

March 31, 2014

10 CFR 50.54(q)
10 CFR 50.90
10 CFR 50, Appendix E

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

Subject: Docket Nos. 50-206, 50-361, 50-362 and 72-041, Amendment Application Numbers, 224, 268, and 253, Permanently Defueled Emergency Action Level Scheme, San Onofre Nuclear Generating Station, Units 1, 2, and 3, respectively, and Independent Spent Fuel Storage Installation

- References:
1. SCE to NRC letter dated June 12, 2013, Docket Nos. 50-361 and 50-362, Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station, Units 2 and 3
 2. SCE to NRC letter dated June 28, 2013, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 3
 3. SCE to NRC letter dated July 22, 2013, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 2

Dear Sir or Madam:

Pursuant to 10 CFR 50.54(q) and 10 CFR 50.90, Southern California Edison (SCE) hereby submits enclosed License Amendment Requests (LARs) 224, 268, and 253 for San Onofre Nuclear Generating Station (SONGS) Units 1, 2, and 3, respectively, and the Independent Spent Fuel Storage Facility; SCE Proposed Change Number (PCN)-607.

PCN-607 revises the SONGS Emergency Action Level (EAL) scheme to reflect the permanently defueled condition of the station. The proposed EALs are based on the guidance contained in Nuclear Energy Institute (NEI) 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," Appendix C, that is applicable for permanently defueled conditions and for an Independent Spent Fuel Storage Installation (ISFSI).

In References 1, 2, and 3, SCE provided certification of SONGS Units 2 and 3 permanent cessation of power operation and permanent removal of fuel from the reactor vessels. Accordingly, pursuant to 10 CFR 50.82(a)(2), the 10 CFR license for SONGS Units 2 and 3 no longer authorize operation of the reactors or emplacement or retention of fuel in the reactor vessel. SONGS Units 2 and 3 pose significantly less risk to the public health and safety in this condition. The proposed EAL scheme adequately addresses the risk associated with SONGS Units 2 and 3 permanently defueled condition and continues to provide adequate protection for plant personnel and the public.

Enclosure 1 contains the evaluation of PCN-607. Enclosure 2 contains a markup of the NEI 99-01, Revision 6, Technical Basis Document as applicable for a permanently defueled plant with an ISFSI. Enclosure 3 provides a comparison matrix describing deviations and differences between the proposed SONGS EALs and those provided in NEI 99-01, Revision 6.

SCE requests approval of these proposed changes by December 31, 2014.

There are no new regulatory commitments made within this submittal.

If there are any questions or if additional information is needed, please contact Mr. Mark E. Morgan at (949) 368-6745.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 3/31/, 2014

Sincerely,



Enclosures:

1. Evaluation of proposed License Amendment Request, Permanently Defueled Emergency Action Levels.
2. San Onofre Nuclear Generating Station (SONGS) Permanently Defueled Emergency Plan, Emergency Action Level Technical Bases Manual
3. EAL Comparison Table, NEI 99-01 Rev. 6 Appendix C EALs versus SONGS PDEP EALs

cc: Marc Dapas, Regional Administrator, NRC Region IV
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ENCLOSURE 1

**EVALUATION OF PROPOSED LICENSE AMENDMENT
REQUEST, PERMANENTLY DEFUELED EMERGENCY
ACTION LEVELS**

1.0 SUMMARY DESCRIPTION

Proposed Change Number 607 (PCN-607) is a request to revise the SONGS Emergency Action Level (EAL) scheme. The revised EAL scheme reflects the permanently defueled condition of San Onofre Nuclear Generating Station (SONGS), and the substantially lower onsite and offsite radiological consequences of accidents possible at SONGS.

2.0 DETAILED DESCRIPTION

SONGS Unit 1 was permanently shut down in 1993 and is in the decommissioning phase. Above-ground structures have been dismantled. Unit 1 fuel is stored in the Independent Spent Fuel Storage Installation and in the GE-Hitachi Morris facility.

By letter dated June 12, 2013 (Reference 5.1), Southern California Edison (SCE) submitted a certification to the NRC indicating its intention to permanently cease power operations at SONGS Units 2 and 3, pursuant to 10 CFR 50.82(a)(1)(i). On June 28, 2013, SCE submitted a certification of permanent removal of fuel from the reactor vessel for SONGS Unit 3 (Reference 5.2) pursuant to 10 CFR 50.82(a)(1)(ii). On July 22, 2013, SCE submitted a certification of permanent removal of fuel from the reactor vessel for SONGS Unit 2 (Reference 5.3) pursuant to 10 CFR 50.82(a)(1)(ii). Upon docketing of these certifications, the 10 CFR Part 50 licenses for SONGS Units 2 and 3 no longer authorize operation of the reactor or emplacement or retention of fuel into the reactor vessel, as specified in 10 CFR 50.82(a)(2).

SONGS Units 2 and 3 have been shut down since January 2012. At the time of this submittal, it has been more than two years since the most recent irradiation of spent fuel that is currently stored in the Units 2 and 3 spent fuel pools. It is expected that SONGS Units 2 and 3 will remain in a wet fuel storage configuration for approximately five years. SONGS poses significantly less risk to the public health and safety in this condition. The proposed EAL scheme reflects the potential accidents that remain applicable in the permanently defueled condition, as well as the substantially lower onsite and offsite radiological consequences of accidents possible at SONGS.

The proposed EAL scheme is based on the guidance contained in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors." Specifically, the EALs are based on those of Appendix C of NEI 99-01, which are specific to permanently defueled stations. As such, adoption of the proposed EAL scheme provides assurance that the SONGS Emergency Plan will continue to protect the health and safety of the public.

3.0 DESIGN BASIS ACCIDENT ANALYSIS

SONGS Units 2 and 3 have permanently ceased operation and removed all nuclear fuel from their reactor vessels. The irradiated fuel will be stored in the spent fuel pool (SFP) and in the Independent Spent Fuel Storage Installation (ISFSI) until it is shipped offsite. In this condition, the number of credible accidents/transients is significantly smaller than for a plant authorized to operate the reactor or emplace or retain fuel in the reactor vessel.

With irradiated fuel being stored in the SFP and the ISFSI, the reactor, Reactor Coolant System (RCS) and secondary system are no longer in operation and have no function related to storage of irradiated fuel. With the permanent cessation of power operation and the permanent removal of the fuel from the reactor core, the accident/transient initial conditions/initial reactor power level of the reactor core cannot be achieved and, as such, most of the accident/transient scenarios are not possible. Therefore, the postulated Updated Final Safety Analysis Report (UFSAR) Chapter 15 accidents/transients involving failure or malfunction of the reactor, RCS or secondary system are no longer applicable. The UFSAR has been updated accordingly in accordance with 10 CFR 50.71(e).

The remaining UFSAR Chapter 15 design basis accident scenarios that apply to a permanently defueled facility that have the potential to result in a radiological release are a fuel handling accident (FHA) in the fuel handling building (FHB), a spent fuel cask drop accident, a spent fuel pool boiling accident, a liquid Radioactive Waste System leak or failure, a radioactive release due to liquid tank failures, and an accidental release of waste gas. Since the waste gas decay tanks have been purged of their contents, a rupture of these components will no longer be an applicable initiator or source of such an accident. With regard to the postulated radioactive release due to liquid tank failures, UFSAR Section 15.7.3.3.5 states no credible accident exists that would result in liquid releases exceeding 10 CFR 20 limits.

Previous generic and plant-specific analyses of radwaste handling accidents at decommissioning plants show the consequences to be within 10 CFR 20 limits. SCE intends to develop a plant-specific radwaste handling analysis for inclusion in the UFSAR.

