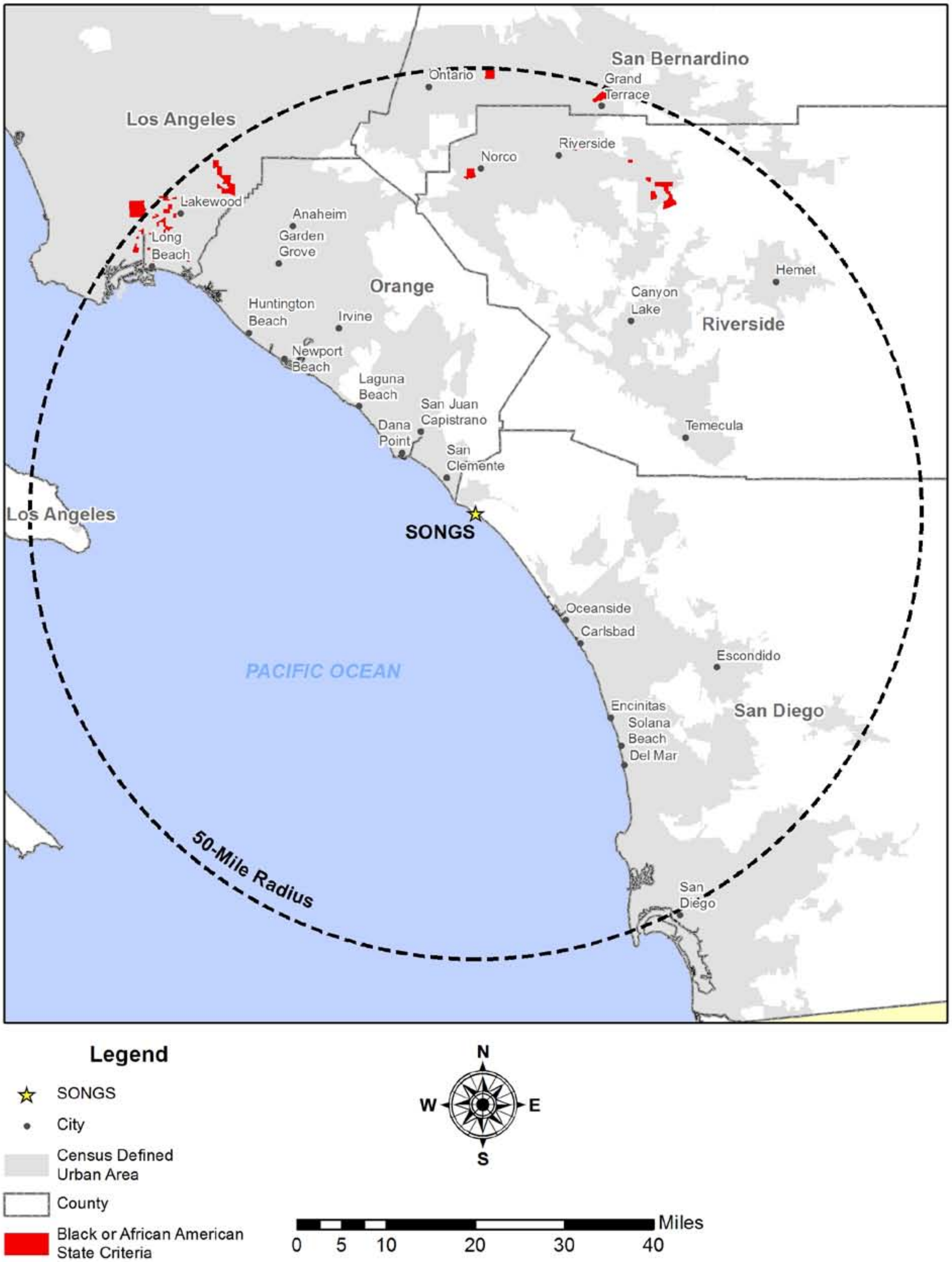

Figure 4.3.13-1: Census – Black African American (State Criteria)

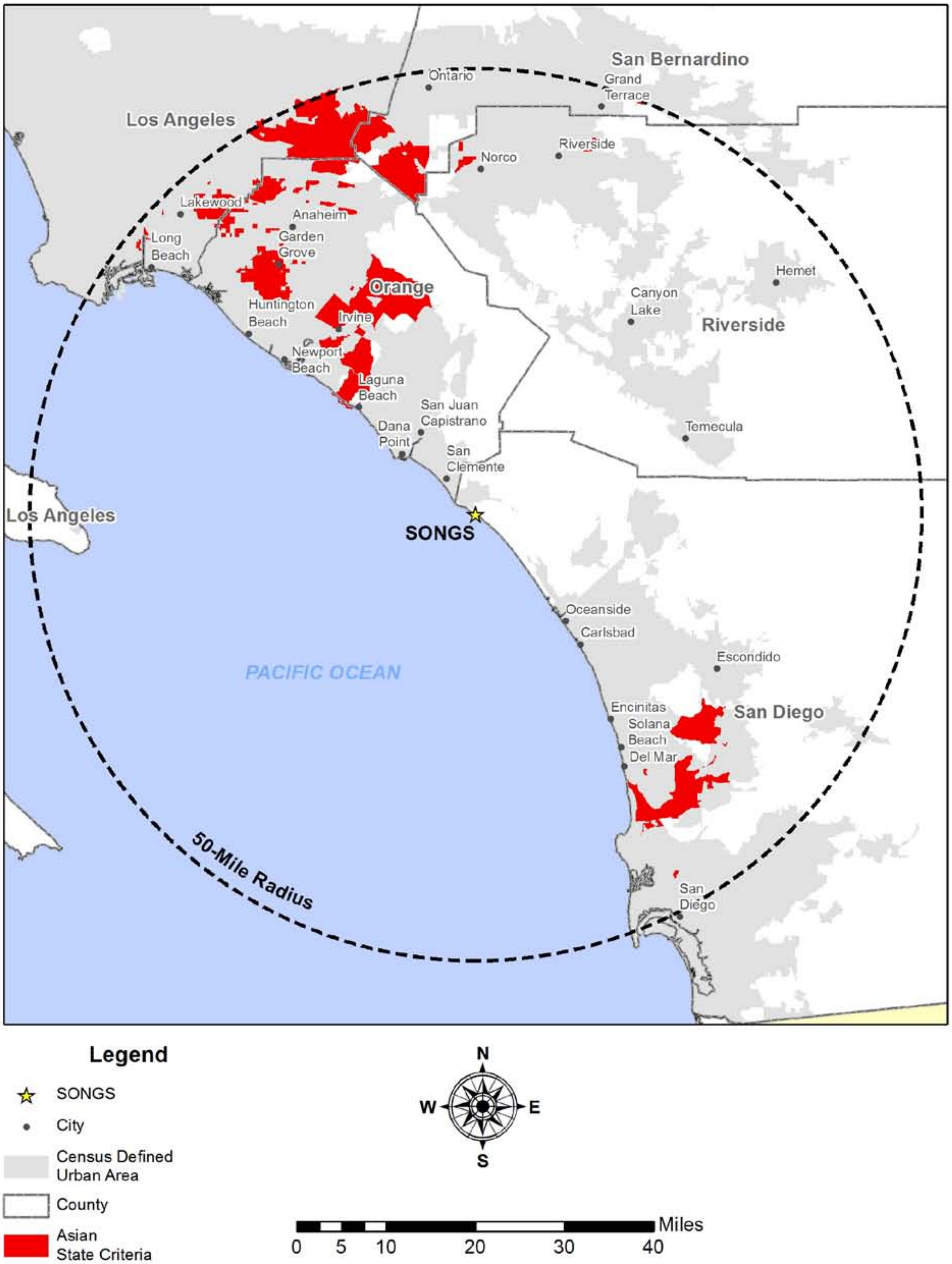

Figure 4.3.13-2: Census – Asian (State Criteria)

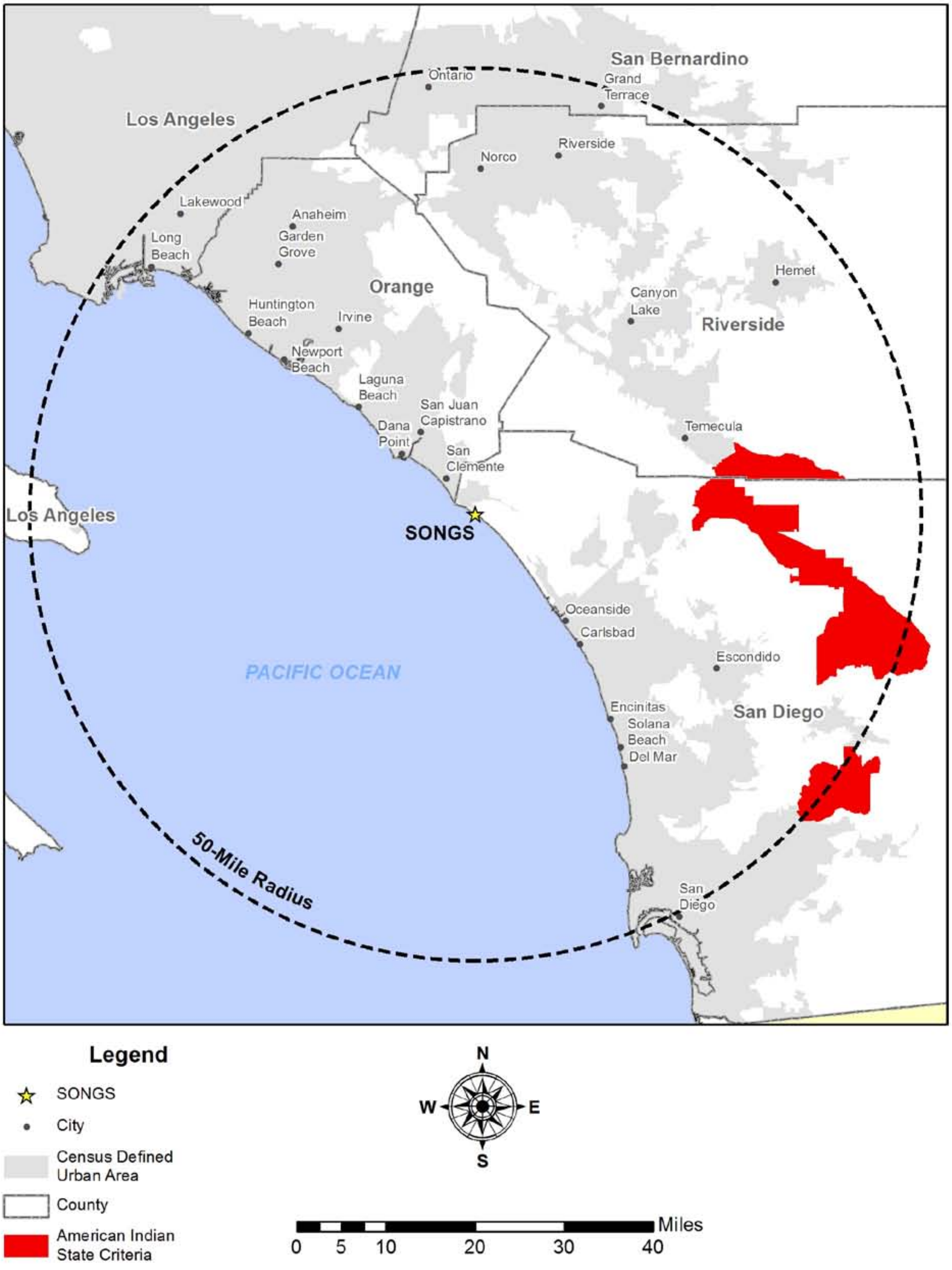

Figure 4.3.13-3: Census – American Indian (State Criteria)

Figure 4.3.13-4: Census – Hawaiian/Pacific Islander (State Criteria)

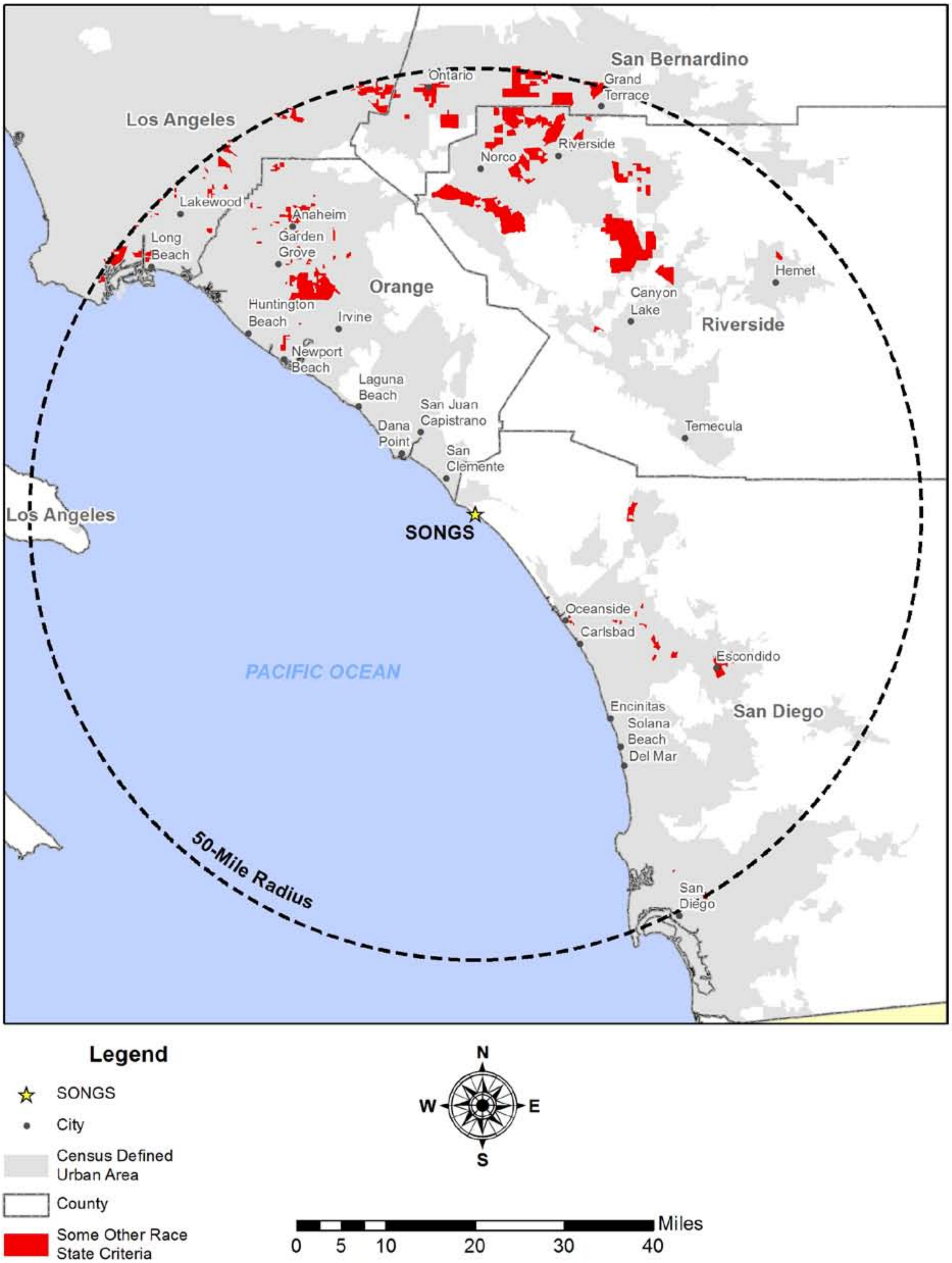

Figure 4.3.13-5: Census – Some Other Race (State Criteria)

Figure 4.3.13-6: Census – Two or More Races (State Criteria)

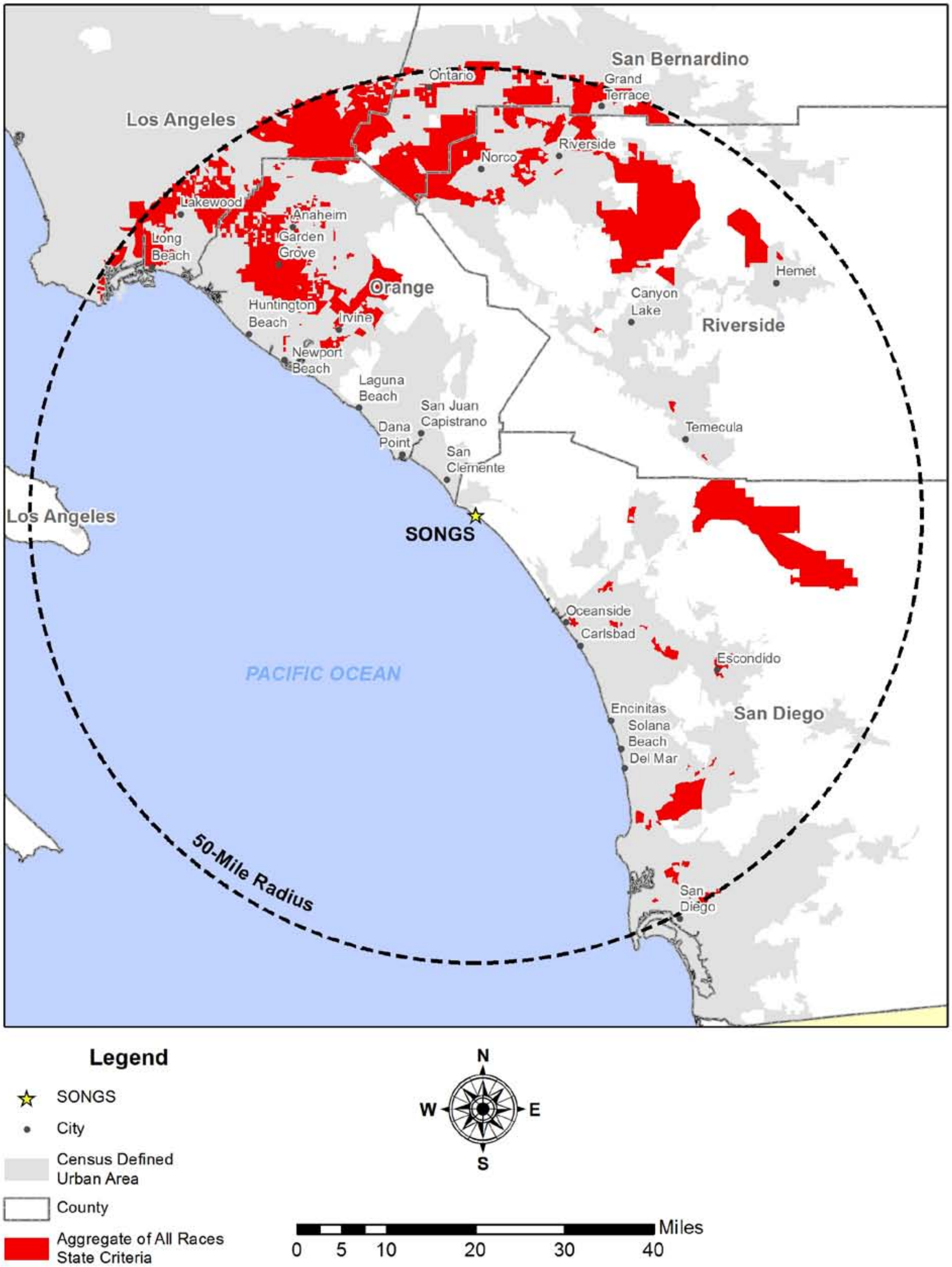

Figure 4.3.13-7: Census – Aggregate of All Races (State Criteria)