As described below, the remaining accident analyses for SONGS, calculated as of August, 2013, show that the dose consequences are within the relevant regulatory limits.

Dose consequences to a member of the public are calculated at the Exclusion Area Boundary (EAB). The EAB for SONGS is roughly formed by two semi-circles with radii of 1967.5 feet each, centered on the Unit 2 containment and a point 134 feet southeast

of the Unit 3 containment, with a tangent connecting the landward arcs and the seaward arcs of the two semi-circles.

3.1 Radioactive Waste System Leak or Failure (Release to Atmosphere)

UFSAR Section 15.7.3.2 discusses the radiological consequences for a liquid Radioactive Waste System leak or failure. Liquid releases considered include rupture of radwaste tanks, refueling water storage tanks, primary ion-exchangers, and the blowdown demineralizer neutralization sump line. The most limiting of these is defined as an unexpected and uncontrolled release of the radioactive liquid stored in a radwaste secondary tank. The radwaste secondary tanks are Seismic Category II, Quality Class III tanks at atmospheric pressure. Rupture of these tanks is considered a limiting fault. A radwaste secondary tank rupture would release the liquid contents in the auxiliary building (radwaste area). All of the radioactive fission gases and iodines are assumed to be released to the outside atmosphere in 2 hours. As shown in Table 1, below, offsite doses due to the rupture of a radwaste secondary tank are less than the 100 mRem TEDE offsite dose criterion per Regulatory Issue Summary 2006-04 and therefore are less than the 1 rem criterion in the Environmental Protection Agency (EPA) Protective Action Guides (PAGs).

DOSE RECEPTOR	DOSE (mRem TEDE)	ACCEPTANCE CRITERION (mRem TEDE)
EAB (Maximum 2-hour dose -- 0.0 to 2.0 hours)	7.1	100
LPZ (30-day accident duration)	1.4	100

Table 1 – Radiological Exposures as a Result of Liquid Tank Rupture
(Release to Atmosphere)

3.2 Spent Fuel Cask Drop Accident

UFSAR Section 15.7.3.5 analyzes spent fuel cask drop events. Of the three situations considered, a spent fuel transfer cask drop (due to a seismic event) from the upper shelf in the cask pool back into the lower portion of the cask pool is the only credible event with the potential for radiological release. Even though single-failure-proof cranes are used to lift a spent fuel transfer cask out of a cask pool, a drop can be postulated when the cask is placed on the upper shelf (i.e., step) of a cask pool for lifting yoke change-out, prior to the transfer cask being welded closed. During this evolution, the transfer cask is not restrained and could fall back into the lower portion of the cask pool if an earthquake occurs.

It is assumed that a minimum of 17 months have elapsed since permanent discharge from the core for Unit 2 or 3 fuel assemblies that are loaded into a transfer cask. The fuel rods from all 32 fuel assemblies that may be present in a transfer cask are conservatively assumed to rupture on impact with the bottom of the cask pool. All of the radioactive iodine and noble gases present in the gap volumes of the decayed fuel rods are assumed to be released from the unwelded transfer cask.

No engineered safety feature (ESF) system is used to mitigate the Control Room, Exclusion Area Boundary (EAB) or Low Population Zone (LPZ) dose consequences of the cask drop accident event. This includes no credit for the Fuel Handling Isolation Signal (FHIS), the fuel handling building post-accident cleanup unit (PACU) filtration system, the Control Room Isolation Signal (CRIS) and the control room (CR) emergency air cleanup system (CREACUS). Doses are evaluated for various control room unfiltered intake plus unfiltered in-leakage inflow rates.

The release of radioactive material to the atmosphere represents a potential exposure hazard to control room personnel and the general public at the EAB and LPZ. However, as shown in Table 2, below, the control room doses and offsite radiological doses for the postulated Spent Fuel Cask Drop accident do not exceed 25% of the 10 CFR Part 50.67 exposure guidelines and are less than the 1 rem criterion in the EPA PAGs.

DOSE RECEPTOR	CASK DROP DOSE (REM TEDE)	ACCEPTANCE CRITERION (REM TEDE)
Control Room (30-day accident duration)	0.89E-3 (0.89 mRem TEDE)	5
EAB (Maximum 2-hour dose -- 0.0 to 2.0 hours)	3.09E-3 (3.09 mRem TEDE)	6.3
LPZ (30-day accident duration)	0.09E-3 (0.09 mRem TEDE)	6.3

Table 2 – Cask Drop Accident Dose Consequences

3.3 Spent Fuel Pool Boiling Accident

UFSAR Section 15.7.3.8 analyzes the spent fuel boiling accident. The postulated loss of all spent fuel pool (SFP) cooling is assumed to result in SFP boiling and the release of a portion of the radionuclide inventory contained in the stored spent fuel assemblies and the SFP water. The following evaluation of the radiological consequences for the SFP boiling event assumes a minimum of 17 months since the shutdown of Units 2 and 3.

Following a loss of SFP cooling, activity releases from the spent fuel due to evaporation and boiling disperse to the Control Room, EAB and LPZ locations. No credit is taken for activity retention within the fuel handling building air. No credit is taken for FHIS or filtration by the Fuel Handling Building PACUs. All activity escaping from the SFP is assumed to be instantaneously released to the environment and atmospherically dispersed to the control room and offsite dose receptors.

No credit is taken for CRIS or CREACUS. For conservatism the control room dose is calculated for an individual at the control room outside air intake location. The total effective dose equivalent (TEDE) dose at this location is conservatively greater than it would be inside the Control Room. The activity concentration inside the control room would be smaller since only a portion of the outside cloud would enter the control room envelope via ventilation system inflow or in-leakage. As shown in Table 3, below, the offsite radiological doses for the postulated SFP Boiling accident do not exceed 25% of the 10 CFR Part 50.67 exposure guidelines and less than the 1 rem criterion in the EPA PAGs.

DOSE RECEPTOR	SFP BOILING DOSE (REM TEDE)	ACCEPTANCE CRITERION (REM TEDE)
Control Room (30-day accident duration)	11.96E-3 (11.96 mRem TEDE)	5
EAB (Maximum 2-hour dose -- 0.0 to 2.0 hours)	0.08E-3 (0.08 mRem TEDE)	6.3
LPZ (30-day accident duration)	0.25E-3 (0.25 mRem TEDE)	6.3

Table 3 – Radiological Consequences of Spent Fuel Pool Boiling

3.4 Fuel Handling Accident Analysis for the Permanently Defueled Condition

A revision to the FHA analysis was incorporated into SONGS UFSAR Section 15.7.3.4 under the provisions of 10 CFR 50.59 to address the permanently defueled condition. The analysis determined a reasonable time post-cessation of operations for movement of fuel from the fuel storage pool during which, if a fuel handling accident occurs, dose consequences would be within 10 CFR 50.67 and Regulatory Guide 1.183 dose limits. The analysis assumed fuel storage pool decontamination based on 23 feet of water over the failed fuel assembly, no credit for emergency ventilation or filtration (control room or otherwise) and no credit taken for radioactive decay of the isotopes during atmospheric dispersion transit to the control room or offsite dose locations.

The FHA inside the FHB involves the inadvertent dropping of a fuel assembly during fuel handling operations, and the subsequent rupture of fuel pins in the dropped assembly and/or impacted assembly. A maximum of 472 fuel rods are assumed to fail as a result of the drop of a fuel assembly on to the fuel assemblies stored in fuel storage pool fuel racks. The FHA-FHB dose analysis models 17 months (12,240 hours) of radioactive decay prior to the event. All gap activity in the damaged rods is assumed to be instantaneously released into the fuel storage pool. During the movement of fuel assemblies in the fuel storage pool, the fuel storage pool water level is assumed to be at least 23 feet over the top of the irradiated fuel assemblies seated in the storage racks.