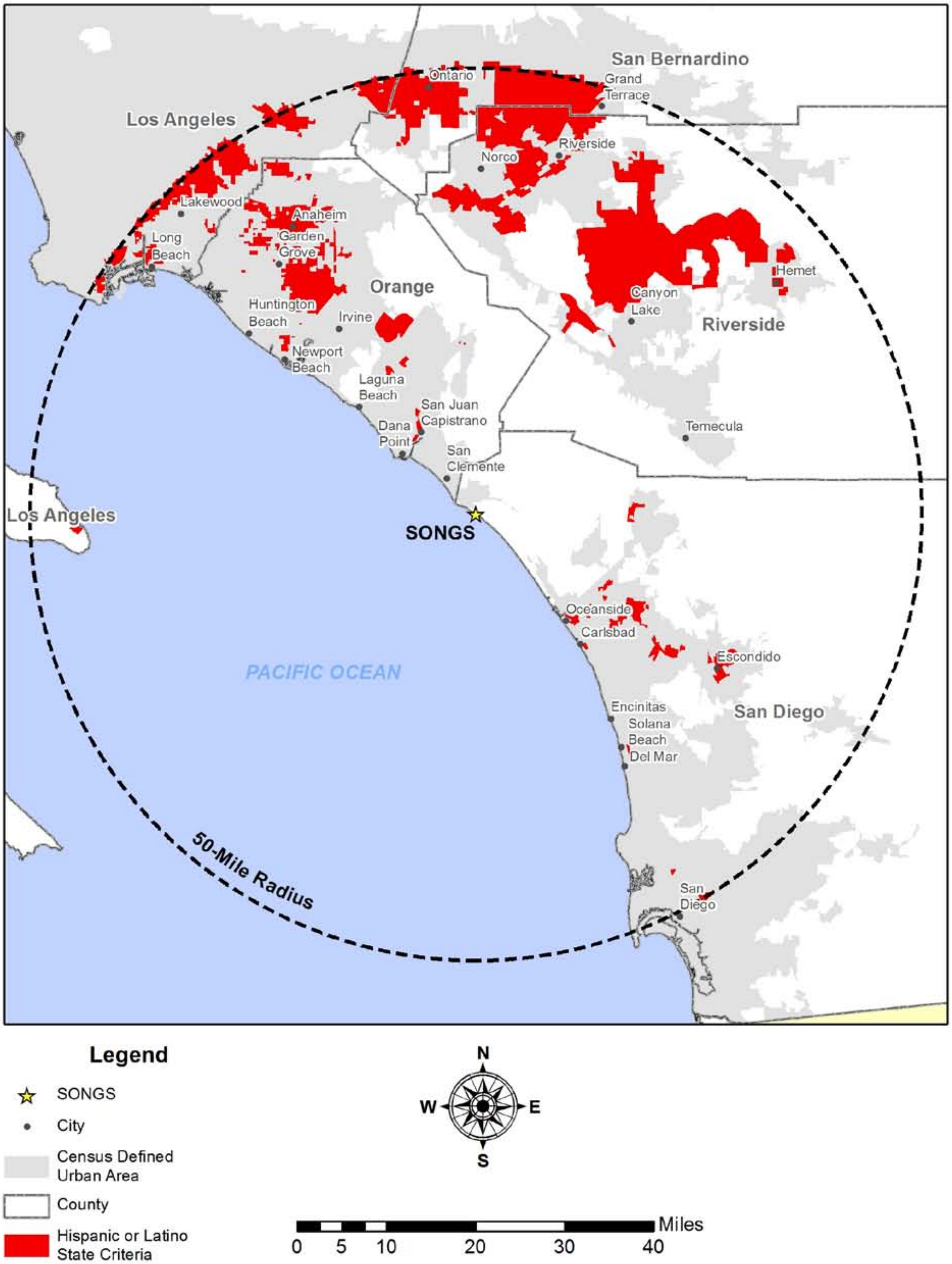

Figure 4.3.13-8: Census – Hispanic or Latino (State Criteria)

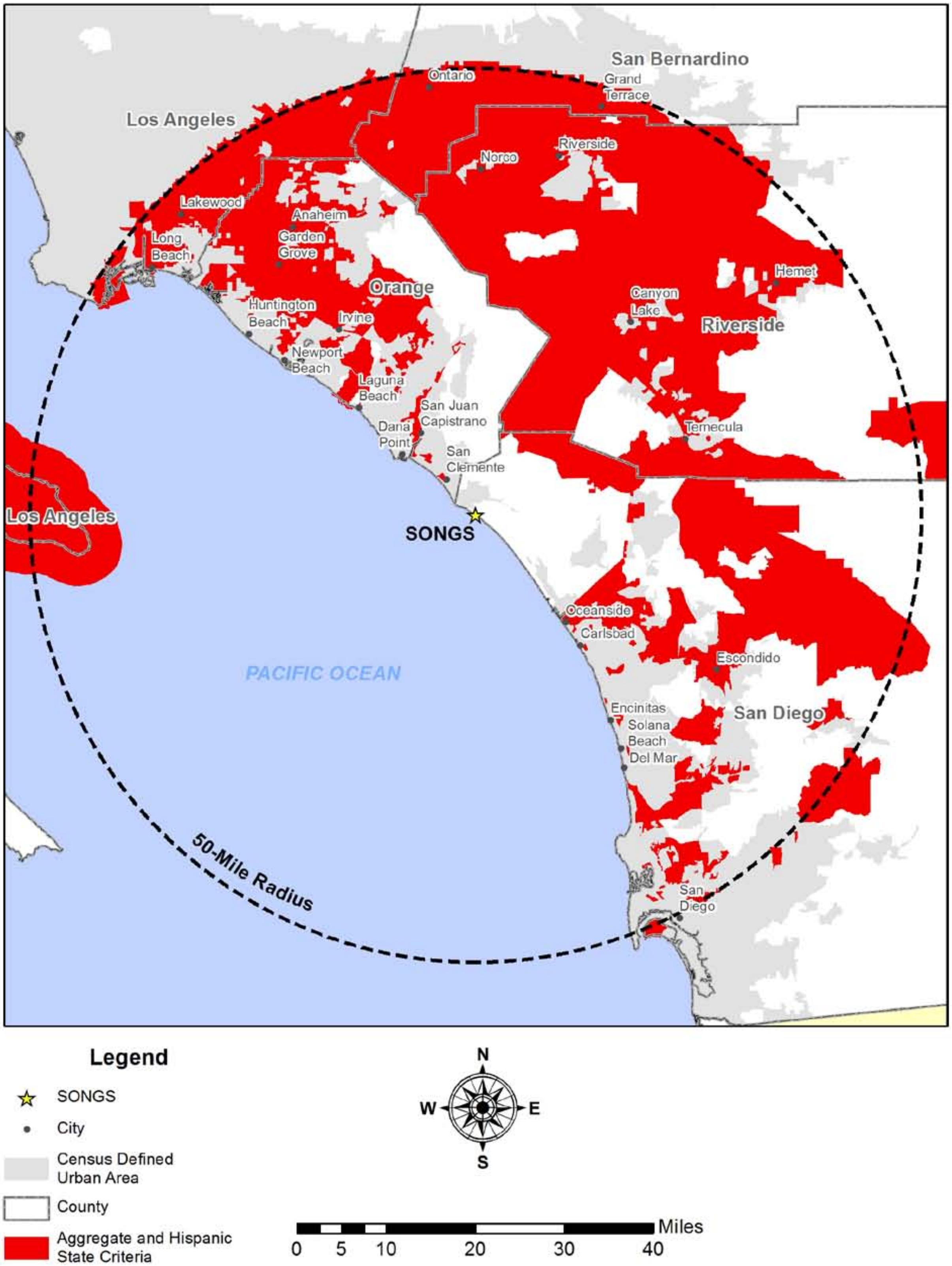

Figure 4.3.13-9: Census – Aggregate Plus Hispanic (State Criteria)

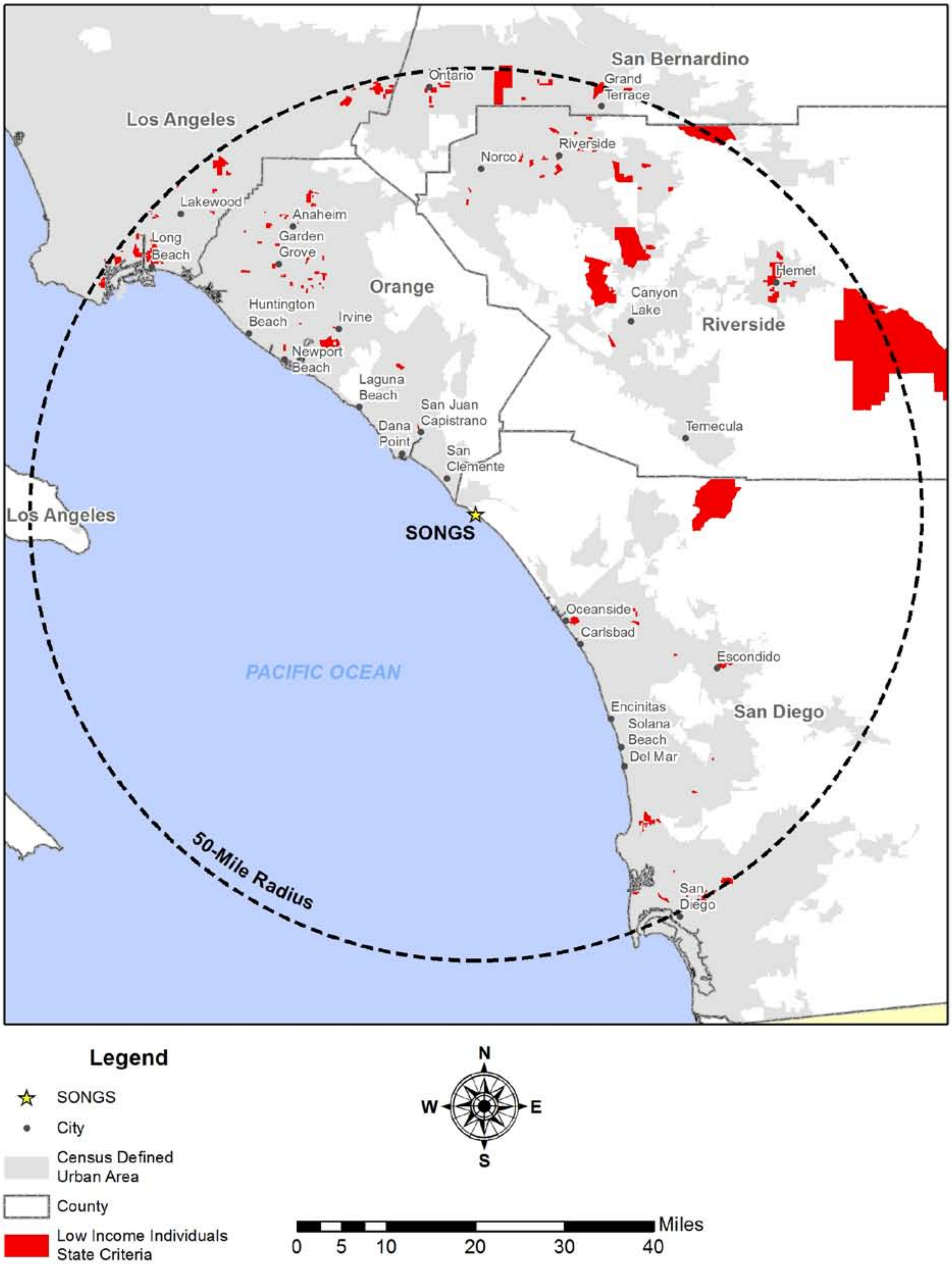

Figure 4.3.13-10: Census – Low Income Individuals (State Criteria)

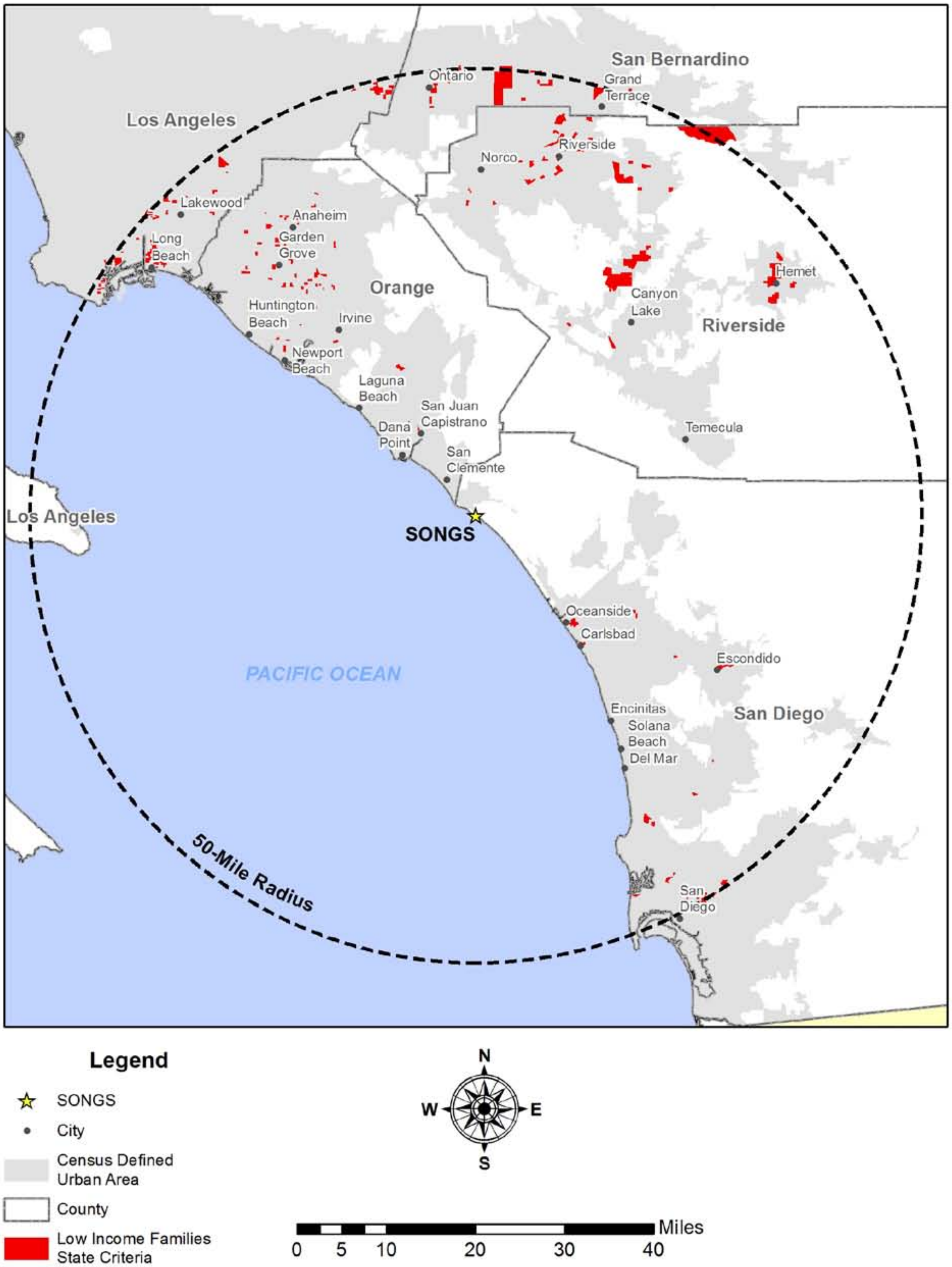

Figure 4.3.13-11: Census – Low Income Families (State Criteria)

4.3.14 Cultural, Historical, and Archeological Resources

Cultural resources include any prehistoric or historic archeological site or historic property, site, or district. Such sites may be listed in or eligible for inclusion in the National Register of Historic Places (NRHP), or otherwise have significant local importance.

From 1973 to 2005, 43 cultural resource studies were conducted within a 0.5-mile radius of SONGS 2 & 3 and along the former alternative transportation routes for the SONGS 2 & 3 steam generator replacement project, which extended well beyond this radius along certain highways and roads. As a result of these studies, 118 archaeological sites were identified and recorded within these areas. This archaeological site inventory consists of a large number of prehistoric sites ranging from surface scatters of artifacts to coastal shell middens. In addition, a number of historic sites have been recorded within this same area. These sites include historic dump sites and historic features associated with highways. From an overall resource management perspective, the area in the vicinity of the SONGS site is considered highly sensitive and extremely rich in cultural resources. (SCE 2005) Prior to taking any specific decommissioning actions, SCE would review these existing studies to ensure their actions are bounded by existing reports.

However, no prehistoric or historic archaeological sites eligible for listing or listed on the NRHP, California Register of Historical Resources (CRHR), or San Diego County Local Register of Historical Resources (LRHR) are located in the OCA at SONGS. (ICF 2012; SCE 2005)

Two prehistoric archaeological sites (CA-SDI-1074 and CA-SDI-4916), and three historic archaeological sites (P-37-024479, P-37-024480, and P-37-024481) were identified well outside of the OCA boundary but within 0.5 mi of SONGS 2 & 3. They are described briefly in Table 4.3.14-1. (ICF 2012; SCE 2005)

In addition, no historic sites eligible for listing or listed on the NRHP, CRHR, or LRHR are located within the OCA at SONGS, and no traditional cultural properties are known to be present there either. (ICF 2012; SCE 2005)

4.3.14.1 Regulations

The federal statute most directly applicable to cultural resource issues during the decommissioning process is Section 106 of the National Historic Preservation Act (NHPA) [16 USC 470 et seq.]. This act created the NRHP and requires the heads of all federal agencies to consider the impacts of undertakings on any cultural properties listed on the NRHP or any that are eligible for listing. Prior to any action to implement an undertaking, Section 106 requires the NRC as a federal agency to do the following (NRC 2002, Section 4.3.14):

- Take into account the effects of an undertaking (including issuance of a license) on historic properties, including any district, site, building, structure, or object included in or eligible for inclusion in the NRHP.

- Afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertaking.

The NRC consults with the state historic preservation office (SHPO), or if appropriate, the tribal historic preservation office, which is responsible for determining which sites or properties are of significant historic or archeological importance. The NRC is also responsible for including other interested parties and affected American Indian tribes.

Evaluation of the potential presence of cultural resources should not rely solely on a query of the SHPO database, but should be based on field surveys and evaluations of the site. Although these evaluations may have been performed as part of the initial environmental evaluation for the sites or as part of another licensing action (e.g., license renewal), the coverage and adequacy of earlier survey efforts must be re-evaluated in cases where an impact may occur. Earlier field surveys and methods may not conform to current standards. (NRC 2002, Section 4.3.14)

In addition, Section 106 of the NHPA requires each federal agency to identify, evaluate, and determine the effects of an undertaking on any cultural resource site that may be within the area impacted by that undertaking. This section requires consultation to resolve adverse effects of an undertaking and establishes mechanisms to obtain and incorporate comments from consulting parties. Federal agencies are directed by 36 CFR Part 800 to comply with the stipulations of the NHPA, as well as the Historic Sites Act of 1935, the Antiquities Act of 1906, and their respective implementing regulations. (NRC 2002, Section 4.3.14)

Because SONGS 2 & 3 is located on federal land, it is also subject to additional statutes directed at resource protection on federal lands. The Antiquities Act of 1906 (16 USC 431-433) prohibits destruction of vertebrate fossils and archeological sites on federal lands and regulates their removal. These regulations were further strengthened by the Archeological Resources Protection Act of 1979 (16 USC 470aa-47011), which prohibits the willful or knowing destruction and unauthorized collection of archeological sites and objects located on federal lands. It also establishes a permitting system for archeological investigations and requires consultation with concerned tribes prior to permit issue. The Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.) protects graves on federal lands and establishes tribal ownership of human remains and/or associated funerary objects taken from federal lands. (NRC 2002, Section 4.3.14)

State regulations for the protection of cultural resources may also apply to the decommissioning of SONG 2 & 3. Sections 21000 et seq. of the California PRC apply specifically to historical resources at PRC 21083.2 to 21084.1, while guidelines for implementation are in the California Code of Regulations Title 14, Chapter 3, Sections 15000 et seq. The state environmental review program includes the following:

Sections 5024 and 5024.5 of the PRC. These sections define the roles of state agencies in developing policies relevant to preserving and maintaining state-owned historical resources. The California Office of Historic Preservation (OHP) reviews projects when a state agency is involved with the project. It is the state agency's responsibility to seek comments about the project from the OHP for any project with the potential to affect historical resources listed in or potentially eligible for inclusion in the National Register of Historic Places or registered as or eligible for registration as a state historical landmark. (COHP 2014)

4.3.14.2 Potential Impacts of Decommissioning Activities on Cultural, Historic, and Archeological Resources

In its decommissioning GEIS, the NRC pinpoints stabilization, decontamination and dismantlement, and large component removal as decommissioning activities with the potential to adversely impact cultural resources (NRC 2002, Table E-3). Land disturbance could damage or destroy a cultural resource, or alter its contextual setting. Erosion and siltation brought about by land disturbance could also adversely affect some cultural resources. Site access and administrative protection of cultural resources may also potentially be altered through decommissioning activities at the site. (NRC 2002, Section 4.3.14)

Impacts to cultural, historical, or archeological resources are considered detectable if the activity has a potential for a discernible adverse effect on the resources. The impacts are destabilizing if the activity would degrade the resource to such a point that its value to future generations is significantly reduced. Physically damaging structures or artifacts, or destroying the physical context of the resource in its environment, are examples of destabilizing impacts. (NRC 2002, Section 4.3.14)

4.3.14.3 Evaluation

The OCA is 83.63 acres of densely developed industrial land with extensive soil disturbance from past construction. Located immediately southwest of I-5, the OCA contains the reactor units, the ISFSI, and other infrastructure. The overall layout of the SONGS site is shown in Figure 3.1.1-1.

As noted above, no cultural, historic, or archeological resources exist in the SONGS OCA. Consequently, provided decommissioning activities are confined to the OCA, they would have no impact on cultural, historical, and archeological resources. The land use is anticipated to remain the same and no adverse impacts to any cultural resources are anticipated should there be a need to use the existing SONGS rail spur easement and leased parcels located outside the OCA.

In general, the amount of land required to support the decommissioning process is relatively small and is a small portion of the overall plant site. Usually the areas disturbed or utilized to support decommissioning are within the operational areas of the site and typically within the protected area, where there is sufficient room for temporary storage, laydown, and staging sites. In most cases, decommissioning staff would be assigned space in existing support or administration buildings. (NRC 2002, Section 4.3.14)

Section 3.2 provides a discussion of the SONGS 2 & 3 decommissioning activities. As noted above, these activities are not anticipated to have a detectable effect on important cultural resources because surveys conducted in 1971, prior to construction of the facility, and again in 2012, found nothing of archaeological value in the area (ICF 2012; SCE *n.d.*). In addition, as decommissioning is likely to occur over several years, the same storage and staging areas would be available to be reused for sequential activities, further minimizing the area utilized.

SONGS also leases two parcels west of I-5 from the U.S. Navy (see Section 4.3.1), the total area of which is 14.9 ac. Both parcels are utilized and considered developed. SCE may opt to utilize these parcels for SONGS 2 & 3 decommissioning activities. The existing rail spur into the OCA, would be used to ship radioactive waste.

4.3.14.4 Conclusions

In its GEIS for decommissioning, the NRC concluded that for plants where the disturbance of lands beyond the operational areas is not anticipated, the impacts on cultural, historic, and archeological resources are not considered to be detectable or destabilizing. The NRC's generic conclusion for such plants is that the potential impacts to cultural, historic, and archeological resources are SMALL, and that any mitigation measures are not likely to be beneficial enough to be warranted. (NRC 2002, Section 4.3.14)

At SONGS, no cultural, historic, or archeological resources exist inside the OCA. Therefore, provided decommissioning activities are confined to the OCA, the impacts of SONGS on cultural, historical, and archeological resources during decommissioning fall well within the bounds established by the NRC in the decommissioning GEIS. If the parcels adjacent to the OCA are utilized during decommissioning, the land use is anticipated to remain the same and no adverse impacts are anticipated.

As the details of SONGS 2 & 3 decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

Table 4.3.14-1: Cultural Resources within 0.5 Miles of SONGS 2 & 3

Site Number	Site Type/Constituents	Cultural/Temporal Affiliation	Location	NRHP Status	CRHR Status	LRHR Status
CA-SDI-1074	Surface shell and artifact scatter	Prehistoric	Approximately 0.5 mi northwest of SONGS 2 & 3	UOU	UOU	UOU
CA-SDI-4916	Small surface artifact scatter of flake tools and lithics	Prehistoric	Approximately 0.25 mi east of SONGS 2 & 3	UOU	UOU	UOU
P-37-024479	Concrete culvert beneath Amtrak railroad mainline	Historic Period (1918)	Approximately 350 ft east of SONGS 2 & 3	UOU	UOU	UOU
P-37-024480	Wooden culvert beneath Amtrak railroad mainline	Historic Period (1943)	Approximately 350 ft east of SONGS 2 & 3	UOU	UOU	UOU
P-37-024481	Wooden box culvert beneath Amtrak railroad mainline	Historic Period (1943)	Approximately 0.25 mi northwest of SONGS 2 & 3	UOU	UOU	UOU

UOU - Unknown or undetermined at this time
(ICF 2012; SCE 2005, Appendix 3)

4.3.15 Aesthetic Impacts

Visual or aesthetic resources are defined as both the natural and man-made landscapes that contribute to the public's experience and appreciation of the environment. Impacts on visual or aesthetic resources are evaluated in terms of a project's physical characteristics, potential visibility, and the extent to which it will alter the aesthetic character of the landscape and the perceived quality of the environment.

In this section, aesthetic issues are discussed within the context of SONGS 2 & 3 decommissioning.

4.3.15.1 Regulations

No federal regulations relate specifically to the degree to which aesthetics may be impacted by a federal project (NRC 2002, Section 4.3.15).

State: California Coastal Act

In California, however, the California Coastal Act §30251 (CCC 2013b) requires the following:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas.*

Although the California Coastal Act was passed in 1976, after SCE's application to build SONGS 2 & 3 was approved by the NRC, SCE addressed the aesthetic impacts of SONGS 2 & 3 in conjunction with obtaining a CDP for the construction and operation of Units 2 & 3 (SCE *n.d.*, Section 3.1).

State: California Scenic Highway Program

The intent of the California Scenic Highway Program is to protect and enhance California's natural beauty and to protect the social and economic values provided by the state's scenic resources. The purpose is to preserve and protect scenic highway corridors from change which would diminish the aesthetic value of lands adjacent to highways. The state laws governing the Scenic Highway Program are found in the Streets and Highway Code, Section 260 et seq.

4.3.15.2 Potential Impacts of Decommissioning Activities on Aesthetics

In its decommissioning GEIS, the NRC singles out structure dismantlement and entombment as only activities that may have impacts on aesthetic resources (NRC 2002, Table E-3). How great the impacts might be is defined by how the proposed changes are perceived by the public, not simply by the magnitude of the changes themselves. The potential for significance arises with the introduction (or continued presence) of an intrusion into an environmental context, resulting in measurable changes to the community (e.g., population declines, property value losses, increased political activism, tourism losses). The NRC (NRC 2002, Section 4.3.15) provides the following criteria for discerning impacts to aesthetics.

Decommissioning activities and the changes they bring are considered to have no detectable impact on the host communities' aesthetic resources if there are:

1) No complaints from the affected public about a changed sense of place or a diminution in the enjoyment of the physical environment; and

2) No measurable impact on socioeconomic institutions and processes.

They are considered to have detectable but not destabilizing impacts on the host communities' aesthetic resources if there are:

1) Some complaints from the affected public about a changed sense of place or a diminution in the enjoyment of the physical environment; and

2) Measurable impacts that do not alter the continued functioning of socioeconomic institutions and processes.

Finally, decommissioning activities are considered to have detectable and destabilizing impacts on the host community's aesthetic resources if there are:

1) Continuing and widely shared opposition to the activities or the changes the activities bring based solely on a perceived degradation of the area's sense of place or a diminution in the enjoyment of the physical environment; and

2) Measurable social impacts that perturb the continued functioning of community institutions and processes.

4.3.15.3 Evaluation

Of the two decommissioning activities the NRC links to impacting aesthetic resources (NRC 2002, Table E-3), only structure dismantlement applies to SONGS. Section 3.2 provides a discussion of the SONGS 2 & 3 decommissioning activities. Decommissioning would last several years, and the appearance of the facility will be altered slowly as the buildings are dismantled.

Prior to dismantlement activities, the aesthetic impacts of the plant would be similar to those that occurred during the operational period. Once dismantlement begins, temporary aesthetic impacts could include dust and mud around the site, traffic and the noise of trucks, construction disarray on the site itself, and the construction of temporary facilities such as a concrete batch plant, cranes, and facilities for segmenting and packaging large components. In many cases, these impacts would not be easily visible offsite.

The removal of structures is generally considered beneficial to the aesthetic impacts of the site. Any visual intrusion during dismantlement of buildings or structures would be temporary and would serve to reduce the aesthetic impact of the site. At a minimum, the aesthetic impact of the site would not be improved during dismantlement and decommissioning, but would remain that of an industrial site as evaluated in the facility's original FES. In compliance with its CDP, the SONGS design incorporated specific measures to minimize and mitigate impacts on aesthetic resources such as landscaping and color treatments, to integrate and enhance the appearance of the plant. Building and station materials were chosen that were appropriate and complimentary to the coastal environment. (SCE *n.d.*, Section 3.1)

SCE would employ BMPs to control many of the potentially adverse impacts of decommissioning activities on aesthetics (e.g., dust and noise). Once decommissioning activities are complete, the fuel transferred to the DOE, and the NRC license terminated, the site will be returned to the U.S. Navy.

4.3.15.4 Conclusions

In its GEIS for decommissioning, the NRC stated that removal of structures is generally considered beneficial to the aesthetic impacts of a site and drew the generic conclusion that for all plants, the potential impacts from decommissioning on aesthetics are SMALL and that any mitigation measures are not likely to be beneficial enough to be warranted (NRC 2002, Section 4.3.15). As discussed above, the aesthetic impact of decommissioning SONGS 2 & 3 would be that of the current aesthetic impact of the plant prior to dismantlement. During dismantlement, the visual intrusion would be temporary and would serve to reduce the aesthetic impact of the site. Therefore, the impacts of SONGS on aesthetic resources during decommissioning are bounded by the decommissioning GEIS. As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

4.3.16 Noise

Noise is usually defined as sound that is undesirable because it interferes with speech, communication, or hearing; is intense enough to damage hearing, or is otherwise annoying. To compare levels over different time periods, several descriptors have been developed that take into account this time-varying nature. These descriptors are used to assess and correlate the various effects of noise, including land use compatibility, sleep and speech interference, annoyance, hearing loss, and startle effects (NRC 2002, Section 4.3.16):

- A-weighted sound levels (dBA): Used to account for the response of the human ear.
- C-weighted scale (dBC): Used to measure impulsive noise such as air blasts from explosions, sonic booms, and gunfire.
- Equivalent sound level (Leq): Used to represent an equivalent level over a given time period (usually one hour), and is a single value in dBA.
- Day-night average sound level (Ldn) and community noise equivalent level (CNEL): Used to evaluate the total community noise environment. The Ldn is the average A-weighted sound level during a 24-hour period with 10 dB added to nighttime levels (between 10 p.m. and 7 a.m) to account for the increased human sensitivity to night-time noise events. The CNEL is similar to Ldn and is normally within 1 dBA of Ldn (CSD 2009).

Noise-sensitive receptors are generally considered to be persons who occupy areas where quiet is an important attribute of the environment. Land uses often associated with noise-sensitive receptors include residential dwellings, hotels, hospitals, nursing homes, educational facilities, libraries, and recreational areas. In addition, wildlife is considered sensitive to noise because it can alter the breeding behaviors of threatened or endangered species beyond the typical levels of natural variability (i.e. normal year-to-year variations) (NRC 2002, Section 4.3.6) Features such as walls, variations in ground-surface topography, vegetation, and buildings have the ability to attenuate, or lessen, the noise that reaches a receptor.

The surrounding land uses dictate which noise levels would be considered acceptable or unacceptable and depend on the intensity of nearby human activity. Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Levels above 75 dBA are more common near major freeways and airports. Although people often accept the higher levels associated with very noisy urban areas, they nevertheless are considered adverse to public health (SCE 2005).

Nighttime noise is a concern because of the likelihood of disrupting sleep. Noise levels above 45 dBA at night can result in the onset of sleep interference. At 70 dBA, sleep interference effects become considerable (EPA 1974).

Existing Noise Environment

SONGS is a typical industrial facility with noise averaging 65 to 75 dBA from things such as electrical generators, vehicles, emergency diesel generators, heavy equipment, and occasionally emergency sirens. Many of these sources often produce noise of short duration which occurs infrequently in most cases. Previous ERs for SONGS determined that the noise generated during operation decreased with distance from the source and was negligible at the site boundary. In addition, there are no noise-sensitive receptors within 400 feet of any portion of the SONGS site (SCE 2005).

Offsite noise sources that affect the ambient noise environment in the vicinity of SONGS include I-5 and the San Diego Northern Railroad, the ocean, and the occasionally intense military operations within the MCBCP (SCE 2005).

I-5 is considered a major local noise source. Daytime noise levels at San Onofre State Beach campsite from traffic on I-5 are 65 Leq, but can exceed 75 dBA during peak traffic hours. For adjacent areas with a direct line-of-sight, the 24-hour presence of traffic on I-5 produces about 85 Ldn near the edge of the right-of-way and more than 70 Ldn for locations within 500 ft of its centerline. In these adjacent areas with a direct line-of-site of I-5, the ambient noise levels would be considerably more than in other areas not adjacent to I-5 (SCE 2005). In addition, noise levels produced by waves crashing on the beach are considered high at 70 dBA. However, most people find the sounds of the ocean comforting (Air and Noise 2013).

Sensitive Receptors

The nearest sensitive receptors to SONGS 2 & 3 are wildlife at and adjacent to the plant and transitory recreational users of San Onofre State Beach (refer to Sections 4.3.6 and 4.3.7 for issues related to biological resources). Public access to the beach adjacent to the SONGS 2 & 3 seawall is provided by an improved walkway. The walkway permits transit between open beach areas upcoast and downcoast from the site. Public passage by means of the improved walkway between sections of San Onofre State Beach north and south of the plant site was required as a permit condition in the February 16, 1982, amendment to the CDP from the CCC. This walkway is open to the public at all times except when closure is necessary for public safety or plant security. (CCC 1982) The next nearest sensitive receptor is a residence near the San Onofre Recreation Beach area, located approximately one mile away (SCE 2012).

4.3.16.1 <u>Regulations</u>

Regulating environmental noise is generally the responsibility of local governments. The State of California maintains recommendations for local jurisdictions in the general plan guidelines published by the governor’s Office of Planning and Research. Several federal agencies have recommended noise standards for land use assessments. These guidelines are advisory in nature and are not mandatory (14 CFR Part 150). It should be noted that neither the federal nor state government have standards for temporary noise.

The following summarizes federal and state recommendations, and local requirements.

Federal Standards

The EPA was given jurisdiction in the Noise Control Act of 1972 (42 USC 4901 et seq.) to promulgate and enforce the regulations issued under the act. Funding for the EPA to perform this function was eliminated in early 1981. However, Congress did not repeal the Noise Control

Act. The Ldn was endorsed by the EPA and is mandated by the U.S. Department of Housing and Urban Development (HUD), the Federal Aviation Administration (FAA), and the Department of Defense (DoD) for land use assessments. There are no standards established by MCBCP to restrict noise impacts to the base.

The EPA has determined that no destabilizing or significant effects on public health and welfare occur for the most sensitive portion of the population (within an adequate margin of safety) if the prevailing Ldn is less than 55 dBA (NRC 2002, Section 4.3.16). Under HUD, noise assessment guidelines are established under 24 CFR 51B. The HUD site acceptability levels are summarized as follows:

- Acceptable (Ldn is 65 dBA or less): Typical building materials and construction will make any impacts to indoor noise minimal. Outdoor recreation and activities would not be impacted. No approval requirements or abatement measures are needed under this condition.

- Normally unacceptable (Ldn is 65 to 75 dBA): Noise exposure will impact outdoor use of the area and indoor use may be affected. Walls or other barriers may be needed to reduce outdoor noise levels. Indoor noise levels may need to be reduced using special construction methods.

- Unacceptable (Ldn above 75 dBA): The noise conditions in this situation are unacceptable and activities need to be approved on a case-by-case basis.

Noise complaints increase significantly when the Ldn increases above 60 to 65 dBA. As noted above, the Federal Housing Administration (FHA) and HUD use an Ldn of 65 dBA as the primary criterion for impact on residential properties and nearby populations. Similarly, as stated in the GEIS, the NRC staff considers noise levels below 60 to 65 dBA to be insignificant (NRC 2002, Section 4.3.16).

State Standards

The State of California requires each local government to perform noise surveys and implement a noise element as part of its general plan. Generally speaking, noise levels less than 60 Ldn are acceptable for residences, schools, hospitals, and other noise-sensitive receptors. The State considers noise levels under 70 Ldn to be normally acceptable for playgrounds and neighborhood parks (SCE 2005).

California Coastal Commission

The CCC administers the federal CZMA in California. The CCC is an independent quasi-judicial state agency that regulates the use of land and water in the coastal zone. As defined by the CZMA, the offshore coastal zone includes a 3-mile (or 15,840-foot) wide band of ocean and a varying onshore zone (from several hundred ft in urban areas up to five mi in rural areas). The CZMA gives the CCC regulatory control over all federal activities and federally licensed, permitted or assisted activities, whenever they occur within the coastal zone. Several local jurisdictions have developed area-specific regulations under a local coastal plan. (CCC 2012)

County of San Diego

As provided in the *Guidelines for Determining Significance for Noise,* San Diego County Code Section 36.409, *Sound Level Limitations on Construction Equipment*, states construction activities that exceed an average sound level of 75 dBA for an eight-hour period, between 7 a.m. and 7 p.m., when measured at the boundary of the property where the noise source is located, are considered unlawful (CSD 2009).

In addition, the San Diego County general plan, noise element, establishes limitations on sound levels. The plan states that an acoustical study is required if it appears that a noise-sensitive land use would be subject to noise levels of CNEL equal to 60 dBA or greater. If noise levels greater than 60 dBA would be experienced, mitigation would be required (CSD 2009).

4.3.16.2 Potential Impacts from Noise of Decommissioning Activities

During the decommissioning process, the sounds that might be heard at offsite locations include noise from construction vehicles, grinders, saws, pneumatic drills, compressors, and loudspeakers. Current plans do not include the use of explosives (Energy Solutions 2014). Table 4.3.16-1 lists predicted noise ranges for significant sources of noise during decommissioning.

4.3.16.3 Evaluation

The timing of noise impacts and the duration or intensity will vary depending on the decommissioning option and the procedures that are used. More noise will occur during active dismantlement than during other stages of decommissioning. Some demolition activities could increase noise levels temporarily.

The noise impacts of decommissioning activities are considered significant if sound levels are sufficiently high that the affected area is essentially unsuitable for normal human activities, or if the breeding behavior of a threatened or endangered species is affected (NRC 2002, Section 4.3.16). Noise level increases larger than 10 dBA to the Ldn at the site boundary during the day could lead to interference with human and animal behavior.

As noted in Table 4.3.16-1, predicted noise ranges from decommissioning activities are 85-90 dBA at 50 ft from the noise source and 65-75 dBA at 500 ft. The nearest sensitive receptors to SONGS are wildlife at and adjacent to the plant, the occasional recreational users utilizing the existing walkway that connects the northern and southern portions of San Onofre State Beach, and recreational users of San Onofre State Beach. This walkway is immediately adjacent to SONGS. However, the ambient noise environment in this area can exceed 70 dBA from noise produced by the ocean, which could mask some noise from decommissioning. Potential noise impacts to threatened and endangered species located on or adjacent to SONGS are evaluated in Section 4.3.7.