The radioactive material that escapes from the fuel storage pool to the FHB is assumed to be released to the environment over a 2-hour time period (i.e., FHB closure is not modeled during the FHA-FHB event). Consistent with the 2-hour release model assumption, the FHA-FHB alternate source term (AST) dose analysis does not model the generation of an Engineered Safety Feature Actuation System (ESFAS) fuel handling [building] isolation signal (FHIS). The FHB normal ventilation exhaust is assumed to remain operational throughout the FHA-FHB event. The FHB air volume dilutes the gaseous activity released from the damaged fuel rods.

The FHA-FHB AST dose analysis does not model a reduction in the amount of radioactive material available for release from the FHB by the fuel handling building Post-Accident Cleanup Unit filter system.

Activity released during the FHA-FHB event is transported by atmospheric dispersion to the control room HVAC intake and to the offsite EAB and LPZ dose receptors. Activity may be released to the environment via the FHB normal ventilation exhaust system through the main plant vent, or as leakage through FHB penetrations (e.g., doors). No credit is taken for radioactive decay of the isotopes during atmospheric dispersion transit to the control room or offsite dose locations. Table 4 presents the San Onofre site-specific 95th percentile meteorology atmospheric dispersion factors for these release pathways for control room dose calculation.

FHA-FHB to CR 95th Percentile Atmospheric Dispersion Factors (seconds/m ³)			
Time Interval	FHB Release Point	Main Plant Vent Release Point	Modeled Value
0 to 2 hours	9.48E-04	1.15E-03	1.15E-03
2 to 8 hours	7.61E-04	6.23E-04	7.61E-04
8 to 24 hours	1.92E-04	2.14E-04	2.14E-04
1 to 4 days	2.65E-04	2.22E-04	2.65E-04
4 to 30 days	2.43E-04	2.02E-04	2.43E-04

Table 4 – FHA-FHB Control Room Atmospheric Dispersion Factors

The FHA-FHB dose analysis for persons located at or beyond the boundary of the exclusion area, including the outer boundary of the low population zone, considers the dose consequences of inhalation and immersion. Radioactive material in the fuel handling building is assumed to be a negligible radiation shine source to the offsite dose receptors relative to the dose associated with immersion in the radioactive plume released from the facility.

The Control Room (CR) dose during a design basis FHA-FHB following permanent shut down of SONGS Units 2 and 3 is based on:

- (a) No credit for control room emergency air cleanup system (CREACUS) and Control Room Isolation Signal (CRIS) and no gamma radiation shine from CREACUS charcoal and HEPA filters.
- (b) CR doses are evaluated at various CR unfiltered inflow (including inleakage) flow rates. The flow rates were varied from 500 cfm to 15,000 cfm, but only the bounding CR dose is reported.

FHA-FHB dose analysis for persons located in the control room considers the dose consequences of inhalation, immersion, and radiation shine from the environmental (or outside) cloud. Radiation shine from contaminated air in the fuel handling building is considered negligible due to the presence of numerous intervening concrete walls and the geometric attenuation due to the distance between the FHB and the control room.

The resulting FHA-FHB offsite and control room operator doses are listed in Table 5. The analysis demonstrates that the FHA-FHB event criteria are met and that the doses are less than the 1 rem criterion in the EPA PAGs.

DOSE RECEPTOR	FHA-FHB DOSE (REM TEDE)	ACCEPTANCE CRITERION (REM TEDE)
Control Room (30-day accident duration)	0.06E-3 (0.06 mRem TEDE)	5
EAB (Maximum 2-hour dose -- 0.0 to 2.0 hours)	0.20E-3 (0.20 mRem TEDE)	6.3
LPZ (30-day accident duration)	0.01E-3 (0.01 mRem TEDE)	6.3

Table 5 – FHA-FHB Dose Consequences

4.0 BEYOND-DESIGN-BASIS ACCIDENT ANALYSIS

The following analyses of beyond design basis scenarios demonstrate that the changes will be acceptable even with a completely drained spent fuel pool:

Hottest Fuel Assembly Adiabatic Heatup

Loss of Pool Water Inventory Dose

In these calculations, dose results are compared to two different standards appropriate for Emergency Planning.

First, the dose results are compared to the Environmental Protection Agency (EPA) Protective Action Guides (PAGs). Fuel clad temperature rise results are compared to the current draft of Interim Staff Guidance NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants."

Second, the results are used to establish conformance to the guidance in Nuclear Energy Institute (NEI) 99-01, "Development of Emergency Action Levels for Non Passive Reactors," Appendix C for Permanently Defueled plants that, in general, the source term and release motive forces are not expected to be sufficient to require declaration of a Site Area Emergency. Accordingly, an Alert dose limit of less than 100 mrem total effective dose equivalent (TEDE) (10% of the EPA PAG limit of 1000 mrem TEDE) over two hours is used for comparison to support the proposed Emergency Action Levels (EALs).

The results of the two beyond design basis calculations are described in the next two sections.

4.1 HOTTEST FUEL ASSEMBLY ADIABATIC HEATUP

4.1.1 General Description

This analysis is provided to evaluate the conditions for the hottest fuel assembly stored in the SONGS fuel pools. The results are compared to criteria applicable to offsite emergency response for the unit in the decommissioning process proposed in SECY-99-168, "Improving Decommissioning Regulations for Nuclear Power Plants," NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants," and NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants." The criteria consider the time for the hottest assembly to heat up adiabatically to critical or failure temperatures for the zirconium cladding. SECY-99-168 performed an evaluation of the heat up time from 30°C to 900°C. NUREG/CR-6451 states that 565°C is the lowest temperature where incipient cladding failure may occur. According to NUREG-1738 the

oxidation heat source becomes a significant heat source at temperatures above 600°C and 900°C is the limit for incipient temperature escalation. 900°C is appropriate for determining the 10 hour heat-up time. As indicated in SECY-99-168, a heat up time of 10 hours is sufficient time to take mitigating action. This is a beyond design basis event and is bounding for any other loss of inventory event.

The NRC recently published for comment Interim Staff Guidance NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants." The guidance presented draws on past NRC practice. Site-specific analyses must "provide sufficient assurance that an offsite radiological release is not postulated to exceed the EPA PAGs at the site boundary, or that there is sufficient time to initiate appropriate mitigating actions by offsite agencies on an ad hoc basis to protect the health and safety of the public. The expected analysis will include the amount of time that lapses from when the SFP drains and air flow passages are blocked to when the hottest fuel assembly reaches 900 degrees Celsius." This calculation is consistent with this guidance.

Inputs to this calculation are summarized below for use in confirmatory calculations.

Maximum Zirconium Temperature

Several studies are presented in NUREG/CR-6451 discussing the maximum allowable temperature of zirconium cladding that will ensure that failure of the zirconium cladding will not occur. Per NUREG/CR-6451, 565 °C (1049 °F) is the lowest temperature where incipient cladding failure might occur. NUREG-1738 uses 900 °C (1652 °F) as the temperature where "runaway oxidation" is expected to occur (pg. 3-7 of NUREG-1738). These two temperatures are the critical temperatures of interest for this calculation.

Zirconium Properties

The specific heat of zirconium at 600 K (620 °F) is 322 J/kg-K and the density of zirconium is 6570 kg/m³ (Ref. 5.4, pg. 822). A temperature of 620 °F is in the temperature range (roughly the midpoint for both ranges) of this analysis. From Reference 5.4, the specific heat slightly increases with an increase in temperature for most of the range of temperatures in this analysis. At higher temperatures, the zirconium would heat up more slowly. This temperature (620 °F) is representative of the full temperature range for this analysis.

Spent Fuel Pool Temperature

Because this analysis assumes that the accident will take place more than a year after the last offload, the initial temperature used in this analysis is 140 °F. Table 9.1-AA of the UFSAR states that the maximum allowable SFP temperature during normal conditions is 140 °F and that the maximum allowable SFP temperature under abnormal or refueling conditions is 160 °F.

Geometry for Limiting Assemblies

Fuel assembly geometry data used in this calculation are applicable to all SONGS 2 and 3 fuel assemblies.

Fuel Pellet Diameter	0.3255 inches
Cladding Thickness (diametral)	0.050 inches
Outer Diameter of Cladding	0.382 inches
Rod Configuration and Total Spaces	16 x 16, 256 spaces
Number of Guide Tubes, Instrument Tubes	5 guide tubes (each occupies the space of 4 rods)
Total Number of Heated Rods	236 rods
Guide Tube Thickness	0.040 inches
Outer Diameter of Guide Tubes	0.980 inches
Heated Height of Rods	150.00 inches
Cladding and Guide Tube Material	Zirconium Alloy for CE Fuel M5 for AREVA Fuel
Theoretical Uranium Dioxide Density	10.96 g/cm ³
Theoretical Uranium Dioxide Density Percentage ¹	94.5% - 96.5% for CE Fuel 97.5% max for AREVA Fuel
Core Thermal Power (Section 1.0 of Ref. 2.3)	3438 MWt
Number of Assemblies in Core (Ref. 2.5)	217

1. A smaller uranium density percentage results in a smaller thermal mass and therefore a shorter heatup time. Therefore a TD for uranium dioxide of 94.5% is used in this analysis.

Heat Load

The assembly with the highest heat load will have the shortest heat-up time. The table showing the maximum fuel assembly heat generation rate for several years is below.

Heat Generated by Highest Heat Load Assembly

Date	Watts
June 12, 2013	4381
October 12, 2013	3624
February 12, 2014	3076
June 12, 2014	2653
October 12, 2014	2314
February 12, 2015	2054
June 12, 2015	1847
December 12, 2015	1608
June 12, 2016	1433
December 12, 2016	1300

4.1.2 Methodology

The adiabatic heatup calculation uses the hottest fuel assembly in the SONGS pools based on fuel management records and determined its heat generation rate as a function of the decay date. For example, as of June 12, 2014, the heat generation rate in the hottest fuel assembly will be 2653 Watts (9052 BTU/hr). The bundle was analyzed as a closed system with no work or heat transfer out of the system. However, there is heat generation in the system. The fuel bundle is modeled as being insulated by a perfect insulator. The masses and specific heats were identified for the materials that make up the fuel assembly: specifically the uranium dioxide (UO₂) and zirconium alloy.

The fundamental equation for a closed system is:

$$Q + W = \Delta U \text{ (Reference 5.6)}$$

Since work (W) is zero the equation reduces to:

$$Q = \Delta U = m \cdot C_p \cdot (\Delta T) \text{ (mass X specific heat of the materials X temperature change)}$$

Q is a function of heat generation rate and time:

$$Q = \dot{Q} \cdot t, \text{ where } \dot{Q} = \text{the heat generation rate}$$

Solving for the heat up time, the equation becomes:

$$t = m \cdot C_p \cdot (\Delta T) / \dot{Q}$$

4.1.3 Results

As of August 2013, the heat up time to 900°C was more than 10 hours.

4.1.4 Conclusions

The analysis demonstrates that as of August 2013 SONGS Units 2 and 3 satisfied the criterion discussed in Interim Staff Guidance NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants." As of August 2013 it would take more than 10 hours for the hottest fuel assembly to reach 900°C.

4.2 DOSE RATES DUE TO SPENT FUEL ASSEMBLIES IN SONGS SPENT FUEL POOL FOLLOWING DRAIN DOWN

4.2.1 General Description

The purpose of this calculation is to evaluate the effects of a loss of water inventory from the SONGS spent fuel pools as of June 12, 2013, the date on which SCE certified permanent cessation of power operations of SONGS Units 2 and 3. Specifically, the primary purpose of this calculation is to determine the potential radiological impact due to loss of shielding to the public at the Exclusion Area Boundary for the event in which the spent fuel assemblies are uncovered following drain down. This is a beyond design basis event.

Dose rates have been calculated at other locations to provide supplemental information regarding the impact to plant personnel. This information can be used to provide some level of preplanning in the event the spent fuel assemblies are uncovered following drain down, however those results are not reported in this summary.

Neutron, (neutron, gamma), and gamma dose rates for the Exclusion Area Boundary locations are reported in this summary.

4.2.2 Methodology

The Monte Carlo N-Particle version 5-1.60 (MCNP5) (Reference 5.5) radiation transport computer code is used for calculating the dose rates from the SONGS SFP. MCNP5 was developed and is maintained by the Los Alamos National Laboratory and is widely used and accepted by the nuclear utility industry to perform radiological analysis. MCNP5 has undergone verification and validation under the vendor Nuclear QA Program.

The source terms for neutron and gamma radiation in spent fuel pools were calculated with consideration of plant shutdown dates as outlined earlier.

4.2.3 Results

A summary of the results from calculations performed are provided in this section. The summary is based on the condition of SONGS spent fuel assemblies as of June 12, 2013. The dose rate results decrease for later dates. Table 6 presents the dose rates at the EAB based on a beyond design basis accident event (loss of water inventory in

the SFP) due to direct and scattered radiation from spent fuel assemblies in a SONGS SFP.

**Table 6: Maximum Dose Rates at the SONGS EAB
As of June 12, 2013**

	Dose Rate (mRem/hr)
Gamma	1.55E-02
Neutron	5.40E-05
(Neutron, Gamma)	6.05E-06

The results of the MCNP5 calculation have relative errors less than 0.05 and thus pass the statistical checks described in the MCNP5 user manual.

4.2.4 Conclusions

Based on calculated direct and scattered dose rates from spent fuel assemblies in a SONGS SFP following drain down, it is concluded that the maximum dose at the EAB would be well below the acceptance criteria. The acceptance criterion for exemption from requiring offsite emergency planning zones is less than 1 rem projected dose for a four day period. The acceptance criterion for establishing the EALs proposed in this request is less than 100 mrem for a two hour period to a member of the public.

5.0 REFERENCES

- 5.1 Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated June 12, 2013; Subject: Certification of Permanent Cessation of Power Operations San Onofre Nuclear Generating Station, Units 2 and 3
- 5.2 Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated June 28, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station Unit 3
- 5.3 Letter from P. T. Dietrich (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated July 22, 2013; Subject: Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2
- 5.4 Incropera & DeWitt, "Fundamentals of Heat and Mass Transfer," Fifth Edition, John Wiley & Sons, Inc., 2002
- 5.5 MCNP5, S&L Computer Program Number 03.7.511-5.0-1.60, Version 1.60.
- 5.6 "Marks Standard Handbook for Mechanical Engineers," 9th Edition

6.0 REGULATORY EVALUATION

The proposed amendment to the SONGS Emergency Action Levels (EALs) for San Onofre Nuclear Generating Station (SONGS) Units 1, 2, and 3, and the Independent Spent Fuel Storage Installation is being submitted to the NRC pursuant to 10 CFR 50.90. This submittal is necessary to establish an EAL scheme appropriate for a defueled nuclear power station. The proposed SONGS Emergency Action Level Scheme is modeled on NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," Appendix C for permanently defueled stations.