Although decommissioning activities could reach up to 90 dBA if they were to occur immediately adjacent to the walkway, these activities are intermittent and of short duration, and would not create an unsuitable environment for recreationalists. Additionally, the more intense decommissioning activities such as demolition would primarily occur at SONGS 2 & 3, located approximately 400 ft from the walkway beyond other SONGS facilities. These existing facilities would help attenuate decommissioning noise.

Worker Safety

Workers at the SONGS site are protected by the existing SONGS site occupational safety and health programs, which are consistent with federal standards for noise exposure (SCE 2005). OSHA establishes regulations to safeguard the hearing of workers exposed to occupational noise (29 CFR Section 1910.95). Sustained noise over 85 dBA can adversely affect workers' hearing (SCE 2005). Worker safety as it relates to noise is addressed in Section 4.3.10.

4.3.16.4 Conclusions

In its GEIS for decommissioning, the NRC generically determined noise impacts associated with decommissioning to be SMALL (NRC 2002, Section 4.3.16). Due to the relatively high ambient noise levels surrounding SONGS, no significant differences are expected between the noise levels of the previously operating plant and the noise levels observed at facilities undergoing decommissioning. Decommissioning noise would also be of short duration. Therefore, noise impacts are not considered destabilizing. Decommissioning activities are not expected to produce noise levels that could impact the activities of humans or threatened and endangered species (refer to Section 4.3.7 for evaluations of potential noise impacts to threatened and endangered species). SCE will comply with the requirements of the CCC and local noise regulations related to minimizing noise, which could include monitoring and limiting decommissioning activities to daytime hours. In addition, SCE will implement BMPs and conduct assessments as called for in its environmental protection procedure, as well as comply with permit and regulatory requirements to minimize indirect impacts from noise to onsite threatened and endangered species. Therefore, noise impacts during decommissioning of SONGS 2 & 3 are bounded by the previously issued GEIS. In addition, as discussed in Section 4.3.10, SCE implements a safety program that includes hearing protection and proper maintenance of equipment to minimize onsite noise. (NRC 2002, Section 4.3.16)

As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs. Considering the available information on the potential impacts of noise from decommissioning SONGS 2 & 3, it is concluded that the impacts will be SMALL.

Table 4.3.16-1: Predicted Noise Ranges from Significant Decontamination and Dismantlement Sources

Source	Source Strength dBA	Reference Distance, m	Predicted Noise Level Ranges (dBA) at Various Distances from the Reference Distance			
			150 m (500 ft)	300 m (1000 ft)	0.8 km (0.5 mi)	1.6 km (1 mi)
Construction Equipment	85-90	15[a]	65-75	59-69	51-61	45-55
Truck	85-90	15	65-75	59-69	51-61	45-55
Rail Engine	86-96	30[b]	76-86	71-81	64-74	58-68
Rail Car 64 km/h (40 mph)	80-86	30	68-74	62-68	53-59	48-54

(NRC 2002, Table 4-5)

a. 15 m ~ 50 ft.

b. 30 m ~ 100 ft.

4.3.17 Transportation

This section addresses impacts related to transporting equipment and materials (radiological and nonradiological) during decommissioning. Materials transported to offsite disposal facilities include nonhazardous waste, LLRW, hazardous waste, and mixed waste. As discussed in Chapter 1, the shipment of spent nuclear fuel is not within the scope of this evaluation. Radiological impacts include exposure of transport workers and the general public along transportation routes. Nonradiological impacts include additional traffic volume, additional wear and tear on roadways, and potential traffic accidents.

LLRW is waste that has become contaminated with radioactive material or has become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, and equipment and tools. LLRW is divided into Classes A, B, and C by NRC regulations at 10 CFR 61.55. These classes are based first on the waste's concentration of long-lived radionuclides and then on the concentration of shorter-lived radionuclides. NRC regulations at 10 CFR 61.55 include tables of radionuclides and maximum concentrations to determine the waste class. There are also characteristics and stability requirements in 10 CFR 61.56(a) and (b) for each waste class.

Existing Conditions

Transportation within the vicinity of SONGS includes one major north-south freeway, I-5, an assortment of local and county roads, and passenger and cargo rail service (part of the Los Angeles–San Diego corridor), and an existing rail spur serving the SONGS site. Commercial vessel shipping lanes are greater than 5 mi southwest of the site in the Pacific Ocean. Portions of Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties fall within the 50-mi radius of SONGS 2 & 3. The discussion of transportation addresses the site vicinity and the top five counties within the region where the majority of SONGS employees live (see Section 4.3.13). Traffic from the highways and interstates of Los Angeles, Riverside, and San Bernardino counties directly feed into the road sets of Orange and San Diego counties.

Highway Transportation Corridors

General access to SONGS 2 & 3 is via I-5 from the north or south to Basilone Road, and then to State Route (SR) 101 to the entrances for SONGS 2 & 3. This combination of roads also provides access to San Onofre State Beach. (SCE 2004)

I-5 is the only public coastal vehicular link between Los Angeles, Orange, and San Diego counties that directly passes SONGS 2 & 3. South of the MCBCP border, I-5 links to the inland communities of San Diego, San Bernardino, and Riverside counties via Interstate 15 (I-15), SR 76, and SR 78. North of the site in Orange County, SR 74 feeds into I-5 from Riverside and San Bernardino counties via I-15. In north Orange County, SR 1 and SR 73 bring traffic south and eventually feed into south-bound I-5. The direct route for traffic coming south from Los Angeles County is I-5.

Level of Service

The California Department of Transportation (Caltrans) has developed level of service (LOS) indicators to measure roadway traffic volume. LOS is a qualitative assessment of traffic flow and how much delay the average vehicle might encounter during peak hours. Table 4.3.17-1 presents the LOS definitions used by local and state agencies (SCE 2005).

Caltrans estimated in 2005 that the Basilone Road interchange off I-5 carries an LOS designation at peak hour of C and an off-peak LOS of B. The El Camino Real interchange with I-5 in San Clemente also had a peak hour LOS of C and an off-peak LOS of B. At the junction where SR 76 meets I-5 in Oceanside, I-5 had a peak hour LOS of D and an off peak LOS of B. Some of the heaviest traffic along I-5 is in north San Clemente and south Oceanside, where the peak hour LOS ratings were D, and off-peak hour ratings were C. The LOS designations of roads in the vicinity of SONGS 2 & 3 were C and B (SCE 2005).

Traffic Counts

Caltrans provides traffic counts for state highways. A summary of the estimates for average annual daily traffic (AADT) counts near SONGS 2 & 3 are provided in Table 4.3.17-2. To provide a comparison, the 2005 and the most recent 2011 AADT counts are provided.

Waterborne Transportation

Commercial, recreational, and military vessels utilize the ocean waters in the vicinity of SONGS. Navigation within the area is facilitated by charts, physical aids to navigation (such as buoys), and regulations and information published by the U.S. Coast Guard (USCG) and the National Oceanic and Atmospheric Administration (NOAA). (EDAW 2005)

Most of the area offshore of SONGS is used primarily by small craft and some military vessels. Recreational boaters and recreational fishermen typically transit the area en route to another destination. Commercial cargo and military vessels do not transit near the SONGS area. No harbor or launching facilities are located in the immediate vicinity. The principal traffic in the area is commercial lobster boats during lobster season (early October through mid-March). Other vessel traffic in the area is minimal (EDAW 2005).

4.3.17.1 Regulations

Several agencies are responsible for implementing environmental regulations related to ground and waterborne transportation routes in the region. Pertinent guidance from these agencies emphasizes the maintenance of safe and acceptable transportation conditions both on area roadways and within port areas.

Federal: Department of Transportation and NRC

Regulations that apply to the transportation of hazardous, mixed waste, and radioactive material promulgated by the DOT are contained in 49 CFR Parts 171-177. NRC regulations related to transportation of LLRW are contained in 10 CFR Part 71, “Packaging and transportation of radioactive material.” These regulations contain requirements for transport vehicles, maximum radiation levels for packages and vehicles, special packaging requirements, driver training, vehicle and packaging inspections, marking and labeling of packages, placarding of vehicles, and training of emergency personnel to respond to mishaps. Highway routing restrictions for certain shipments of LLRW are also included in DOT regulations. NRC regulations contain performance requirements for certain types of transportation packages of radioactive material. In addition, federal and state regulations govern the size and weights of trucks (NRC 2002).

Federal: USCG

The USCG has a statutory responsibility under the Ports and Waterways Safety Act (PWSA) of 1972, Title 33 USC §1221, to ensure the safety and environmental protection of U.S. ports and waterways. The PWSA authorizes the USCG to ". . . establish, operate and maintain vessel traffic services in ports and waterways subject to congestion." The USCG's ports and waterways safety system is a comprehensive process that assesses safety and environmental protection, and identifies any necessary corrective action (USCG 2012).

State: California Coastal Commission

The CCC administers the federal CZMA in California. The CCC is an independent quasi-judicial state agency that regulates the use of land and water in the coastal zone. As defined by the CZMA, the offshore coastal zone includes a 3-mile (or 15,840-foot) wide band of ocean and a varying onshore zone (from several hundred ft in urban areas up to five mi in rural areas). The CZMA gives the CCC regulatory control over all development, including federally licensed, permitted, or assisted activities, whenever they occur within the coastal zone. Several local jurisdictions have developed area-specific regulations under a local coastal plan.

State: California State Lands Commission

The CSLC authority is set forth in Division 6 of the California PRC and it is regulated by the California Code of Regulations, Title 2, sections 1900–2970. It is within the CSLC's authority to lease sovereign lands held in the public trust, including sub-tidal lands located between the mean high tide line out to 3 nautical mi offshore. SCE currently holds an easement lease for the Units 2 & 3 conduits with the CSLC (CSLC 1985).

State: California Department of Transportation

Nonradiological

Caltrans has prepared a manual titled *Guide for the Preparation of Traffic Impact Studies*. In terms of LOS, Caltrans endeavors to maintain a goal of LOS C on state highways. However, Caltrans acknowledges that this may not always be feasible. In these circumstances, Caltrans often accepts lower LOS on facilities currently operating below the LOS C objective (SDC 2011).

Radiological and Other Hazardous Waste

All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and state regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol (Caltrans 2012).

Local: San Diego Association of Governments and Congestion Management

The San Diego Association of Governments (SANDAG), local jurisdictions, and transportation operators (i.e., Caltrans, Metropolitan Transit Development Board, North San Diego County Transit District, etc.) are responsible for implementing and monitoring the congestion management plan (CMP). The purpose of the CMP is to monitor the performance of the region's transportation system, develop programs to address near-term and long-term congestion, and better integrate transportation and land use planning. Under the CMP, large projects that generate 200 or more peak hour trips must be reviewed to assess impacts on state highways and regionally significant arterials. The state highways identified in the CPM that could be affected by decommissioning include I-5, SR 78, and SR 76 (SDC 2011).

4.3.17.2 Potential Decommissioning Impacts from Transportation

The types of transportation impacts for decommissioning nuclear power facilities and operating nuclear power plants are similar. The factors that determine the magnitude of transportation impacts of decommissioning include:

- Changes in waste production due to decontamination and dismantlement activities that increase the amount of waste shipped offsite.
- Changes in the transportation methods (rail, truck, or barge) related either to the increased amount to be shipped offsite or to the type of material to be shipped.
- Changes in the mix of types of waste categories shipped offsite.

The public health impacts result from exposures of transport workers and the general public along transportation routes during normal shipments and from material that could be released as a result of transportation accidents, as well as from transportation accidents that do not involve the release of radioactive material. The radiological impacts to public health and safety are considered detectable if the dose rates from shipping containers exceed regulatory limits. Radiological impacts are considered destabilizing if material is shipped in unapproved containers (NRC 2002).

The nonradiological impacts of transportation of radioactive waste are considered detectable or destabilizing if the vehicles are maintained or driven in a manner that would result in a significantly greater accident rate than experienced by the trucking industry. Additional nonradiological impacts are increases in both truck/vehicle (i.e. worker and decommissioning vehicles) and boat traffic density, and wear and tear on roadways and railways. The impacts of decommissioning activities on the transportation infrastructure are considered detectable if the increased traffic causes a decrease in LOS or measurable deterioration of affected roads that can be directly tied to activities at the plant. (NRC 2002)

4.3.17.3 Evaluation

Transportation impacts are dependent on the number of shipments to and from the facility, the type of shipments, the distance that material is shipped, waste and material quantities, disposal plans, and the number of workers commuting to and from the site. The distance that the waste travels depends on the plant's proximity to a disposal site. The number of shipments and volume of waste shipped during the decontamination and dismantlement phases of decommissioning are greater than during operations.

Radiological

Radiological impacts are divided into those for “routine” or incident-free shipments (i.e., the shipment reaches its destination without incident) and those for shipments that involve an accident with a subsequent radiological release. In each case, the impact is expressed in cumulative dose for the transport workers and public.

The NRC performed an evaluation of the likely magnitude of radiological impacts of radiological waste shipments in its 2002 decommissioning GEIS. The results were estimated doses and latent cancer fatalities for the transportation workers and public under incident-free and accident conditions for decommissioning a single unit. The NRC used available data from decommissioning plants and made assumptions to develop the inputs for the analysis. NRC expects that with the assumptions, the results of the analysis should bound the transportation impacts for all decommissioning options for pressurized water reactors and boiling water reactor nuclear power plants. (NRC 2002, Section 4.3.17.3)

SCE compared the assumptions and analysis inputs used for NRC’s analysis with waste volumes estimated for SONGS 2 & 3 decommissioning, transport mode, and disposal facility options. This comparison is on a one-unit basis because the NRC’s analysis is for a single unit; this analysis is presented in Table 4.3.17-3. The material inventory input used by the NRC was based on past decommissioning power plant experience.

The NRC analysis in the 2002 decommissioning GEIS reviewed the LLRW generation anticipated for decommissioning activities and divided it into three categories corresponding to exposure dose assumptions. Waste was divided into high-activity waste (reactor vessel and internal components), low-activity waste (activated concrete), and very low activity waste. Most of the waste was estimated to fall into the category of very low activity waste and the NRC assumed that this waste category would have negligible impacts during transportation. The wastes estimated for SONGS 2 & 3 are presented in Table 3.2.2-1. To compare these waste estimates to the waste categories that the NRC used in the decommissioning GEIS, Classes B, C, and greater-than-Class-C were considered the high-activity waste; Class A waste would be very low-activity and low-activity waste. SONGS Class A estimates were developed based on volume and material rather than activity, so are not easily compared to the NRC categorization. A comparison to the NRC estimates presented in its decommissioning GEIS is given in Table 4.3.17-3.

As indicated in Table 4.3.17-3, the waste volumes estimated per unit to be shipped would be lower for the high-activity waste and higher for the low-activity waste than the NRC had assumed for its analysis. While the very low-activity and low-activity waste volume for SONGS is higher, two other parameters greatly reduce worker and population exposure. Due to the availability of the rail line, SCE plans to ship the bulk of radiological waste by rail; however, there may be times when truck shipments will be required. The NRC indicates in the decommissioning GEIS that use of rail reduces radiological impacts by more than a factor of 10 over truck shipments (NRC 2002, Section 4.2.17.3). Furthermore, disposal facilities available for SONGS 2 & 3 radiological waste are less than half the distance assumed by NRC in its analysis.

The disposal facilities considered in the SCE comparison are Energy Solutions in Clive, Utah, and Waste Control Specialists in Andrews, Texas. Both are licensed for Class A waste, and Waste Control Specialists is also licensed for Class B and C waste. (NRC 2013f) In addition, both facilities can dispose of mixed waste within the LLRW classifications for which they are licensed because they have RCRA permits (Energy Solutions 2013; WCS 2013). Energy Solutions in Clive, Utah, is approximately 790 miles from SONGS, while Waste Control Specialists in Andrews, Texas, is approximately 1,100 miles (Energy Solutions 2014; Google Maps 2013; Mapquest 2013). Of the two facilities, Waste Control Solutions in Andrews, Texas, is farther. A review of potential rail routes to Andrews, Texas, indicates two possibilities, a mostly direct route through Tucson, Arizona, at about 1,100 miles (Maps of the World 2010; TDOT 2012).

Another key assumption made by the NRC in its analysis was that the bulk of the radiological waste generated during decommissioning would be very low activity waste, and thus radiological impacts resulting from shipping it to a disposal facility would be negligible. As shown in Table 4.3.17-3, the Class A waste volume for decommissioning one unit at SONGS 2 & 3 is a considerably higher volume than in the NRC's analysis[2].

SCE also compared the number of shipments needed for its waste to the number of shipments estimated by the NRC in its analysis. Table 4.3.17-3 gives the number of truck shipments that the NRC estimated and the number of intermodal containers for the SONGS 2 & 3 waste. For planning purposes, SCE has considered shipping its radioactive waste by rail using intermodal containers; however, as stated above, although SCE plans to ship via rail, there may be times when truck shipment of LLRW is required. Each intermodal container is assumed to carry one truck load, and each train would carry many containers. SCE estimated the number of intermodal container loads needed using the truck load volume assumptions for high-activity ($5.3m^3$ per load) and low-activity ($9\ m^3$ per load) used in the NRC's 2002 analysis (NRC 2002, Appendix K).

The inputs and assumptions, including the assumption that very low-activity waste would have negligible radiological impacts, indicate that transportation worker and public exposure would be considerably less due to the lower shipping mileage alone, without considering the use of rail, which offers further reduction in exposure. The NRC considers the use of rail to offer a reduction of more than a factor of 10 (NRC 2002, Section 4.3.17). However, as stated above, there may be times when truck shipment of LLRW is required. Given that the bulk of LLRW shipments would be by rail, and considering rail shipment's reduction in exposure, the

[2] In fiscal year 2010, "NRC finalized the transfer of the possession license for Zion Units 1 and 2 from Exelon Generating Company LLC to Zion Solutions LLC to facilitate decommissioning of the units, allowing the implementation of an innovative approach to reactor decommissioning, which, if successful, could become the model for decommissioning other power reactor sites" (NRC 2010). The waste estimate for Zion's innovative decommissioning approach is 6 million cubic ft (Zion Solutions 2008).

transportation worker and public exposures from shipment of SONGS waste is anticipated to be within those estimated by NRC in the decommissioning GEIS.

SCE will comply with all applicable NRC and DOT regulations, including Federal Railroad Administration regulations and requirements, and use approved packaging and shipping containers for the shipping of radiological waste. SCE will also comply with State of California regulations enforced by Caltrans and the California Highway Patrol. The NRC holds the position that its regulations for the transportation of radioactive material are adequate to protect the public against unreasonable risk, and thus compliance with existing regulations would result in radiological impacts that were neither detectable nor destabilizing (NRC 2002).

Nonradiological Traffic

Nonradiological impacts of transportation include increased traffic and wear and tear on area roadways. In addition, with dismantling of offshore structures, increased boat traffic would occur. Traffic associated with decommissioning, including workers, would utilize the Basilone Road access off I-5. In 2005, the LOS at Basilone Road during the peak hour was C and the off-peak was LOS of B. In the vicinity of SONGS, I-5 peak hour traffic ranged from LOS C to LOS D.