6.1 No Significant Hazards Consideration Determination

Southern California Edison (SCE) has evaluated whether a significant hazards consideration is posed by granting the license amendment requested. Southern California Edison (SCE) has evaluated whether or not a significant hazards consideration is involved with the proposed changes by addressing the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

- (1) *Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?*

San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 have permanently ceased operation. The proposed amendment would replace the existing EAL scheme with an EAL scheme that reflects the permanently shut-down status of the plant. The proposed Emergency Action Level Scheme is based on NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," Appendix C for permanently defueled stations. The proposed amendment has no effect on structures, systems, and components (SSCs) and no effect on the capability of any plant SSC to perform its design function. The proposed amendment would not increase the likelihood of the malfunction of any plant SSC.

The spent fuel pool and its support systems are used for spent fuel storage. It is expected that SONGS will remain in a wet fuel storage configuration for approximately five years. In this condition, the spectrum of postulated accidents is much smaller than for an operational plant. As a result of the certifications submitted by SCE in accordance with 10 CFR 50.82(a)(1), and the consequent removal of authorization to operate the reactor or to place or retain fuel in the reactor in accordance with 10 CFR 50.82(a)(2), most of the accident scenarios postulated in the SONGS Final Safety Analysis Report are no longer possible, and there is no significant increase in consequences of previously postulated accidents.

The proposed license amendment will not significantly increase the probability of occurrence of previously evaluated accidents, since most previously analyzed

accidents can no longer occur and the probability or consequences of the few remaining are unaffected by the proposed amendment.

Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) *Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

The proposed amendment does not involve any change in the plant's design, configuration, or operation. The proposed changes have no impact on facility SSCs affecting the safe storage of irradiated fuel, or in the methods of operation of such SSCs, or on the handling and storage of irradiated fuel itself. The proposed EAL scheme is for the plant's defueled condition. There is no impact on the prevention, diagnosis, or mitigation of accidents previously evaluated. Accidents cannot result in different or more adverse failure modes or accidents than those previously evaluated because the reactors are permanently shut down and defueled and SONGS is no longer authorized to operate the reactors.

The proposed EAL scheme does not make changes to the systems credited in the remaining relevant accident analyses. No changes are being made to parameters within which the plant is normally operated or in the setpoints which initiate protective or mitigating actions, and no new failure modes are being introduced or new accident precursors that could initiate a new or different kind of accident. Proper control and monitoring of safety significant parameters and activities such as dose assessments to determine any radiological releases and provisions for communications and coordination with offsite organizations will be maintained.

The proposed amendment does not introduce a new mode of plant operation or new accident precursors, does not involve any physical alterations to plant configuration, or make changes to system setpoints that could initiate a new or different kind of accident.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

- (3) *Does the proposed amendment involve a significant reduction in a margin of safety?*

The proposed amendment to the EAL scheme will provide thresholds for initiation of Emergency Planning actions that are commensurate with the permanently defueled condition of the station. The proposed amendment does not involve a change in the plant's design, configuration, or operation. The proposed amendment does not affect either the way in which the plant SSCs perform their safety function or its design and licensing bases.

Because the 10 CFR Part 50 licenses for SONGS no longer authorize operation of the reactor or emplacement or retention of fuel into the reactor vessel, as specified in 10 CFR 50.82(a)(2), the occurrence of postulated accidents associated with reactor operation is no longer possible. The proposed amendment does not adversely affect the inputs or assumptions of any of the design basis analyses that impact the applicable postulated accidents.

The proposed changes to the SONGS EAL scheme do not impact the safe storage of irradiated fuel. The revised scheme does not affect any requirements for SSCs credited in the remaining analyses of applicable postulated accidents; and as such, does not significantly reduce the margin of safety associated with these accident analyses. Postulated design basis accidents involving the reactor are no longer possible because the reactor is permanently shut down and defueled and SONGS is no longer authorized to operate the reactors.

Therefore, the proposed amendment does not involve a significant reduction in a margin of safety.

Based on the above, SCE concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c). Accordingly, a finding of “no significant hazards consideration” is justified.

6.2 Applicable Regulatory Requirements

10 CFR 50.47, “Emergency plans,” sets forth emergency plan requirements for nuclear power plant facilities. The regulations in 10 CFR 50.47(a)(1)(i) state, in part, “...*no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.*”

10 CFR 50.47(b) establishes the standards that the onsite and offsite emergency response plans must meet for the NRC staff to make a positive finding that there is reasonable assurance that the licensee can and will take adequate protective measures in the event of a radiological emergency. Planning Standard (4) of this section requires that a licensee's emergency response plan contain the following:

“A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.”

The proposed SONGS EAL scheme is based on the standard scheme provided in NEI 99-01, “Development of Emergency Action Levels for Non-Passive Reactors,” Revision 6, Appendix C. Appendix C of NEI 99-01, Revision 6 provides Initiating Conditions and Emergency Action Levels that are appropriate for a permanently defueled station.

6.3 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change, (2) activities at SONGS will continue to be conducted in compliance with the Commission's regulations (as exempted), and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.4 ENVIRONMENTAL IMPACT EVALUATION

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if the amendment changes a requirement with respect to use of a facility component within the restricted area provided that (i) the amendment involves no significant hazards consideration, (ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (iii) there is no significant increase in individual or cumulative occupational radiation exposure.

SCE has reviewed the amendment applications and has determined that they meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22, no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the proposed license amendment. The following is the basis for this determination:

- (i) The proposed license amendments do not involve a significant hazards consideration, as described in the Significant Hazards Evaluation in 6.1 above.
- (ii) There will be no significant change in the types or a significant increase in the amounts of any effluents released offsite. Effluent flow and flow-paths have been substantially reduced and will be reduced further if not eliminated in coming months. There will be no significant change in the types or increase in the amounts of any effluents that may be released offsite and does not involve irreversible environmental consequences beyond those already associated with the SONGS Final Environmental Statement and the Generic EIS on Decommissioning of Nuclear Facilities (NUREG-0586, Supplement 1, 2002).
- (iii) The amendment applications do not result in a significant increase to the individual or cumulative occupational radiation exposure because the proposed change involves changes to the Emergency Plan which are of administrative, managerial or organizational nature with no significant impact on occupational radiation exposure. Therefore, the amendment applications do not result in a

significant increase to the individual or cumulative occupational radiation exposure.

In accordance with 10 CFR 51.30, "Environmental Assessment," and 51.32, "Finding of No Significant Impact," the following additional information is provided in support of an environmental assessment and finding of no significant impact for the proposed changes. The proposed change will not increase the probability or consequences of accidents. No changes are being made in the types or quantities of effluents that may be released offsite, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the amendment applications. The amendment applications do not affect non-radiological plant effluents and have no other environmental impact. Therefore, there are no significant non-radiological impacts associated with the amendment applications. Based on the assessment above, the amendment applications will not have a significant effect on the quality of the human environment.

Enclosure 2

San Onofre Nuclear Generating Station (SONGS) Permanently Defueled Emergency Plan

Emergency Action Level Technical Bases Manual

(Volume 2, PDEP-2)

Prepared by: _____ Date
xxxx

Reviewed by: _____ Date
xxxx

Approved by: _____ Date
xxxx

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1 INTRODUCTION

1.1 Purpose

This document contains the Nuclear Regulatory Commission (NRC) approved set of Initiating Conditions (ICs), their associated Emergency Action Level (EAL) thresholds, and their site specific technical bases, for the Permanently Defueled (PD) San Onofre Nuclear Generating Station (SONGS), including the Independent Spent Fuel Storage Installation (ISFSI).

Decision-makers responsible for implementation of SO123-VIII-1, Recognition and Classification of Emergencies, and EP(123) 1, Emergency Classification and Event Code Chart, may use this document as a technical reference and an aid in EAL interpretation¹.

This document is also used to facilitate review of any proposed changes to the SONGS PD EALs.

1.2 Background and Licensing Basis

SONGS has previously been operated under a 10 CFR § 50 license. In 2013 Southern California Edison Co. (SCE) notified the NRC that plant operations had ceased and that all fuel had been permanently removed from the associated reactor vessels. Spent fuel will continue to be stored wet within the associated spent fuel pools for some period of time until it can all be relocated to the ISFSI and ultimately turned over to the Department of Energy.

A permanently defueled station is essentially an interim spent fuel storage facility where the fuel is stored in a pool of water that serves as both a cooling medium (i.e., removal of decay heat) and shield from direct radiation. These primary functions of the spent fuel storage pool are the focus of the PD ICs and EALs.

SCE has proposed and expects to receive approval from the NRC for exemption from specific emergency planning requirements. The exemption is reflected in a Permanently Defueled Emergency Plan (PDEP). The exemption and corresponding plan changes reflect the lowered radiological source term and risks associated with spent fuel pool storage relative to reactor at-power operation. Source terms and accident analyses associated with design basis accidents are documented in the SONGS Final Safety Analysis Report (FSAR).

With regard to event recognition and classification, regulations specific to the declaration of emergencies are provided in planning standard 10 CFR 50.47(b)(4) and 10 CFR 50 Appendix E.IV.B.

The NRC, by letter to Nuclear Energy Institute (NEI) dated 03/28/13 (ML12346A436), documented its review of the draft version of NEI 99-01, Revision 6, dated November 2012 (ML12326A805), and found it acceptable for use by licensees seeking to upgrade their emergency action levels (EAL) in accordance with 10 CFR 50 Appendix E. The regulatory and technical analysis for this endorsement can be retrieved through ADAMS Accession No. ML13008A736.

¹ Emergency event declaration is required to be made as soon as conditions warranting classification are present and recognizable, but within 60 minutes in all cases of conditions being present. Use of this document for assistance is not intended to delay event declaration.

1.3 Emergency Classification Levels (ECLs)

As defined in NUREG-0654/FEMA-REP-1, nuclear power plant emergencies are separated into four Emergency Classification Levels (ECLs):

- Notification of Unusual Event
- Alert
- Site Area Emergency
- General Emergency

The ECLs are escalated from least severe to most severe according to the relative threat to the health and safety of the public and emergency workers. An ECL is determined to be met by identifying abnormal conditions and then comparing them to ICs through EALs threshold values as discussed below. When multiple EALs are met, event declaration is based in the highest ECL reached.

The permanently defueled ICs and EALs within this document use the two lower of the four ECLs. The source terms and release motive forces associated with a permanently defueled plant are not sufficient to require declaration of a Site Area Emergency or General Emergency.

1.4 Initiating Conditions (ICs)

An IC is a general description of an event or condition that aligns with the definition of one of the four ECLs by virtue of the potential or actual effects or consequences.

Each IC is given a unique identification code consisting of two letters and one number. The first letter identifies the recognition category, the second letter identifies the ECL, and the number identifies the sequence of the IC within the recognition category. The EAL identification codes are developed as follows:

Permanently Defueled Recognition Categories

- PD-A – Abnormal Rad Levels / Radiological Effluent
- PD-H – Hazards and Other Conditions Affecting Plant Safety
- PD-S – System Malfunctions

Independent Spent Fuel Storage Installation (ISFSI) Recognition Categories

- E-H– Hazards and Other Conditions Affecting ISFSI

Permanently Defueled Emergency Classification Levels (lowest to highest)

- U – Notification of Unusual Event
- A – Alert

For a permanently defueled station, the Notification of Unusual Event ICs provide for an increased awareness of abnormal conditions while the Alert ICs are specific to actual or potential impacts to spent fuel. Radiological effluent IC and EALs were included to provide a basis for classifying events that cannot be readily classified based on an observable events or plant conditions alone.

1.5 Emergency Action Levels (EALs)

An EAL is a pre-determined, site specific, observable threshold for an IC that, when met or exceeded, places the plant in a given ECL.

EAL thresholds may utilize a variety of criteria including instrument readings and status indications; observable events; results of calculations and analyses; entry into particular procedures; and the occurrence of natural phenomena.

EALs are individually identified by the IC identification code followed by the EAL number, such as AA1.1 for an effluent release or HU1.1 for a security condition.

All EAL classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition, is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy.

For EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary. When an EAL that specifies a time duration for the off-normal condition is assessed, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock". For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., dose assessments); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the 60-minute declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (e.g., maintain the necessary expertise on-shift).

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that 1) the activity proceeds as planned and 2) the site remains within the limits imposed by the license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72.

1.6 EAL Technical Bases Manual Content

EAL Matrix Table

This manual contains an EAL matrix table that addresses all of the recognition categories for the PD and ISFSI EAL thresholds.

The EAL matrix table is designed as an evaluation tool that organizes the ECLs from the highest (Alert) on the left to the lowest (Notification of Unusual Event) on the right. Evaluating the EALs for each ECL from highest to lowest reduces the possibility that an event will be under classified. All EALs are to be reviewed for applicability prior to event declaration.

Other user aids such as wallboards may be developed from the EAL matrix table to support evaluation of abnormal conditions in other human factored formats.

EAL Documentation Format

Each EAL within the technical bases manual is documented in the following manner:

- IC Identification Number
- Initiating Condition
- EALs Threshold Value(s)
- Basis
- Basis Reference(s)

2 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

2.1 Definitions

ALERT

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

CONFINEMENT BOUNDARY

The outside surfaces of a storage cask containing spent fuel that act as a barrier between the radioactive substances contained within and the environment.

EMERGENCY ACTION LEVEL (EAL)

A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

EMERGENCY CLASSIFICATION LEVEL (ECL)

One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are:

- Notification of Unusual Event (UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

EXCLUSION AREA BOUNDARY (EAB)

The exclusion area is that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. For SONGS, the EAB is roughly formed by two semicircles with radii of 1967.5 ft. each, centered on the Unit 2 Containment dome and a point 134 ft. southeast of the Unit 3 Containment dome, with a tangent connecting the landward arcs and seaward arcs of the two semicircles. The EAB is depicted in UFSAR Figure 2.1-5.

HOSTAGE

A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION

An act toward SONGS or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on SONGS. Non-hostile-action-based EALs are used to address such activities (i.e., this may include violent acts between individuals within the vehicle barrier system area).

HOSTILE FORCE

One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

IMMINENT

The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

INITIATING CONDITION (IC)

An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

NORMAL LEVELS

As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.

NOTIFICATION OF UNUSUAL EVENT (NOUE)

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

OWNER CONTROLLED AREA

For SONGS, the owner controlled area is the SCE SONGS controlled property, to include facilities and parking lots located on the west side of the Interstate 5 freeway, extending westward from Old Highway 101 to the median high-tide line, bordered on the north and south by the State Park Beach.

PROJECTILE

An object directed toward SONGS that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA

The protected area is an area encompassed by physical barriers and to which access is controlled. For SONGS, the Units 2/3 (plant) protected area is the property surrounding Units 2 and 3 that is encompassed by physical barriers to which access is controlled. This area is within the security isolation zone and is depicted on Drawing 21090, Owner Controlled Area Plot Plan. The Independent Spent Fuel Storage Installation is designated as a separate protected area.

SAFETY SYSTEM

A system required for cooling the spent fuel pool in the permanently defueled mode of operation.

SECURITY CONDITION

Any Security Event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A security condition does not involve a hostile action.