For purposes of this analysis, nonradioactive waste is assumed to be shipped via truck. Transportation of nonradiological waste will occur over the course of the entire DECON period. The total volume of nonradioactive waste is estimated at 25,216,569 ft^3, and the total volume of scrap metal is estimated at 12,928,042 ft^3. (Energy Solutions 2014, Table 6-4) To present a worst-case analysis, it is assumed that all nonradioactive waste and scrap metal would be shipped during the peak dismantling period of two years (Energy Solutions 2014, Table 6-1). Based on a 1,080 ft^3 container, the total number of nonradioactive waste shipments would be approximately 23,000, and scrap metal shipments would be approximately 12,000. Assuming 20 working days per month for two years, the total outgoing shipments of nonradioactive waste and scrap metal would result in an average of approximately 150 one-way trips by truck per day during the peak period. The number of incoming shipments (in support of decommissioning activities) to SONGS would be much smaller than the number of outgoing shipments. It is anticipated that many of the shipments to SONGS, including shipments of equipment and heavy machinery, would come from local sources (NRC 2002).

The number of workers also results in traffic and wear and tear on area roadways. At the peak of decommissioning, a total of approximately 560 workers could be onsite on a given day (Energy Solutions 2014, Tables 6-2 and 6-3), resulting in up to approximately 1,100 worker trips per day.

The impacts of commuting during decommissioning would be lower than during operations, when SONGS had more than 2,000 workers. The number of peak hour decommissioning trips would be expected to exceed 200, which could prompt a review under the local congestion management plan (SDC 2011).

Offshore activities to remove vertical risers on the Units 2 & 3 intake and discharge conduits would increase vessel traffic in the area. Potentially a crane barge, deck barge, and dredge could be used, as was planned for Unit 1 conduit removal activities (EDAW 2005). Crew boats carrying workers and divers would be mobilized to the dismantlement site daily. SCE has estimated each trip to and from the offshore dismantling area would require less than one hour. Before dismantling would occur, SCE will comply with the requirements of the CZMA, as regulated by the CCC, for activity within this coastal zone area including the beach area. In addition, SCE will coordinate with the USCG to provide updated information to local mariners to minimize potential maritime hazards. Although removal of the conduit risers would increase vessel traffic in the area, it is not expected that these activities would cause a navigational safety hazard or a substantial delay in the normal movements of commercial or recreational vessels. The environmental impacts review for the Unit 1 conduit disposition indicated that impacts to recreational and commercial transportation would be insignificant (EDAW 2005).

Nonradiological Accidents

Nonradiological impacts of transportation accidents are typically expressed in terms of fatalities. The impacts of transportation accidents are based on the round-trip distance between the decommissioning site and the waste facility. Based on 671 truck shipments of 3,000 miles each way, a total of approximately 4 million miles, and on a fatal accident rate of 8.8×10^{-9} per mi, the NRC estimates in the decommissioning GEIS 0.0356 fatalities for transportation accidents for shipment of LLRW. The GEIS concludes that nonradiological impacts from traffic accidents at this level would not be significant (NRC 2002). As discussed above, SCE plans to ship radioactive waste by rail, but there may be times when truck shipments will be required. The rail accident analysis assumed shipment of the entire estimated LLRW volume via rail.

The fatal accident rate for rail shipments is 4.86×10^{-8} per rail car per mile (Saricks and Tompkins 1999). As discussed above, the shipments are assumed to use intermodal containers and conservatively assuming one per rail car and all the shipments would be for 1,100 miles per way, the rail car mileage is 24 million miles, and the estimated fatalities would be 1.18.

The GEIS did not estimate fatalities from shipment of nonradioactive waste. The nonradioactive waste generated from SONGS decommissioning is assumed to be shipped out-of-state due to the moratorium on disposal of decommissioned materials at Class III landfills located in California imposed by California Executive Order D-62-02 (Energy Solutions 2014, Section 5.0). Class III landfills are municipal solid waste landfills meeting geologic and flooding criteria (CalRecycle 2014). Several landfills located in the Phoenix, Arizona, area are permitted for municipal and industrial waste including asbestos (Maricopa County 2014; WM 2014). For analysis purposes, the mileage of approximately 380 miles between San Clemente, CA, and Phoenix, AZ, was used (Google Maps 2014a). There are several scrap metal recycling companies serving southern California (Thomas Publishing 2014), and for analysis purposes, a destination for scrap metal recycling at the Port of Los Angeles, CA, a distance of approximately 60 miles, was used (SA Recycling 2014; Google Maps 2014b). Using these assumptions and the estimated number of shipments, the round trip shipping miles are approximately 19 million. Using the NRC's fatal accident rate as discussed above results in a fatality estimate of 0.17.

The total estimated fatalities for shipments is thus estimated to be 1.35 based on conservative assumptions for the entire decommissioning activities and considered to be SMALL.

4.3.17.4 Conclusions

In its GEIS for decommissioning, the NRC generically determined transportation impacts associated with decommissioning to be SMALL (NRC 2002). The public health and safety impacts of transporting radioactive waste are evaluated on the basis of compliance with applicable regulations. The NRC has taken the position (46 FR 21619) that its "...regulations are adequate to protect the public against unreasonable risk from the transportation of radioactive materials."

SCE will comply with all applicable NRC and DOT regulations and requirements and use approved packaging and shipping containers regarding the shipping of radiological waste. Therefore, the radiological impacts of transporting radiological waste from decommissioning SONGS 2 & 3 would be SMALL and are bounded by the previously issued EIS. No mitigation measures are likely to be sufficiently beneficial to be warranted (NRC 2002).

The GEIS also determined nonradiological transportation impacts of decommissioning to be SMALL (NRC 2002). The NRC concluded that transporting the materials to and from a decommissioning site would not significantly impact the overall traffic volume or compromise the safety of the public (NRC 2002). The decommissioning traffic associated with SONGS is considered negligible compared to existing traffic volumes and would not be expected to significantly alter the LOS of area roadways. In addition, this amount of traffic is not expected to significantly deteriorate roadways. However, the number of peak hour decommissioning trips would be expected to exceed 200, which could prompt a review under the local congestion management plan (SDC 2011).

As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs. Considering the available information on the potential transportation impacts from decommissioning SONGS 2 & 3, it is concluded that the impacts will be SMALL.

Table 4.3.17-1: Caltrans Level of Service Designations

Level of Service	Traffic Conditions
A	Free-flow conditions with unimpeded maneuverability. Stopped delay at signalized intersections is minimal.
B	In the range of stable flow, but the presence of other users in the traffic streams begins to be noticeable.
C	In the range of stable flow, but marks beginning of the flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream.
D	High-density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences poor level of comfort.
E	Near capacity. Operations with significant delays and low average speeds.
F	Forced or breakdown flow. Operations with extremely low speeds, high delay.

(SCE 2005)

Table 4.3.17-2: Traffic Counts near SONGS, 2005 and 2011

AADT Counts on State Routes			Total AADT/Truck Only AADT	
Description			**2005**	**2011**
State Route 78 at Interstate 5 Junction			151,000/5,466	76,000/3,549
State Route 76 at Interstate 5 Junction			52,000/2,288	47,500/2,090
State Route 1 at Interstate 5 Junction			38,500/2,395	36,500/2,270
State Route 74 at Interstate 5 Junction			28,500/8,921	43,000/3,459
State Route 73 at Interstate 5 Junction			42,000/399	34,000/323
Total AADT Counts on I-5	**AADT Count South of Junction**		**AADT Count North of Junction**	
	Total AADT/Truck Only AADT		Total AADT/Truck Only AADT	
Description	**2005**	**2011**	**2005**	**2011**
Interstate 5 at State Route 78 Junction	212,000/10,200	197,000/9,476	208,000/9,980	193,000/9,264
Interstate 5 at State Route 76 Junction	167,000/9,980	172,000/—	164,000/—	159,000/—
Interstate 5 at Basilone Road Junction	138,000/9,980	132,000/9,544	141,000/—	137,000/—
Interstate 5 at State Route 1 Junction	220,000/9,350	242,000/10,285	211,000/—	234,000/—
Interstate 5 at State Route 74 Junction	234,000/9,992	258,900/11,055	253,000/10,069	279,000/11,104
Interstate 5 at State Route 73 Junction	—	287,000/—	—	249,000/—

(Caltrans 2011)

Table 4.3.17-3: Comparison of NRC Radiological Impacts Analysis Inputs and Assumptions

Parameter	NRC Input or Assumption	SONGS Decommissioning (per unit)
Waste Volume		
High-activity waste (reactor vessel and internal components) volume/shipments	42,400 ft^3/227 truck shipments	4,100 ft^3/15 intermodal containers[(a)]
Low-activity waste (activated concrete) volume	26,500 ft^3/84 truck shipments	See Class A, below
Very low-activity waste/shipments	191,000 ft^3/360 truck shipments	See Class A, below
Class A (very low-activity and low-activity) waste/shipments	Presented separately above	1,800,000 ft^3/11,000 intermodal containers[(b)]
Shipment mode	Truck	Rail
Shipping distance	3,000 mi, mostly rural	1,100 mi[(c)], mostly rural

(Energy Solutions 2014; NRC 2002, Appendix K)

a. The greater-than-Class C is assumed to be stored in the onsite ISFSI and not shipped. The volume is one-half of the total Class B and C waste estimated for both units.

b. The volume is one-half of the total Class A waste estimated for both units.

c. Two low-level waste disposal facilities are potentially available for disposal of SONGS 2 & 3 radiological waste, the farthest of the two and the one permitted for disposal of waste classes A, B, and C is Waste Control Specialists (WCS 2013) in Andrews, TX, with two potential routes (Maps of the World 2013). The longer of the two options is conservatively assumed for analytical purposes only.

4.3.18 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments are commitments of resources that cannot be recovered, and irretrievable commitments of resources are those that are lost only for a period of time. The irreversible and irretrievable commitments of resources that are anticipated during the decommissioning process are similar to those that were considered for facility construction and operating including land, water, human resources, cultural, and threatened and endangered species. However, because land devoted to LLRW disposal sites and industrial landfills is addressed in their licensing documents, the NRC did not consider the commitment of the land resources for disposal of waste from decommissioning within the scope of impacts from decommissioning. An irretrievable or irreversible commitment of resources is defined as a loss that is detectable and destabilizing, such as when a species becomes extinct, or, in the case of mining, when ore is removed. (NRC 2002, Sections 4.3.18 and 4.3.18.1)

4.3.18.1 Regulations

As discussed in NRC's decommissioning GEIS, the NRC's NEPA implementing regulations (10 CFR 51, Appendix A to Subpart A), require NEPA reviews to include a discussion of any irreversible or irretrievable commitments of resources anticipated for the project.

4.3.18.2 Potential Impacts of Decommissioning Activities on Irretrievable Resources

The decommissioning activities will consume materials, have small impacts on various resources as discussed in Sections 4.3.1–4.3.17, and require land for disposal of radiological and non-radiological waste. The NRC indicated that the decommissioning activities with the potential to impact irreversible and irretrievable commitment of resources include structural dismantlement; LLRW packaging, storage, and disposal; and transportation (NRC 2002, Section 4.3.18.3).

4.3.18.3 Evaluation

SONGS 2 & 3 decommissioning will involve dismantlement and removal of structures and restoration of the property to a state for unrestricted release per NRC regulations in accordance with the criteria for decommissioning in 10 CFR 20, subpart E. Furthermore, the property would be returned to the U.S. Navy under the terms of the lease and further negotiations. Thus, land used for SONGS is not irreversible or irretrievable. The use of land for disposal of radiological and non-radiological waste was determined by the NRC to be outside the scope of decommissioning impacts of a nuclear power plant; however, the availability of disposal capacity is briefly discussed below.

The decommissioning activities will have small impacts to water, air, ecological, socioeconomic, and cultural resources as discussed in Sections 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, 4.3.12, and 4.3.14. These small impacts do not represent irretrievable or irreversible impacts and would be temporary, occurring during the decommissioning timeframe. The NRC's decommissioning GEIS considered the use of the environment (air, water, and land) to not represent significant irreversible or irretrievable resource commitments, but rather a relatively short-term investment.

The decommissioning of SONGS 2 & 3 would consume some materials, an irretrievable commitment, including materials for decontamination, solvents, industrial gases, tools, and fuel for construction equipment and transportation of workers and materials to and from the facility.

The irreversible commitment of such resources was considered by the NRC in the decommissioning GEIS and their consumption was considered minor.

As mentioned above, the irretrievable or irreversible commitment of land for disposal of a facility's radiological and non-radiological waste is considered out of scope for decommissioning impacts. SONGS 2 & 3 waste volumes will be considerable and will consume capacity at disposal facilities.

The radiological waste volume estimated for decommissioning SONGS 2 & 3 is presented in Table 3.2.2-1. There are two licensed disposal facilities available for disposal of SONGS 2 & 3 radiological waste. Waste Control Specialists is the Andrews, Texas, 1,338-acre facility currently licensed for disposal of Class A, B, and C waste including mixed waste of these classes (WCS 2013) with a permitted capacity of 2.3 million ft^3 (TCEQ 2013). Energy Solutions in Clive, Utah, is a 540-acre facility currently licensed for disposal of Class A waste (Energy Solutions 2013; NDR 2011) with a capacity of 8.72 million cy^3 (236 million ft^3) for Class A waste and 1.35 million cy^3 (36.5 million ft^3) mixed waste (UDEQ 2013).

Decommissioning of SONGS 2 & 3 will generate various hazardous wastes. California has multiple facilities permitted for the storage, treatment, and disposal of hazardous waste under the RCRA, in addition to California-designated hazardous waste, including electronic waste, solvent recovery, and used oil (CDTSC 2013a). Chemical Waste Management operates a landfill in Kings County with 695 acres permitted for Class I (hazardous) waste, Toxic Substances and Control Act (TSCA) polychlorinated biphenyls, and Class II/III (non-hazardous) waste (CDTSC 2013b).

Decommissioning will also generate an estimated 13 million ft^3 of scrap metal that will be shipped off site for recycling. In addition, lead shielding that has not been irradiated will be shipped to a facility that has a use for it. (Energy Solutions 2014, Section 3.4 and Table 6-4)

The non-radiological waste volume estimated for decommissioning SONGS 2 & 3 is 25 million ft^3. The nonradioactive waste generated from SONGS 2 & 3 decommissioning is assumed to be shipped to an out-of-state landfill due to the moratorium on disposal of decommissioned materials at California nonhazardous landfills imposed by California Executive Order D-62-02 (Energy Solutions 2014, Section 5.0). Landfills permitted to receive the waste and that have available disposal capacity will be used for disposal.

4.3.18.4 Conclusions

The decommissioning of SONGS 2 & 3 would result in SMALL irretrievable or irreversible commitment of resources from consumption of materials needed for decommissioning activities and small impacts to land, water, and air. In its GEIS for decommissioning, the NRC made the generic determination that the impacts on irreversible and irretrievable commitments are SMALL (NRC 2002, Section 4.3.18.4); therefore, the impact of SONGS on irreversible and irretrievable commitments during decommissioning is bounded by this previously issued EIS. As the details of SONGS decommissioning activities are developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by previously issued EISs.

CHAPTER 4 REFERENCES

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5. NO-ACTION DECOMMISSIONING ALTERNATIVE

The action discussed in the *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NRC 2002) is decommissioning, while this EIE discusses specifically the decommissioning of SONGS 2 & 3. The objective of decommissioning is to restore a radiologically contaminated facility to a condition in which there is no unreasonable risk from the decommissioned facility to the public health and safety.

NRC regulations do not allow the option of not decommissioning.

An initial operating license for a nuclear power plant is issued by the NRC for up to 40 years. The license may be renewed for additional 20-year periods if NRC requirements are met. However, at the end of the term of the license (whether it has been extended or not), the regulations require that the facility be decommissioned.

Restarting the reactor is not a viable alternative to decommissioning because regulations do not allow the licensee to reload fuel and restart the facility after a certification has been submitted stating that the fuel has been removed from the reactor vessel. SCE submitted this certification for SONGS Unit 3 on June 28, 2013, (SCE 2013a) and for SONGS Unit 2 on July 22, 2013 (SCE 2013b).

A “no action” alternative, or not decommissioning SONGS 2 & 3, implies that SCE would simply abandon or leave the facility after ceasing operations. But once the facility permanently ceases operation, if the licensee does not conduct decommissioning activities to the extent that meets the license termination criteria in 10 CFR 20 Subpart E, the license will not be terminated (although the licensee will not be authorized to operate the reactor). In such a case, the licensee must continue to comply with the necessary requirements for the operating license. Therefore, the environmental impacts for maintaining SONGS 2 & 3 would be considered within the bounds of the previously issued EISs such as NUREG-1437, and no further analysis is required.

CHAPTER 5 REFERENCES

NRC (U.S. Nuclear Regulatory Commission). 2002. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities.* NUREG-0586, NRC, Washington, D.C.

SCE (Southern California Edison). 2013a. Correspondence from Peter T. Dietrich, Senior Vice President & Chief Nuclear Officer to the NRC, Permanent Removal of Fuel from the Reactor Vessel San Onofre Nuclear Generating Station Unit 3. June 28, 2013.

SCE. 2013b. Correspondence from Peter T. Dietrich, Senior Vice President & Chief Nuclear Officer to the NRC, Permanent Removal of Fuel from the Reactor Vessel San Onofre Nuclear Generating Station Unit 2. July 22, 2013.

6. SUMMARY OF FINDINGS AND CONCLUSIONS

This chapter summarizes the findings and conclusions from this EIE related to decommissioning of SONGS 2 & 3. This EIE presents the licensee's review of the environmental impacts of its decommissioning plans, determining whether the anticipated or potential impacts are within the bounds of existing EISs. The EIE analyses draw from the NRC's generic analyses and generic determinations of bounding impacts in NUREG-0586.

This EIE satisfies the environmental impact review requirements for the PSDAR and provides information on groundwater monitoring at SONGS per RG 1.185, Rev. 1. The EIE also provides the foundation of the LTP supplement to the ER, which will be submitted later in the decommissioning process.

Within NUREG-0586, the NRC identified several issue areas that require site-specific analysis. These include offsite land uses, aquatic and terrestrial ecology (beyond the operational boundary area), threatened and endangered species, environmental justice, and cultural and historical resources (beyond the operational study area). These site-specific issues are addressed in this EIE.

Table 6-1 presents each environmental issue that was evaluated in the EIE and identifies whether the impact would be SMALL, MODERATE, or LARGE. In addition, the table identifies the significance of impacts as stated in NUREG-0586.

For decommissioning, the standard of significance is derived from the Council on Environmental Quality terminology for "significantly" (40 CFR 1508.27, which considers "context" and "intensity"). The impact categorization is consistent with NRC guidance as presented in NUREG-0586 (NRC 2002). The levels of significance are defined as:

> SMALL: Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts in this supplement, the NRC has concluded that those impacts that do not exceed permissible levels in the commission's regulations are considered small.
>
> MODERATE: Environmental impacts are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
>
> LARGE: Environmental impacts are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The discussion of each environmental issue in this EIE includes an explanation of how the significance level was determined. In determining the significance level, it is assumed that ongoing mitigation measures would continue during decommissioning (including those mitigation measures implemented during plant construction and/or operation), as appropriate. In addition, it is assumed that SCE will comply with all applicable federal, state, and local regulatory requirements.

6.1 Conclusions

In summary, the potential impacts from decommissioning SONGS 2 & 3 are not expected to increase or substantially differ from those identified in NUREG-0586. Considering the available information, it is concluded that all impacts would be SMALL and for those environmental issues for which NRC made a generic determination in NUREG-0586, SONGS 2 & 3 impacts are bounded by NUREG-0586. As the details of SONGS 2 & 3 decommissioning activities are further developed, SCE will comply with 10 CFR 50.82(a)(7) regarding notification to the NRC and review of changes to determine if anticipated environmental impacts continue to be bounded by NUREG-0586.

Because all the environmental impacts have been determined to be SMALL per 40 CFR 1508.27 and NRC NUREG-0586, SCE may proceed with the decommissioning activity without further analysis provided that the impacts resulting from decommissioning activities fall within the range of impacts as described in Chapter 4. However, if the activity results in impacts to environmental issues not considered in this EIE, or if the impact involves an environmental issue determined to be conditionally site-specific as defined above, then the activity cannot be performed until a further site-specific analysis is completed, along with a license amendment request, and the NRC has approved the license amendment.