UNPLANNED

A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

VEHICLE BARRIER SYSTEM (VBS)

Vehicle control measures (passive or active) used to protect against the malevolent use of a land vehicle. The VBS consists of both active and passive components, terrain features, man-made structural features, and vehicle access checkpoints as defined in the SONGS Security Plan.

2.2 Acronyms and Abbreviations

CDE.....	Committed Dose Equivalent
CFR.....	Code of Federal Regulations
DBA.....	Design Basis Accident
EAB.....	Exclusion Area Boundary
EAL.....	Emergency Action Level
ECL.....	Emergency Classification Level
EPA.....	Environmental Protection Agency
EPIP.....	Emergency Plan Implementing Procedure
FAA.....	Federal Aviation Administration
FBI.....	Federal Bureau of Investigation
FEMA.....	Federal Emergency Management Agency
FHB.....	Fuel Handling Building
FSAR.....	Final Safety Analysis Report
IC.....	Initiating Condition
ISFSI.....	Independent Spent Fuel Storage Installation
LCO.....	Limiting Condition of Operation

mR, mRem, mrem, mREM..... milli-Roentgen Equivalent Man
 NEI Nuclear Energy Institute
 NRC..... Nuclear Regulatory Commission
 NORAD..... North American Aerospace Defense Command
 NOUE Notification of Unusual Event
 OCA..... Owner Controlled Area
 ODCM..... Offsite Dose Calculation Manual
 ORO Off-site Response Organization
 PA..... Protected Area
 PAG..... Protective Action Guideline
 R..... Roentgen
 Rem, rem, REM Roentgen Equivalent Man
 RWB Radiological Waste Building
 SAR Safety Analysis Report
 SCE Southern California Electric
 SONGS..... San Onofre Nuclear Generating Station
 TEDE..... Total Effective Dose Equivalent
 VBS Vehicle Barrier System

3 PERMANENTLY DEFUELED EAL MATRIX TABLE

ALERT	NOTIFICATION OF UNUSUAL EVENT
<p>PD-AA1</p> <p>Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The Emergency Director should declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. • If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes. • If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes. • The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until dose assessment results are available. <ol style="list-style-type: none"> 1. Reading on ANY of the following radiation monitors equal to or greater than the reading shown for 15 minutes or longer: <ul style="list-style-type: none"> • Plant Vent (2RE7865) 1.0E+8 µCi/sec • Plant Vent (3RE7865) 1.0E+8 µCi/sec 2. Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the <u>EAB</u>. 3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the <u>EAB</u> for one hour of exposure. 4. Field survey results indicate EITHER of the following at or beyond the <u>EAB</u>: <ul style="list-style-type: none"> • Closed window dose rates greater than 10 mr/hr expected to continue for 60 minutes or longer. • Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation. 	<p>PD-AU1</p> <p>Release of gaseous or liquid radioactivity greater than 2 times the <u>ODCM</u> limits for 60 minutes or longer.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The Emergency Director should declare the Notification of Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded. • If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes. • If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes. <ol style="list-style-type: none"> 1. Reading on ANY effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer. 2. Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the <u>ODCM</u> limits for 60 minutes or longer.

ALERT	NOTIFICATION OF UNUSUAL EVENT
<p>PD-AA2 UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity.</p> <ol style="list-style-type: none"> UNPLANNED dose rate greater than 15 mr/hr in ANY of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> <u>Command Center</u> <u>Central Alarm Station</u> Survey results that indicate an UNPLANNED rise of 100 mr/hr over NORMAL LEVELS that impedes access to ANY of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> U2 63' Fuel Handling Building U3 63' Fuel Handling Building 	<p>PD-AU2 UNPLANNED rise in plant radiation levels.</p> <ol style="list-style-type: none"> <ol style="list-style-type: none"> UNPLANNED water level drop in the spent fuel pool as indicated by ANY of the following: <ul style="list-style-type: none"> <u>local level indicator</u> AND UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors. <ul style="list-style-type: none"> 2(3)RE7850, Fuel Handling Building Spent Fuel Cask Area Radiation Monitor Area radiation monitor reading or survey result indicates an UNPLANNED rise of 25 mR/hr over NORMAL LEVELS.
	<p>PD-SU1 UNPLANNED spent fuel pool temperature rise.</p> <ol style="list-style-type: none"> UNPLANNED spent fuel pool temperature rise to greater than 140°F.
<p>PD-HA1 HOSTILE ACTION within the VEHICLE BARRIER SYSTEM or airborne attack threat within 30 minutes.</p> <ol style="list-style-type: none"> A HOSTILE ACTION is occurring or has occurred within the VEHICLE BARRIER SYSTEM as reported by the Security Shift Supervisor. A validated notification from the NRC of an aircraft attack threat within 30 minutes of the site. 	<p>PD-HU1 Confirmed SECURITY CONDITION or threat.</p> <ol style="list-style-type: none"> A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor. Notification of a credible security threat directed at the site. A validated notification from the NRC providing information of an aircraft threat.

ALERT	NOTIFICATION OF UNUSUAL EVENT
	<p>PD-HU2</p> <p>Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling.</p> <p><i>Op. Modes: Not Applicable</i></p> <p>1. a. The occurrence of ANY of the following hazardous events:</p> <ul style="list-style-type: none"> • Seismic event (earthquake) • Internal or external flooding event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager <p>AND</p> <p>b. The event has damaged at least one train of a SAFETY SYSTEM needed for spent fuel cooling.</p> <p>AND</p> <p>c. The damaged SAFETY SYSTEM train(s) cannot, or potentially cannot, perform its design function based on EITHER:</p> <ul style="list-style-type: none"> • Indications of degraded performance • VISIBLE DAMAGE
<p>PD-HA3</p> <p>Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.</p> <p>1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.</p>	<p>PD-HU3</p> <p>Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Notification of Unusual Event.</p> <p>1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.</p>

ALERT	NOTIFICATION OF UNUSUAL EVENT
	<p>E-HU1</p> <p>Damage to a loaded cask CONFINEMENT BOUNDARY.</p> <p>1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by dose rates greater than either of the following:</p> <ul style="list-style-type: none"> • <u>520 mR/hr (gamma) 3 feet from the surface at the top centerline.</u> • <u>190 mR/hr (gamma) 3 feet from the surface of the neutron shield at the mid-height centerline.</u>

4 EAL TECHNICAL BASES

4.1 PD-AA1

Initiating Condition:

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.

EALs:

Notes:

- The Emergency Director should declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until dose assessment results are available.

1. Reading on **ANY** of the following radiation monitors equal to or greater than the reading shown for 15 minutes or longer:
 - Plant Vent Stack (2RE7865) 1.0E+08 μ Ci/sec
 - Plant Vent Stack (3RE7865) 1.0E+08 μ Ci/sec
2. Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the EAB.
OR
3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the EAB for one hour of exposure.
OR
4. Field survey results indicate **EITHER** of the following at or beyond the EAB:
 - Closed window dose rates greater than 10 mr/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes.

Additional SONGS Site Specific Bases Information:

Dose assessment calculations using SONGS dose assessment computer model (RADDOSE-V Version RD5v3.0i) for a fuel handling building accident with a KR-85 noble gas release, wind speed of 6.7 mph and stability class D (prevalent values for 2011 and 2012) indicates that a dose of 10 mrem for one hour of exposure at the EAB would require a noble gas release rate of $5.60\text{E}+08$ uCi/sec. The Plant Vent Stack Wide Range Gas Monitors 2RE7865 and 3RE7865 have a readable range of $1.0\text{E}-04$ to $1.0\text{E}+08$ uCi/sec, therefore a reading corresponding to 10 mrem at the EAB would be off-scale high. The upper limit (max readable value, indicator will go beyond value before reaching offscale-high) of the monitors range has been selected as the threshold to classify an Alert in accordance with EAL PD-AA1, this will correspond to 3.6 mrem for one hour of exposure, assuming a wind speed of 6.7 mph and stability class D.