Table 6-1: Summary of the Environmental Impacts from Decommissioning SONGS Units 2 & 3

Issue	Impact	GEIS Determination	EIE Determination
4.3.1 Onsite/Offsite Land Use			
Onsite land use activities	There would be no changes in onsite land use patterns during decommissioning. SCE will meet NRC regulations for license termination and return the site in accordance with Department of the Navy requirements, to be established through negotiations. No adverse onsite land use impacts are anticipated. Onsite land use impacts related to decommissioning of SONGS 2 & 3 would be considered SMALL.	SMALL	SMALL
Offsite land use activities	Though not currently planned for use in support of decommissioning, parcels already leased by SONGS from the U.S. Navy on the west side of I-5 outside the OCA have the potential to be utilized for post-operations decommissioning activities. These parcels are currently utilized to support SONGS, and no land use change inconsistent with current utilization is expected. In addition, there may be a need to refurbish portions of the existing rail spur in support of decommissioning, but modifications are not expected to deviate from current land use. For the SONGS 2 & 3 off-shore intake and discharge conduits, current plans are to apply proposed abandonment measures set forth by SCE for SONGS Unit 1 (see Section 4.3.5 discussion). Should these plans change, SCE will take appropriate action in compliance with all regulatory requirements. For possible utilization of existing easements, there would be minimal modification to offsite land use and no adverse impacts are anticipated. Offsite land use impacts related to decommissioning of SONGS 2 & 3 would be considered SMALL.	Site-specific analysis required	SMALL
4.3.2 Water Use	Dewatering effects due to removal of structures below groundwater elevation will be limited to an area within a 1,000-foot radius of the SONGS 2 & 3 subsurface structures and will not impact any offsite water user. Water uses, including dewatering volumes, are anticipated to be significantly less than water use during operation. Impacts related to water use would be considered SMALL.	SMALL	SMALL

Issue	Impact	GEIS Determination	EIE Determination
4.3.3 Water Quality			
Surface Water and Groundwater	Due to the implementation of BMPs, compliance with permits, and the unlikelihood of low concentrations of hazardous substances due to legacy activities, the potential impacts of decommissioning on nonradioactive aspects of water quality for both surface water and groundwater would be considered SMALL.	SMALL	SMALL
4.3.4 Air Quality	SCE will implement standard mitigating measures to reduce particulate matter and ozone emissions during decommissioning, per the requirements of the SDAPCD. Air quality impacts related to decommissioning of SONGS 2 & 3 would be considered SMALL.	SMALL	SMALL
4.3.5 Aquatic Ecology			
Activities within the operational area	BMPs will be employed, all required permits and lease amendments will be obtained, and avoidance and mitigation measures will be implemented; therefore, decommissioning activities within operational areas, including the removal of submerged structures are anticipated to have SMALL impact on aquatic resources. SCE will continue to comply with applicable NDPES regulations and permits for its continued water withdrawals and wastewater discharges.	SMALL	SMALL
Activities beyond the operational area	Nearshore and offshore conduit riser removal activities would be conducted under approved CSLC requirements to minimize impacts to SMALL. All applicable BMPs and avoidance and mitigation measures will be employed and all required permits, lease amendments, and other approvals will be obtained. SONGS will continue to comply with applicable NPDES regulations and permits for its continued water withdrawals and wastewater discharges. Impacts due to decommissioning activities on aquatic ecology are anticipated to be SMALL.	Site-specific analysis required	SMALL
4.3.6 Terrestrial Ecology			
Activities within the operational area	Decommissioning activities would be limited to previously disturbed areas onsite. BMPs will be employed, all required permits and lease amendments will be obtained, and avoidance and mitigation measures will be implemented. Impacts to onsite terrestrial resources from decommissioning would be SMALL.	SMALL	SMALL

Issue	Impact	GEIS Determination	EIE Determination
Activities beyond the operational area	Other than the activities necessary to support removal actions of security barriers outside the plant perimeter fence, any proposed decommissioning activities will be restricted to developed and paved surfaces. BMPs will be employed, all required permits and lease amendments will be obtained, and avoidance and mitigation measures will be implemented. It is reasonable to conclude that impacts to offsite terrestrial resources from decommissioning would not be considered destabilizing, therefore would be SMALL.	Site-specific analysis required	SMALL
4.3.7 Threatened and Endangered Species	Decommissioning of SONGS 2 & 3 is not anticipated to adversely impact any federally or state-listed species. Decommissioning activities would be limited to previously disturbed areas onsite and temporary nearshore and offshore disturbance to support removal of intake and outfall conduit risers. SCE will employ mitigation measures as required by California agencies to minimize impacts to the environment and protect listed species. In addition, SCE will implement BMPs, avoidance and mitigation measures, and conduct assessments as called for in its environmental protection procedure, as well as comply with permit and regulatory requirements to minimize impacts from noise, air emission, dust and runoff. Therefore, it is reasonable to conclude that impacts to threatened or endangered species from decommissioning would be SMALL.	Site-specific analysis required	SMALL
4.3.8 Radiological			
Activities resulting in occupational dose to workers and activities resulting in dose to the public	SCE will continue to monitor effluents, comply with all applicable regulatory limits, continue its REMP to assess the impacts to the environment from these effluents annually, and keep worker exposure levels ALARA. SCE estimates that SONGS 2 & 3 decommissioning activities would result in occupational and public doses within NRC estimates. Radiological impacts related to the decommissioning of SONGS 2 & 3 would be considered SMALL.	SMALL	SMALL
4.3.9 Radiological Accidents	Once the reactor fuel has been moved to the spent fuel pool, the only design basis accidents are those associated with the spent fuel pool. These accidents are generally related to fuel handling or dropping heavy objects into the spent fuel pool. As long as the integrity of the spent fuel pool and its supporting systems is maintained, the potential impacts of accidents are bounded by the impacts of those for the spent	SMALL	SMALL

Issue	Impact	GEIS Determination	EIE Determination
	fuel pool. The NRC continues to consider accidents involving the spent fuel pool to be a SMALL risk because licensees would be required to maintain an acceptable design and performance criteria throughout the life of the plant. SONGS will maintain its license basis and safety analysis along with the environmental impact assessment of radiological accident risk as documented in the FES. Impacts related to radiological accidents during decommissioning of SONGS 2 & 3 would be considered SMALL.		
4.3.10 Occupational Issues	SCE will continue to implement its industrial safety program, train its employees on safety procedures, conduct safety inspections, hold pre-job briefings, and other safety-reinforcing practices. Because the industrial safety program will be continued and would be expected to continue to be effective in preventing occupational injuries and illnesses, decommissioning activities are expected to have a SMALL impact on occupational issues.	SMALL	SMALL
4.3.11 Cost	A decommissioning cost assessment is not a requirement; however, an accurate decommissioning cost estimate is necessary for a safe and timely plant decommissioning. As instructed in RG 1.185, SCE will evaluate cost as required in the PSDAR Section 3.	N/A	N/A
4.3.12 Socioeconomic	It is anticipated that there would be little or no impact in the local community due to the closure of SONGS or because of changes in staffing levels at the plant. The population in the 50-mile region is expected to continue growing throughout the decommissioning time period, and the economy and job market show signs that they will continue to improve. The housing market is stable and adequate for housing demand due to population growth. While SCE has a strong tax presence in San Diego County, the SONGS property assessment is a relatively small portion of San Diego's total tax collections. SCE's tax obligations will be reduced due to SONGS decommissioning, but SCE and SONGS will continue to contribute to county tax revenues throughout the decommissioning time period, and there would be no negative impact to services in the community.	SMALL	SMALL

Issue	Impact	GEIS Determination	EIE Determination
4.3.13 Environmental Justice	The GEIS for decommissioning has concluded that adverse environmental justice impacts and associated significance of the impacts must be determined on a site-specific basis. As described throughout Chapter 4 of the EIE, SCE has determined that no significant offsite environmental impacts will be created by SONGS 2 & 3 decommissioning activities. As the NRC procedure recognizes (NRC 2013, Page D-2), if no significant offsite impacts occur in connection with the proposed action, then no member of the public would be substantially affected. Therefore, there can be no disproportionately high and adverse impact or effects on members of the public, including minority and low-income populations, resulting from the decommissioning of SONGS 2 & 3.	Site-specific analysis required	SMALL
4.3.14 Cultural and Historic Resources			
Activities within the operational areas	No cultural, historic, or archeological resources exist inside the OCA. Therefore, provided decommissioning activities are confined to the OCA, the impacts of SONGS on cultural, historical, and archeological resources during decommissioning fall well within the bounds established by the NRC in the decommissioning GEIS. Decommissioning activities are expected to have a SMALL impact on cultural and historic resources within the operational area.	SMALL	SMALL
Activities beyond the operational areas	Land use is anticipated to remain the same and no adverse impacts to any cultural resources are anticipated should the existing SONGS rail spur easement and leased parcels located outside the OCA be used for decommissioning activities. Decommissioning activities are expected to have a SMALL impact on cultural and historic resources beyond the operational area.	Site-specific analysis required	SMALL
4.3.15 Aesthetics	In its decommissioning GEIS, the NRC stated that removal of structures is generally considered beneficial to the aesthetic impacts of a site. The aesthetic impact of decommissioning SONGS 2 & 3 would be that of the current aesthetic impact of the plant prior to dismantlement. During dismantlement, the visual intrusion would be temporary and would serve to reduce the aesthetic impact of the site. Decommissioning activities are expected to have a SMALL impact on aesthetics.	SMALL	SMALL

Issue	Impact	GEIS Determination	EIE Determination
4.3.16 Noise	Due to the relatively high ambient noise levels surrounding SONGS, and that no significant differences are expected between the noise levels of the previously operating plant and the noise levels observed at facilities undergoing decommissioning, noise impacts are not considered destabilizing. Decommissioning activities are not expected to produce noise levels that could impact the activities of humans or threatened and endangered species. Impacts related to noise during decommissioning of SONGS 2 & 3 would be considered SMALL.	SMALL	SMALL
4.3.17 Transportation	SCE will comply with all applicable NRC and DOT regulations and requirements and use approved packaging and shipping containers regarding the shipping of radiological waste. The decommissioning traffic associated with SONGS is considered negligible compared to existing traffic volumes and would not significantly alter the LOS of area roadways; however, peak hour trips are expected to exceed 200, a threshold for conducting a review under the local congestion management plan. Therefore, transportation impacts from decommissioning SONGS 2 & 3 would be SMALL.	SMALL	SMALL
4.3.18 Irreversible and Irretrievable Commitment of Resources	The decommissioning of SONGS 2 & 3 would result in SMALL irretrievable or irreversible commitment of resources from consumption of materials needed for decommissioning activities and small impacts to land, water, and air.	SMALL	SMALL

CHAPTER 6 REFERENCES

NRC (U.S. Nuclear Regulatory Commission). 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors, Final Report*. NUREG-0586. November 2002.

NRC. 2013. NRR Office Instruction No. LIC-203, *Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues*, Revision 3. July 1, 2013.

Appendix A

SAN ONOFRE NUCLEAR GENERATING STATION

Annual Radioactive Effluent Release Report

2007

January - December

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2007)

COMMON

Onsite Groundwater Samples
January 1, 2007 - December 31, 2007

This section provides results of on-site samples of groundwater in accordance with the voluntary Nuclear Energy Institute (NEI) Groundwater Protection Initiative. The sample locations and the frequency of sampling are likely to change as Unit 1 decommissioning proceeds. For those few sample data that are not below the lower limit of detection, the levels are near the analytical sensitivity for the laboratory techniques. They do not indicate that there has been an inadvertent release of radioactive material beyond the site boundary.

Sample Date	Location	Tritium Activity, uCi/ml	Gamma Activity, (uCi/ml)
01/02/2007	U1 DW 1	<LLD	<LLD
	U1 DW 2	<LLD	<LLD
	U1 DW 3	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
01/03/2007	U1 DW 4	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
01/15/2007	U1 DW 1	<LLD	<LLD
	U1 DW 2	<LLD	<LLD
	U1 DW 3	<LLD	<LLD
	U1 DW 4	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
01/24/2007	U1 DW 1	<LLD	<LLD
	U1 DW 2	<LLD	<LLD
	U1 DW 3	<LLD	<LLD
	U1 DW 4	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
02/01/2007	U1 DW 1	<LLD	<LLD
	U1 DW 3	<LLD	<LLD
	U1 DW 4	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
03/19/2007	U1 DW 1	<LLD	<LLD
	U1 DW 2	<LLD	<LLD
	U1 DW 3	<LLD	<LLD
	U1 DW 4	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2007)

COMMON

Onsite Groundwater Samples
January 1, 2007 - December 31, 2007

Sample Date	Location	Tritium Activity, uCi/ml	Gamma Activity, (uCi/ml)
03/22/2007	Composite	<LLD	<LLD
04/14/2007	U1 DW 5	<LLD	<LLD
04/15/2007	U1 DW 5	<LLD	<LLD
04/16/2007	U1 DW 1 U1 DW 2 U1 DW 3 U1 DW 4 U1 DW 5 U1 DW 6 U1 DW 7 U1 DW 8 U1 DW 9	<LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD
04/17/2007	U1 DW 5	<LLD	<LLD
04/18/2007	U1 DW 5	<LLD	<LLD
04/19/2007	U1 DW 5	<LLD	<LLD
04/20/2007	U1 DW 5	<LLD	<LLD
04/21/2007	U1 DW 5	<LLD	<LLD
04/22/2007	U1 DW 5	<LLD	<LLD
04/24/2007	U1 DW 5	<LLD	<LLD
04/26/2007	U1 DW 5	<LLD	<LLD
04/27/2007	U1 DW 5	<LLD	<LLD
04/28/2007	U1 DW 5	<LLD	<LLD
04/29/2007	U1 DW 5	<LLD	<LLD
04/30/2007	U1 DW 5	<LLD	<LLD
05/01/2007	U1 DW 5	<LLD	<LLD
05/02/2007	U1 DW 5	<LLD	<LLD
05/04/2007	U1 DW 5	<LLD	<LLD
05/14/2007	U1 DW 1 U1 DW 2 U1 DW 3 U1 DW 4 U1 DW 5 U1 DW 6 U1 DW 7 U1 DW 8	<LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD <LLD <LLD <LLD <LLD

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (2007)

COMMON

Onsite Groundwater Samples
January 1, 2007 - December 31, 2007

Sample Date	Location	Tritium Activity, uCi/ml	Gamma Activity, (uCi/ml)
06/12/2007	U1 DW 1	<LLD	<LLD
	U1 DW 4	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
07/16/2007	U1 DW 1	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 6	<LLD	<LLD
	U1 DW 7	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
07/27/2007	U1 DW 5	<LLD	<LLD
08/06/2007	U1 DW 5	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
08/12/2007	U1 DW 5	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
08/13/2007	U1 DW 1	<LLD	<LLD
08/20/2007	U1 DW 1	<LLD	<LLD
	U1 DW 5	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
08/24/2007	U1 DW 10	<LLD	<LLD
09/05/2007	U1 DW 10	<LLD	<LLD
09/11/2007	U1 DW 10	<LLD	<LLD
09/19/2007	U1 DW 5	<LLD	<LLD
	U1 DW 8	<LLD	<LLD
	U1 DW 10	<LLD	<LLD
09/25/2007	U1 DW 10	<LLD	<LLD
10/01/2007	U1 DW 10	<LLD	<LLD
10/05/2007	U1 DW 6	<LLD	<LLD
10/06/2007	U1 DW 6	<LLD	<LLD
10/07/2007	U1 DW 6	<LLD	<LLD
10/08/2007	U1 DW 6	<LLD	<LLD
10/09/2007	U1 DW 6	<LLD	<LLD

Onsite Groundwater Samples
January 1, 2007 - December 31, 2007

Sample Date	Location	Tritium Actvity, uCi/ml	Gamma Activity, uCi/ml
10/10/2007	U1 DW 6	<LLD	<LLD
10/11/2007	U1 DW 6 U1 DW 8 U1 DW 10	<LLD <LLD <LLD	<LLD <LLD <LLD
10/12/2007	U1 DW 6	<LLD	<LLD
10/13/2007	U1 DW 6	<LLD	<LLD
10/14/2007	U1 DW 6	<LLD	<LLD
10/15/2007	U1 DW 6	<LLD	<LLD
10/16/2007	U1 DW 6	<LLD	2.73E-6
10/17/2007	U1 DW 6	<LLD	<LLD
10/29/2007	U1 DW 6	<LLD	<LLD
10/30/2007	U1 DW 6	<LLD	<LLD
10/31/2007	U1 DW 6	<LLD	<LLD
11/01/2007	U1 DW 6	<LLD	<LLD
11/02/2007	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
11/03/2007	U1 DW 6 U1 DW 10 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD <LLD
11/04/2007	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
11/05/2007	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
11/06/2007	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD

COMMON

Onsite Groundwater Samples
January 1, 2007 - December 31, 2007

Sample Date	Location	Tritium Actvity, uCi/ml	Gamma Activity, uCi/ml
11/07/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/08/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/09/2007	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/10/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/11/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/12/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/13/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/14/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/15/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD

COMMON

Sample Date	Location	Tritium Activity, uCi/ml	Gamma Activity, uCi/ml
11/20/2007	U1 DW 6	<LLD	<LLD
	U1 DW 10	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
11/26/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
12/03/2007	U1 DW 6	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
12/12/2007	U1 DW 10	<LLD	<LLD
	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
12/18/2007	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
12/26/2007	U1 DW 11	<LLD	<LLD
	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD

U1 DW = Dewatering wells to support U1 decommissioning.
Composite = Composite of the dewatering wells for a week.
A priori LLDs = H-3: 1.0 E-5 uCi/ml, Cs-137: 5.0 E-7 uCi/ml.

COMMON

This section provides results of on-site samples of groundwater in accordance with the voluntary Nuclear Energy Institute (NEI) Groundwater Protection Initiative. The sample locations and the frequency of sampling are likely to change as the Groundwater Protection Initiative is implemented. For those few sample data that are not below the lower limit of detection, the levels are near the analytical sensitivity for the laboratory techniques. They do not indicate that there has been an inadvertent release of radioactive material beyond the site boundary.

Sample Date	Location	Tritium Activity, uCi/ml	Gamma Activity, uCi/ml
12/04/2007	SONGS PA 1	<LLD	<LLD
12/07/2007	SONGS PA 2 SONGS PA 3 SONGS PA 4	1.2E-6 <LLD <LLD	<LLD <LLD <LLD
12/08/2007	SONGS OCA 3	<LLD	<LLD
12/27/2007	SONGS PA-2	1.2E-6	<LLD

SONGS PA = Wells installed in the Protected Area to implement the Groundwater Protection Initiative.

SONGS OCA = Wells installed in the Owner Controlled Area to implement the Groundwater Protection Initiative.

A priori LLDs = H-3: 2.0 E-6 uCi/ml, Cs-137: 1.8 E-8 uCi/ml.

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Onsite Groundwater Samples

This section provides results of on-site samples of groundwater in accordance with the voluntary Nuclear Energy Institute (NEI) Groundwater Protection Initiative. The sample locations and the frequency of sampling are likely to change as Unit 1 decommissioning proceeds. For those few sample data that are not below the lower limit of detection, the levels are near the analytical sensitivity for the laboratory techniques. They do not indicate that there has been an inadvertent release of radioactive material beyond the site boundary.

January 1, 2008 - December 31, 2008

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
01/02/2008	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
01/06/2008	U1 DW 11 U1 DW 12	<LLD <LLD	<LLD <LLD
01/09/2008	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
01/16/2008	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
01/23/2008	U1 DW 6	<LLD	<LLD
01/30/2008	U1 DW 6	<LLD	<LLD
02/14/2008	U1 DW 6 U1 DW 11 U1 DW 13	<LLD <LLD <LLD	<LLD <LLD <LLD
03/14/2008	U1 DW 6 U1 DW 11 U1 DW 13	<LLD <LLD <LLD	<LLD <LLD <LLD
04/14/2008	U1 DW 6 U1 DW 11 U1 DW 12 U1 DW 13	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
05/15/2008	U1 DW 12 U1 DW 13	<LLD <LLD	<LLD <LLD
05/16/2008	U1 DW 12 U1 DW 13	<LLD <LLD	<LLD <LLD
05/17/2008	U1 DW 12 U1 DW 13	<LLD <LLD	<LLD <LLD
05/18/2008	U1 DW 12 U1 DW 13	<LLD <LLD	<LLD <LLD

Onsite Groundwater Samples (Continued)

January 1, 2008 - December 31, 2008

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
05/19/2008	U1 DW 12 U1 DW 13	<LLD <LLD	<LLD <LLD
06/04/2008	U1 DW 12	<LLD	<LLD
06/05/2008	U1 DW 12	<LLD	<LLD
06/07/2008	U1 DW 12	<LLD	<LLD
06/08/2008	U1 DW 12	<LLD	<LLD
06/09/2008	U1 DW 12	<LLD	<LLD
06/10/2008	U1 DW 12	<LLD	<LLD
06/12/2008	U1 DW 12	<LLD	<LLD
06/13/2008	U1 DW 12	<LLD	<LLD
07/09/2008	U1 DW 14	<LLD	<LLD
07/10/2008	U1 DW 14	<LLD	<LLD
07/11/2008	U1 DW 14	<LLD	<LLD
07/13/2008	U1 DW 14	<LLD	<LLD
07/14/2008	U1 DW 14	<LLD	<LLD
08/15/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD
08/22/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD
08/23/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD
08/24/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD
08/25/2008	U1 DW 12 U1 DW 13 U1 DW 14 U1 DW 15	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
08/26/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD
08/27/2008	U1 DW 12 U1 DW 13 U1 DW 14	<LLD <LLD <LLD	<LLD <LLD <LLD

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Onsite Groundwater Samples (Continued)

January 1, 2008 - December 31, 2008

Sample Date	Location	Tritium Activity, μCi/ml	Gamma Activity, μCi/ml
08/28/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
08/29/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
08/30/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
09/04/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
09/05/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
	U1 DW 15	<LLD	<LLD
09/06/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
	U1 DW 15	<LLD	<LLD
09/07/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
	U1 DW 15	<LLD	<LLD
09/08/2008	U1 DW 12	<LLD	<LLD
	U1 DW 13	<LLD	<LLD
	U1 DW 14	<LLD	<LLD
	U1 DW 15	<LLD	<LLD
09/15/2008	U1 DW 15	<LLD	<LLD

U1 DW = Wells installed to support decommissioning of Unit 1. The locations of these wells will change as decommissioning proceeds.

a priori LLDs = H-3: 1.0 E-5 μCi/ml, Cs-137: 6.8 E-8 μCi/ml

Onsite Groundwater Samples (Continued)

This section provides results of on-site samples of groundwater in accordance with the voluntary Nuclear Energy Institute (NEI) Groundwater Protection Initiative. The sample locations and the frequency of sampling may change as Protection Initiative over time. For those few sample data that are not below the lower limit of detection, the levels are near the analytical sensitivity for the laboratory techniques. They do not indicate that there has been an inadvertent release of radioactive material beyond the site boundary.

January 1, 2008 - December 31, 2008

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
01/03/2008	SONGS PA 2	1.60E-6	<LLD
01/11/2008	SONGS PA 2	1.28E-6	<LLD
01/18/2008	SONGS PA 2	1.52E-6	<LLD
01/25/2008	SONGS PA 2	1.22E-6	<LLD
02/14/2008	SONGS PA 1 SONGS PA 4	<LLD <LLD	<LLD <LLD
02/21/2008	SONGS PA 3 SONGS PA 2	<LLD 1.81 E-6	<LLD <LLD
03/21/2008	SONGS OCA 1	<LLD	<LLD
03/25/2008	SONGS OCA 2	<LLD	<LLD
03/26/2008	SONGS PA 2	1.14E-6	<LLD
03/27/2008	SONGS OCA 3	<LLD	<LLD
04/25/2008	SONGS PA 2	6.50E-7	<LLD
05/29/2008	SONGS PA 2	<LLD	<LLD
06/11/2008	SONGS PA 1 SONGS PA 4	<LLD <LLD	<LLD <LLD
06/13/2008	SONGS PA 2 SONGS PA 3	5.30E-7 <LLD	<LLD <LLD
06/27/2008	SONGS OCA 1 SONGS OCA 2 SONGS OCA 3	<LLD <LLD <LLD	<LLD <LLD <LLD
07/17/2008	SONGS PA 2	<LLD	<LLD
09/22/2008	SONGS OCA 2	<LLD	<LLD
09/24/2008	SONGS OCA 1 SONGS OCA 3	<LLD <LLD	<LLD <LLD

Onsite Groundwater Samples (Continued)

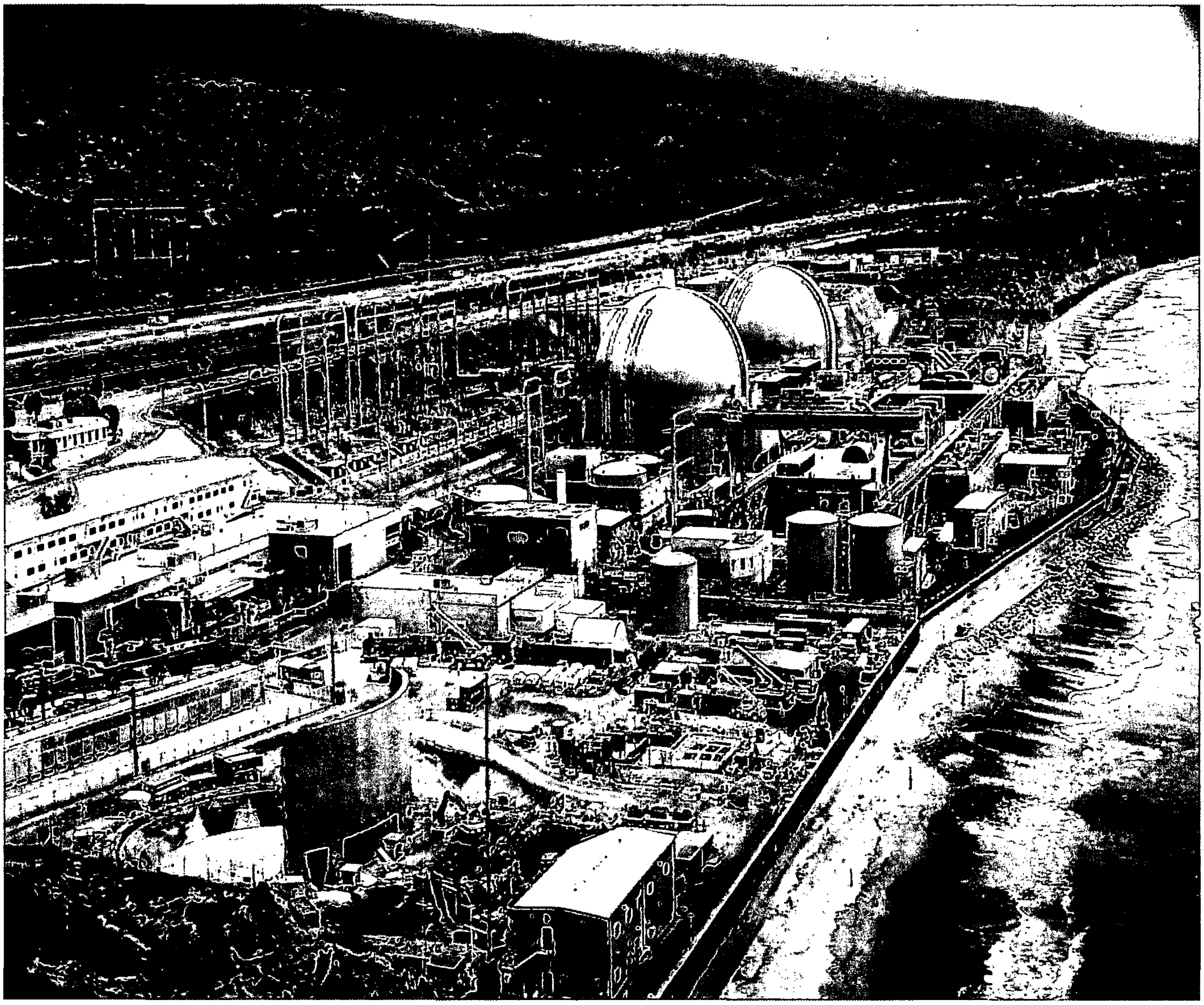
January 1, 2008 - December 31, 2008

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
9/26/2008	SONGS PA 1 SONGS PA 2 SONGS PA 3 SONGS PA 4	<LLD 2.96E-7 <LLD <LLD	<LLD <LLD <LLD <LLD
12/29/2008	SONGS OCA 3	<LLD	<LLD
12/30/2008	SONGS PA 1 SONGS PA 2 SONGS PA 3 SONGS PA 4	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
12/31/2008	SONGS OCA 1 SONGS OCA 2	<LLD <LLD	<LLD <LLD

SONGS PA = Wells installed in the Protected Area to implement the Groundwater Protection Initiative.

SONGS OCA = Wells installed in the Owner Controlled Area to implement the Groundwater Protection Initiative.

a priori LLDs = H-3: 3.0E-6 µCi/ml, Cs-137: 1.8 E-8 µCi/ml



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Onsite Groundwater Samples (Continued)

This section provides results of on-site samples of groundwater in accordance with the voluntary Industry Groundwater Protection Initiative. The sample locations and the frequency of sampling may change as Protection Initiative over time. For those few sample data that are not below the lower limit of detection, the levels are near the analytical sensitivity for the laboratory techniques.

January 1, 2009 - December 31, 2009

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
3/21/2009	GW-OCA-1	<LLD	<LLD
	GW-OCA-2	<LLD	<LLD
3/23/2009	GW-OCA-3	<LLD	<LLD
3/26/2009	GW-PA-3	<LLD	<LLD
	GW-PA-4	<LLD	<LLD
3/27/2009	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
6/5/2009	GW-OCA-2	<LLD	<LLD
6/8/2009	GW-OCA-1	<LLD	<LLD
6/10/2009	GW-NIA-1	1.06E-06	<LLD
	GW-NIA-2	7.77E-07	<LLD
6/11/2009	GW-OCA-3	<LLD	<LLD
6/12/2009	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
	GW-PA-4	<LLD	<LLD
7/15/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	5.29E-07	<LLD
7/31/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	1.29E-06	<LLD
8/6/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA 2	9.50E-07	<LLD
8/14/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	1.26E-06	<LLD

Onsite Groundwater Samples (Continued)

January 1, 2009 - December 31, 2009

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
8/20/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	1.17E-06	<LLD
8/27/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	1.24E-06	<LLD
9/3/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	1.21E-06	<LLD
9/10/2009	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
	GW-PA-4	<LLD	<LLD
9/24/2009	GW-OCA-3	<LLD	<LLD
9/25/2009	GW-OCA-1	<LLD	<LLD
	GW-OCA-2	<LLD	<LLD
12/3/2009	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	9.47E-07	<LLD
12/9/2009	GW-OCA-3	<LLD	<LLD
12/10/2009	GW-OCA-1	<LLD	<LLD
	GW-OCA-2	<LLD	<LLD
12/14/2009	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
	GW-PA-4	<LLD	<LLD

GW-PA = Wells installed in the Protected Area to implement the Groundwater Protection Initiative.

GW-OC = Wells installed in the Owner Controlled Area to implement the Groundwater Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Groundwater Protection Initiative.

a priori LLDs = H-3: 3.0E-6 µCi/ml, Cs-137: 1.8 E-8 µCi/ml

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SECTION K. MISCELLANEOUS

ONSITE GROUND WATER SAMPLES

This section provides results of on-site samples of ground water in accordance with the voluntary Industry Ground Water Protection Initiative. The data provided on this page are from temporary sample locations as part of an investigation underway in the area formerly occupied by Unit 1. The locations will change as the investigation proceeds and are expected to be discontinued with time.

January 1, 2010 - December 31, 2010

Sample Date	Location	Tritium Activity, μCi/ml	Gamma Activity, μCi/ml
6/22/10	Bore hole 4	-	<LLD
6/23/10	Bore hole 4	3.18E-6	<LLD
	Bore hole 4	2.88E-6	<LLD
	Bore hole 7	1.88E-6	<LLD
6/24/10	Bore hole 3	4.25E-6	<LLD
	Bore hole 14	3.81E-6	<LLD
	Bore hole 15	9.53E-6	<LLD
	Bore hole 16	3.50E-6	<LLD
	Bore hole 17	7.62E-7	<LLD
6/25/10	Bore hole 9	2.01E-6	<LLD
	Bore hole 11	1.11E-5	<LLD
	Bore hole 18	<LLD	<LLD
	Bore hole 19	1.33E-6	<LLD
	Bore hole 20	1.93E-6	<LLD
	Bore hole 22	<LLD	<LLD

a priori LLD = H-3: 3.0E-6 μCi/ml

μCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

This section provides results of on-site samples of ground water in accordance with the voluntary Industry Ground Water Protection Initiative. The sample locations and the frequency of sampling may change over time.

January 1, 2010 - December 31, 2010

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
2/8/10	GW-PA-2	<LLD	<LLD
3/11/10	GW-OCA-1 GW-OCA-2	<LLD <LLD	<LLD <LLD
3/15/10	GW-NIA-1 GW-NIA-2	<LLD 5.52E-7	<LLD <LLD
3/26/10	GW-PA-1 GW-PA-2 GW-PA-3 GW-PA-4	<LLD <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
3/29/10	GW-OCA-3 GW-OCA-3	<LLD <LLD	<LLD <LLD
6/14/10	GW-OCA-1 GW-OCA-2	<LLD <LLD	<LLD <LLD
6/16/10	GW-OCA-3	<LLD	<LLD
6/17/10	GW-OCA-3	<LLD	<LLD
6/23/10	GW-NIA-1 GW-NIA-2	4.70E-7 1.23E-6	<LLD <LLD
6/24/10	GW-PA-1 GW-PA-2 GW-PA-3 GW-PA-4	5.04E-7 <LLD <LLD <LLD	<LLD <LLD <LLD <LLD
9/8/10	GW-NIA-1 GW-NIA-2	<LLD 1.05E-6	<LLD <LLD
9/10/10	GW-PA-1	<LLD	<LLD
9/13/10	GW-PA-2 GW-PA-3 GW-PA-4	<LLD <LLD <LLD	<LLD <LLD <LLD

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, μCi/ml	Gamma Activity, μCi/ml
9/20/10	GW-OCA-1 GW-OCA-2 GW-OCA-3	<LLD <LLD <LLD	<LLD <LLD <LLD
10/14/10	NIA-3 NIA-4 NIA-5	<LLD <LLD 1.73E-6	<LLD <LLD <LLD
10/21/10	GW-NIA-1 GW-NIA-2	<LLD 1.27E-6	<LLD <LLD
12/23/10	NIA-4 NIA-6 NIA-10 NIA-11 GW-NIA-2	<LLD <LLD <LLD <LLD 1.14E-6	<LLD <LLD <LLD <LLD <LLD
12/27/10	NIA-5 GW-NIA-1	2.10E-6 <LLD	<LLD <LLD

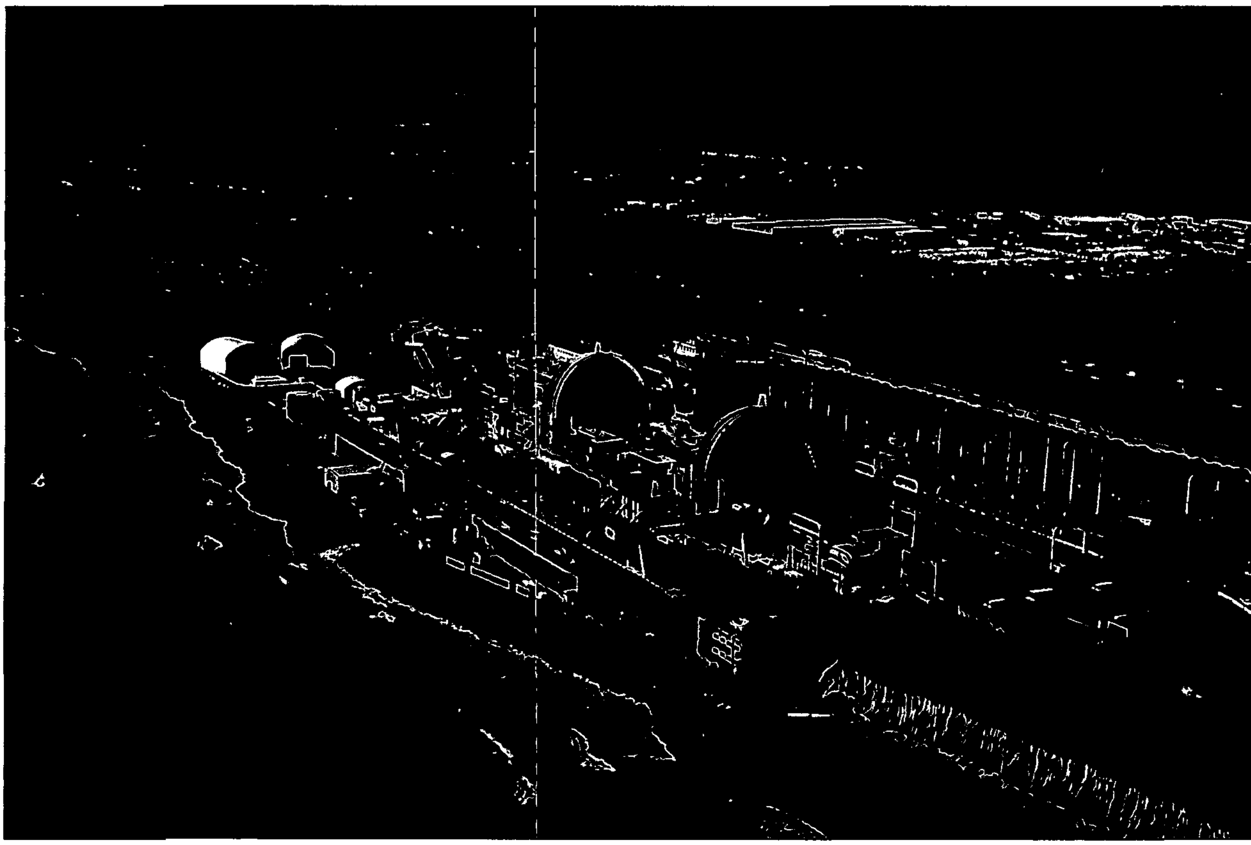
GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

a priori LLD = H-3: 3.0E-6 μCi/ml

μCi/ml = indicated microcuries per milliliter



SAN ONOFRE NUCLEAR GENERATING STATION

Annual Radioactive Effluent Release Report

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SECTION K. MISCELLANEOUS (Continued)

ONSITE GROUND WATER SAMPLES

This section provides results of on-site samples of ground water in accordance with the voluntary Industry Ground Water Protection Initiative. The sample and the frequency of sampling may change over time.

January 1, 2011 – December 31, 2011

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
1/8/11	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-6	4.57E-7	<LLD
	NIA-6	6.09E-7	<LLD
	NIA-8	1.31E-6	<LLD
	NIA-9	<LLD	<LLD
1/16/11	NIA-4	<LLD	<LLD
	NIA-6	5.55E-7	<LLD
	NIA-7	<LLD	<LLD
	NIA-8	1.01E-6	<LLD
	NIA-9	<LLD	<LLD
1/17/11	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
1/22/11	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	1.81E-6	<LLD
	NIA-6	6.77E-7	<LLD
	NIA-7	5.79E-7	<LLD
	NIA-8	8.28E-7	<LLD
	NIA-9	<LLD	<LLD
1/27/11	NIA-7	<LLD	<LLD
	NIA-7	<LLD	<LLD
1/28/11	NIA-7	<LLD	<LLD
	NIA-7	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA = Temporary wells installed in the North Industrial Area for investigation of groundwater .

a priori LLD = H-3: 3.0E-6 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
1/29/11	NIA-7	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-7	7.96E-7	<LLD
1/30/11	NIA-7	<LLD	<LLD
	NIA-7	5.60E-7	<LLD
	NIA-7	<LLD	<LLD
1/31/11	NIA-7	5.49E-7	<LLD
	NIA-7	<LLD	<LLD
2/1/11	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	1.20E-6	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-8	1.99E-6	<LLD
	NIA-9	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	7.90E-7	<LLD
2/12/11	NIA-6	5.45E-7	<LLD
	NIA-6	8.89E-7	<LLD
	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	<LLD	<LLD
3/3/11	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
3/4/11	PA-4	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA = Temporary wells installed in the North Industrial Area for investigation of groundwater .

a priori LLD = H-3: 3.0E-6 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, μCi/ml	Gamma Activity, μCi/ml
3/13/11	NIA-6	3.33E-6	<LLD
	NIA-6	3.72E-6	<LLD
	NIA-6	3.83E-6	<LLD
	NIA-6	3.69E-6	<LLD
	NIA-6	3.72E-6	<LLD
	NIA-6	3.57E-6	<LLD
	NIA-6	3.31E-6	<LLD
3/24/11	NIA-6	6.89E-7	<LLD
3/30/11	GW-OCA-2	<LLD	<LLD
	GW-OCA-3	<LLD	<LLD
3/31/11	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	<LLD	<LLD
	GW-OCA-1	<LLD	<LLD
4/2/11	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.19E-7	<LLD
	NIA-6	3.53E-6	<LLD
	NIA-6	3.54E-6	<LLD
	NIA-6	2.52E-6	<LLD
	NIA-6	2.81E-6	<LLD
	NIA-6	2.26E-6	<LLD
	NIA-6	3.63E-6	<LLD
	NIA-7	2.12E-6	<LLD
6/11/11	NIA-5	5.82E-7	<LLD
	NIA-6	2.24E-6	<LLD
	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	7.98E-7	<LLD
6/17/11	GW-OCA-2	<LLD	<LLD
6/18/11	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	GW-NIA-7	1.37E-6	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
6/20/11	GW-OCA-1	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA = Temporary wells installed in the North Industrial Area for investigation of groundwater .

a priori LLD = H-3: 3.0E-6 μCi/ml

μCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
6/23/11	GW-OCA-3	<LLD	<LLD
6/24/11	GW-PA-1 GW-PA-2 GW-PA-3 GW-PA-4	<LLD <LLD <LLD 8.38E-7	<LLD <LLD <LLD <LLD
7/16/11	NIA-8 NIA-9	7.29E-7 <LLD	<LLD <LLD
8/6/11	GW-NIA-1 GW-NIA-2	<LLD 1.39E-6	<LLD <LLD
8/11/11	GW-PA-4	6.87E-7	<LLD
8/13/11	NIA-6 NIA-7	1.52E-6 <LLD	<LLD <LLD
8/20/11	NIA-3 NIA-4 NIA-5	<LLD <LLD 1.05E-6	<LLD <LLD <LLD
9/19/11	GW-OCA-1	<LLD	<LLD
9/21/11	GW-OCA-3	<LLD	<LLD
9/22/11	GW-PA-1 GW-PA-2 GW-PA-3 GW-PA-4	<LLD <LLD <LLD 8.68E-7	<LLD <LLD <LLD <LLD
9/24/11	NIA-5 NIA-6 NIA-10 NIA-11	1.07E-6 1.98E-6 <LLD <LLD	<LLD <LLD <LLD <LLD
9/26/11	GW-OCA-2	<LLD	<LLD
10/31/11	GW-PA-4	5.64E-7	<LLD
12/9/11	GW-PA-4	<LLD	<LLD
12/15/11	GW-PA-2 GW-PA-3	<LLD <LLD	<LLD <LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA = Temporary wells installed in the North Industrial Area for investigation of groundwater .

a priori LLD = H-3: 3.0E-6 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
12/16/11	GW-PA-1	<LLD	<LLD
12/18/11	NIA-6	1.70E-6	<LLD
	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	7.25E-7	<LLD
12/22/11	GW-OCA-3	<LLD	<LLD
12/23/11	GW-OCA-1	<LLD	<LLD
	GW-OCA-2	<LLD	<LLD
12/24/11	NIA-14	<LLD	<LLD
	NIA-15	<LLD	<LLD
	NIA-15	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA = Temporary wells installed in the North Industrial Area for investigation of groundwater .

a priori LLD = H-3: 3.0E-6 µCi/ml

µCi/ml = indicated microcuries per milliliter

SAN ONOFRE NUCLEAR GENERATING STATION

Annual Radioactive Effluent Release Report

2012

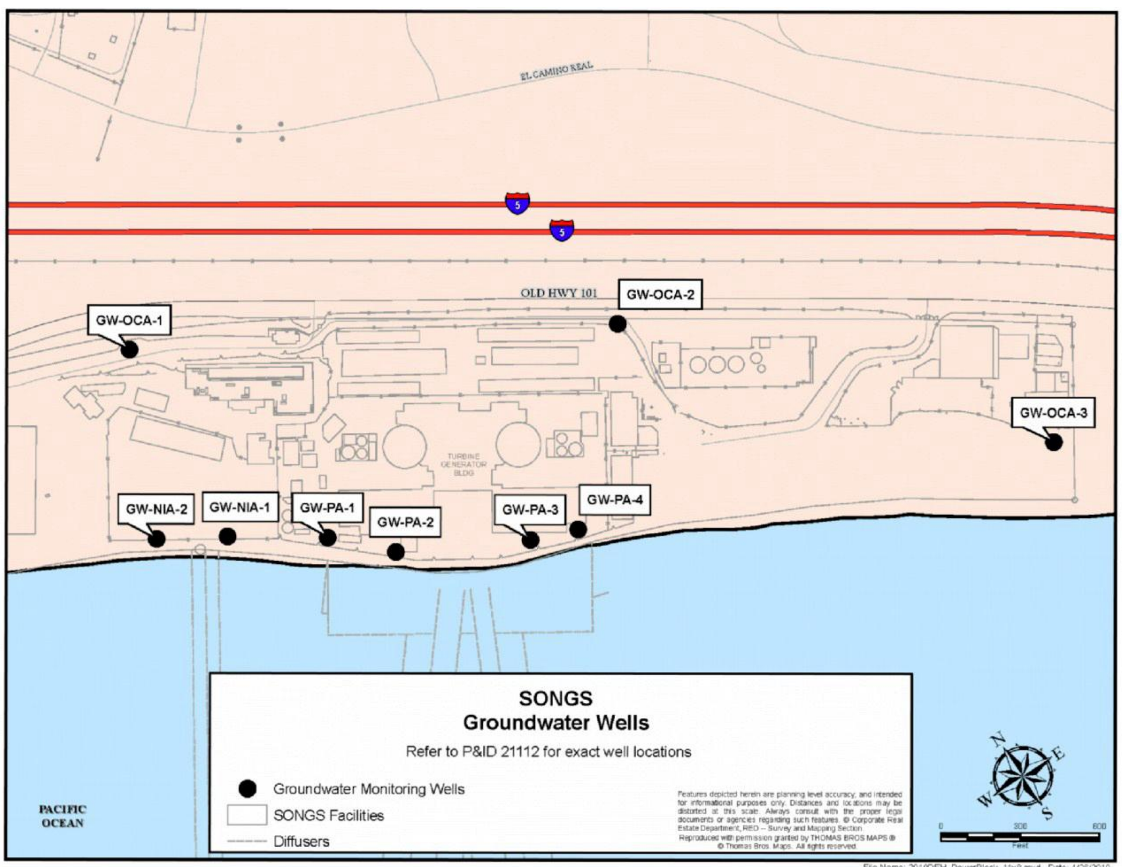
January - December

SECTION K. MISCELLANEOUS (Continued)

ONSITE GROUND WATER SAMPLES

This section provides results of on-site samples of ground water that were obtained as part of SCE's implementation of the voluntary industry Ground Water Protection Initiative. The sample locations and the frequency of sampling may change over time. The ground water beneath SONGS is not a source of drinking water.

Ground water sample data indicated the present of low but detectable levels of tritium in shallow ground water in the area formerly occupied by Unit 1. The concentrations of tritium are well below all regulatory limits. An investigation was performed to characterize these low concentrations of tritium and to identify the potential source. The investigation determined that the low concentrations are present in the shallow ground water situated generally between the former Unit 1 containment and fuel handling building, and extend towards the seawall. An extraction plan has been implemented to initiate hydraulic containment of the plume and to facilitate monitoring and documentation of any changes in tritium concentration. Extraction of the shallow ground water beneath the former Unit 1 area is being performed and the resultant water is managed and discharged through an ODCM-credited release point. Any tritium in the wastewater is included in Tables 2A, 2B and 2D and the dose included in the 10 CFR 50 Appendix I Table 1 of the ARERR.



SECTION K. MISCELLANEOUS (Continued)

ONSITE GROUND WATER SAMPLES

January 1, 2012 – December 31, 2012

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
1/7/12	NIA-5	9.75E-06	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	1.15E-05	<LLD
3/3/12	NIA-EXT-13	1.40E-05	<LLD
	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	<LLD	<LLD
3/10/12	NIA-EXT-13	1.23E-05	<LLD
	NIA-EXT-12	2.63E-06	N/A
	NIA-EXT-14	<LLD	N/A
	NIA-4	<LLD	<LLD
	NIA-5	8.50E-06	<LLD
	NIA-6	<LLD	<LLD
3/12/12	GW-OCA-1	<LLD	<LLD
3/15/12	GW-OCA-2	<LLD	<LLD
3/23/12	GW-OCA-3	<LLD	<LLD
3/29/12	GW-PA-3	<LLD	<LLD
	GW-PA-4	<LLD	<LLD
3/30/12	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
6/14/12	GW-NIA-1	<LLD	<LLD
6/15/12	NIA-5	6.14E-06	<LLD
	GW-NIA-2	3.60E-06	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
6/21/12	GW-OCA-3	<LLD	<LLD
6/22/12	NIA-EXT-12	<LLD	<LLD
6/23/12	GW-PA-3	<LLD	<LLD
6/24/12	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
6/26/12	GW-NIA-1	<LLD	<LLD
6/27/12	GW-PA-4	<LLD	<LLD
	GW-OCA-1	<LLD	<LLD
6/28/12	GW-OCA-2	<LLD	<LLD
6/29/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	3.63E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
7/2/12	NIA-EXT-15	<LLD	<LLD
7/3/12	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-13	2.74E-06	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-10	<LLD	<LLD
7/5/12	GW-NIA-2	2.76E-06	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.42E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
7/6/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
7/9/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.90E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
7/11/12	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
7/12/12	NIA-8	2.43E-06	<LLD
	NIA-9	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
7/13/12	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	2.89E-06	<LLD
	NIA-5	5.17E-06	<LLD
7/16/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.62E-06	<LLD
	NIA-EXT-15	<LLD	<LLD
7/17/12	NIA-EXT-14	<LLD	<LLD
	NIA-7	<LLD	<LLD
7/18/12	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.74E-06	<LLD
	NIA-6	<LLD	<LLD
7/19/12	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	3.11E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
7/20/12	NIA-8	2.28E-06	<LLD
	NIA-9	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

<u>ONSITE GROUND WATER SAMPLES</u> (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
7/23/12	NIA-EXT-12	<LLD	<LLD
7/24/12	NIA-7	<LLD	<LLD
	NIA-EXT-13	2.74E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
7/25/12	GW-NIA-2	2.51E-06	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.18E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
7/26/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-8	2.63E-06	<LLD
	NIA-9	<LLD	<LLD
7/30/12	NIA-7	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.26E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
8/1/12	NIA-11	<LLD	<LLD
	NIA-10	<LLD	<LLD
	GW-NIA-2	2.27E-06	<LLD
	NIA-5	5.18E-06	<LLD
	NIA-3	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
8/2/12	NIA-6	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-9	<LLD	<LLD
	NIA-8	2.48E-06	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
8/7/12	NIA-7	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.27E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
8/8/12	NIA-4	<LLD	<LLD
	NIA-5	5.28E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
8/9/12	GW-NIA-1	<LLD	<LLD
	GW-NIA-2	2.42E-06	<LLD
	NIA-3	<LLD	<LLD
8/14/12	GW-NIA-2	2.75E-06	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.43E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.19E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
8/15/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-8	2.17E-06	<LLD
	NIA-9	<LLD	<LLD
8/20/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.55E-06	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

<u>ONSITE GROUND WATER SAMPLES</u> (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
8/21/12	NIA-4	<LLD	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
8/23/12	GW-NIA-2	2.81E-06	<LLD
	NIA-5	5.34E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
8/24/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-8	2.39E-06	<LLD
	NIA-9	<LLD	<LLD
8/27/12	GW-NIA-2	2.89E-06	<LLD
8/29/12	GW-PA-4	<LLD	<LLD
8/30/12	GW-PA-1	<LLD	<LLD
	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
8/31/12	GW-OCA-2	<LLD	<LLD
9/5/12	GW-OCA-3	<LLD	<LLD
9/6/12	NIA-EXT-13	2.33E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
9/7/12	GW-NIA-2	3.23E-06	<LLD
	NIA-5	4.52E-06	<LLD
	NIA-EXT-12	<LLD	<LLD
9/13/12	GW-OCA-1	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
9/17/12	NIA-7	<LLD	<LLD
	NIA-EXT-13	2.30E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
9/18/12	GW-NIA-2	2.64E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
9/19/12	GW-NIA-1	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	3.63E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-9	<LLD	<LLD
9/20/12	NIA-3	<LLD	<LLD
9/21/12	NIA-8	<LLD	<LLD
9/25/12	NIA-7	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.70E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
9/26/12	GW-NIA-2	<LLD	<LLD
	NIA-6	<LLD	<LLD
	NIA-4	<LLD	<LLD
9/27/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-5	3.49E-06	<LLD

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GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
9/28/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
10/1/12	NIA-7	<LLD	<LLD
	NIA-EXT-13	2.10E-06	<LLD
	NIA-EXT-15	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
10/2/12	GW-NIA-2	2.25E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
10/3/12	NIA-4	<LLD	<LLD
	NIA-6	<LLD	<LLD
10/4/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-5	3.78E-06	<LLD
10/5/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
10/8/12	NIA-7	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
10/9/12	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.20E-06	<LLD
10/10/12	GW-NIA-2	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	5.73E-06	<LLD
	NIA-6	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

GW-PA = Wells installed in the Protected Area to implement the Ground Water Protection Initiative.

GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

<u>ONSITE GROUND WATER SAMPLES</u> (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
10/11/12	NIA-3	<LLD	<LLD
10/12/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
10/13/12	GW-NIA-1	<LLD	<LLD
10/14/12	GW-NIA-2	2.17E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
10/17/12	NIA-EXT-13	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
10/18/12	NIA-4	<LLD	<LLD
	NIA-5	3.83E-06	<LLD
	NIA-6	<LLD	<LLD
10/19/12	NIA-3	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
10/20/12	GW-NIA-1	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
10/24/12	NIA-EXT-12	3.62E-06	<LLD
	NIA-EXT-13	2.62E-06	<LLD
	NIA-7	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
10/25/12	GW-NIA-2	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD

GW-OCA = Wells installed in the Owner Controlled Area to implement the Ground Water Protection Initiative.

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GW-NIA = Wells installed in the North Industrial Area to implement the Ground Water Protection Initiative.

NIA and NIA-EXT = Temporary investigation wells installed in the North Industrial Area

a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
10/26/12	NIA-3	<LLD	<LLD
	NIA-5	3.82E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-4	<LLD	<LLD
10/27/12	GW-NIA-1	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
10/28/12	GW-NIA-2	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
10/31/12	NIA-5	3.28E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-4	<LLD	<LLD
11/1/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
11/2/12	NIA-7	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
11/3/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
11/4/12	GW-NIA-2	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
11/5/12	NIA-3	<LLD	<LLD
	NIA-5	3.65E-06	<LLD
11/7/12	NIA-6	<LLD	<LLD
	NIA-4	<LLD	<LLD

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µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
11/8/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
11/9/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
	NIA-7	<LLD	<LLD
11/11/12	GW-NIA-2	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
11/13/12	NIA-5	3.16E-06	<LLD
	NIA-EXT-13	<LLD	<LLD
11/15/12	NIA-6	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-4	<LLD	<LLD
11/16/12	NIA-3	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
	NIA-7	<LLD	<LLD
11/19/12	GW-NIA-2	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-5	3.27E-06	<LLD
	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD

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a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
11/20/12	GW-NIA-1	<LLD	<LLD
	NIA-3	<LLD	<LLD
	NIA-6	<LLD	<LLD
	NIA-7	<LLD	<LLD
11/21/12	NIA-8	<LLD	<LLD
	NIA-9	<LLD	<LLD
	NIA-EXT-13	2.44E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
11/27/12	NIA-5	2.93E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-11	<LLD	<LLD
	GW-NIA-2	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
11/28/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
11/30/12	NIA-EXT-13	<LLD	<LLD
12/3/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	2.88E-06	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
12/4/12	GW-NIA-2	<LLD	<LLD
	NIA-5	3.07E-06	<LLD
	NIA-6	<LLD	<LLD
12/5/12	NIA-10	<LLD	<LLD
	NIA-11	<LLD	<LLD
12/6/12	GW-OCA-1	<LLD	<LLD
12/7/12	GW-OCA-2	<LLD	<LLD

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a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
12/8/12	GW-NIA-1	<LLD	<LLD
	NIA-8	<LLD	<LLD
	NIA-10	<LLD	<LLD
	NIA-4	<LLD	<LLD
12/9/12	GW-NIA-2	<LLD	<LLD
	NIA-5	4.36E-06	<LLD
	NIA-11	<LLD	<LLD
12/10/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
12/11/12	NIA-6	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
12/12/12	GW-OCA-3	<LLD	<LLD
12/14/12	GW-PA-2	<LLD	<LLD
	GW-PA-3	<LLD	<LLD
12/15/12	GW-PA-1	<LLD	<LLD
12/16/12	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
12/17/12	GW-PA-4	<LLD	<LLD
12/19/12	GW-NIA-2	<LLD	<LLD
	NIA-5	3.67E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-11	<LLD	<LLD
12/20/12	NIA-3	<LLD	<LLD
	GW-NIA-1	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-10	<LLD	<LLD

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a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter

ONSITE GROUND WATER SAMPLES (Continued)

Sample Date	Location	Tritium Activity, µCi/ml	Gamma Activity, µCi/ml
12/21/12	NIA-8	2.19E-06	<LLD
	NIA-9	<LLD	<LLD
	NIA-7	<LLD	<LLD
12/23/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD
12/27/12	GW-NIA-2	<LLD	<LLD
	NIA-5	4.17E-06	<LLD
	NIA-6	<LLD	<LLD
	NIA-11	<LLD	<LLD
12/28/12	NIA-3	<LLD	<LLD
	NIA-4	<LLD	<LLD
	NIA-7	<LLD	<LLD
	NIA-10	<LLD	<LLD
12/29/12	GW-NIA-1	<LLD	<LLD
	NIA-8	<LLD	<LLD
12/30/12	NIA-EXT-12	<LLD	<LLD
	NIA-EXT-13	<LLD	<LLD
	NIA-EXT-14	<LLD	<LLD
	NIA-EXT-15	<LLD	<LLD

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a priori LLD = H-3: 3.0E-06 µCi/ml

µCi/ml = indicated microcuries per milliliter