Since the gases mix in the continuous exhaust plenum before entering the stack, a reading on any unit monitor would correspond to a similar reading in the other monitor, and only one valid reading will be needed to classify this event.

Plant Vent Stack radiation monitor 2/3RE7808G is not used for this EAL because the upper limit is $4.0\text{E}+07$ uCi/sec (Action Request 070100476-7), and it will be off-scale high before the wide range monitors listed above.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-AA1

4.2 PD-AU1

Initiating Condition:

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

EALs:

Notes:

- The Emergency Director should declare the Notification of Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes.

1. Reading on ANY effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.

OR

2. Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer valid for classification purposes.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

EAL #1 - This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

EAL #2 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

Escalation of the emergency classification level would be via IC PD-AA1.

Additional SONGS Site Specific Bases Information:

None

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-AU1

4.3 PD-AA2

Initiating Condition:

UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity.

EALs:

1. UNPLANNED dose rate greater than 15 mR/hr in **ANY** of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity:

- Command Center
- Central Alarm Station

OR

2. Survey results that indicate an UNPLANNED rise of 100 mr/hr over NORMAL LEVELS that impedes access to **ANY** of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity:

- U2 63' Fuel Handling Building
- U3 63' Fuel Handling Building

Basis:

This IC addresses increased radiation levels that impede necessary access to areas containing equipment that must be operated manually or that requires local monitoring, in order to maintain systems needed to maintain spent fuel integrity. As used here, 'impede' includes hindering or interfering, provided that the interference or delay is sufficient to significantly threaten necessary plant access. It is this impaired access that results in the actual or potential substantial degradation of the level of safety of the plant.

This IC does not apply to anticipated temporary increases due to planned events.

Additional SONGS Site Specific Bases Information:

Areas for EAL#2 are based on areas inhabited during an operator walk down of equipment needed to maintain or restore Spent Fuel cooling or water level.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-AA2
2. SO23-13-23 Loss of Spent Fuel Pool Cooling

4.4 PD-AU2

Initiating Condition:

UNPLANNED rise in plant radiation levels.

EALs:

1. a. UNPLANNED water level drop in the spent fuel pool as indicated by **ANY** of the following:
 - local level indicator**AND**
 - b. UNPLANNED rise in area radiation levels as indicated by **ANY** of the following radiation monitors.
 - 2(3)RE7850, Fuel Handling Building Spent Fuel Cask Area Radiation Monitor
- OR**
2. Area radiation monitor reading or survey result indicates an UNPLANNED rise of 25 mr/hr over NORMAL LEVELS.

Basis:

This IC addresses elevated plant radiation levels caused by a decrease in water level above irradiated (spent) fuel or other UNPLANNED events. The increased radiation levels are indicative of a minor loss in the ability to control radiation levels within the plant or radioactive materials. Either condition is a potential degradation in the level of safety of the plant.

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel or video camera observations (if available). A significant drop in the water level may also cause an increase in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. Note that EAL #1 is applicable only in cases where the elevated reading is due to an UNPLANNED water level drop. EAL #2 excludes radiation level increases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials.

Escalation of the emergency classification level would be via IC PD-AA1 or PD-AA2.

Additional SONGS Site Specific Bases Information:

Tech. Spec 3.7.16 documents the minimum requirement of 23' over the top of irradiated fuel assemblies seated in the storage racks.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-AU2
2. SONGS Tech Spec 3.7.16

4.5 PD-SU1

Initiating Condition:

UNPLANNED spent fuel pool temperature rise.

EALs:

1. UNPLANNED spent fuel pool temperature rise to greater than 140°F.

Basis:

This IC addresses a condition that is a precursor to a more serious event and represents a potential degradation in the level of safety of the plant. If uncorrected, boiling in the pool will occur, and result in a loss of pool level and increased radiation levels.

Escalation of the emergency classification level would be via IC PD-AA1 or PD-AA2.

Additional SONGS Site Specific Bases Information:

Per procedure SO23-13-23 Loss of Spent Fuel Pool Cooling, a Spent Fuel Pool temperature >140°F is the point at which operators must take actions to restore cooling capabilities.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-SU1
2. SO23-13-23 Loss of Spent Fuel Pool Cooling

4.6 PD-HA1

Initiating Condition:

HOSTILE ACTION within the VEHICLE BARRIER SYSTEM or airborne attack threat within 30 minutes.

EALs:

1. A HOSTILE ACTION is occurring or has occurred within the VEHICLE BARRIER SYSTEM as reported by the Security Shift Supervisor.
OR
2. A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the VEHICLE BARRIER SYSTEM or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program].

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the VEHICLE BARRIER SYSTEM. This includes any action directed against an ISFSI that is located within the VEHICLE BARRIER SYSTEM.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the VEHICLE BARRIER SYSTEM was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Additional SONGS Site Specific Bases Information:

VEHICLE BARRIER SYSTEM is utilized in place of the Owner Controlled Area (OCA) due to the extreme size of the current OCA.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-HA1

4.7 PD-HU1

Initiating Condition:

Confirmed SECURITY CONDITION or threat.

EALs:

1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor.
OR
2. Notification of a credible security threat directed at the site.
OR
3. A validated notification from the NRC providing information of an aircraft threat.

Basis:

This IC addresses events that pose a threat to plant personnel or the equipment necessary to maintain cooling of spent fuel, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under IC PD-HA1.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12, Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program].

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC PD-HA1.

Additional SONGS Site Specific Bases Information:

None

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-HU1

4.8 PD-HU2

Initiating Condition:

Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling.

EALs:

1

- (1) a. The occurrence of **ANY** of the following hazardous events:
- Seismic event (earthquake)
 - Internal or external flooding event
 - High winds or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. The event has damaged at least one train of a SAFETY SYSTEM needed for spent fuel cooling.

AND

- c. The damaged SAFETY SYSTEM train(s) cannot, or potentially cannot, perform its design function based on **EITHER**:
- Indications of degraded performance
 - VISIBLE DAMAGE

Basis:

This IC addresses a hazardous event that causes damage to at least one train of a SAFETY SYSTEM needed for spent fuel cooling. The damage must be of sufficient magnitude that the system(s) train cannot, or potentially cannot, perform its design function. This condition reduces the margin to a loss or potential loss of the fuel clad barrier, and therefore represents a potential degradation of the level of safety of the plant.

For EAL 1.a, the event titled "Tsunami" has not been included in the PD EALs because it is already covered under "Internal or external flooding event" and does not constitute a separate and distinct hazardous event.

For EAL 1.c, the first bullet addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available.

For EAL 1.c, the second bullet addresses damage to a SAFETY SYSTEM train that is not in service/operation or readily apparent through indications alone. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level could, depending upon the event, be based on any of the Alert ICs; PD-AA1, PD-AA2, PD-HA1 or PD-HA3.

Additional SONGS Site Specific Bases Information:

None.

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-HU2

4.9 PD-HA3

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

EALs:

1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an Alert.

Additional SONGS Site Specific Bases Information:

None

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-HA3
2. EPA-400, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

4.10 PD-HU3

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Notification of Unusual Event.

EALs:

1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an Notification of Unusual Event.

Additional SONGS Site Specific Bases Information:

None

Basis Reference(s):

1. NEI 99-01 Rev 6, PD-HU3

4.11 E-HU1

Initiating Condition:

Damage to a loaded cask CONFINEMENT BOUNDARY.

EALs:

1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by dose rates greater than either of the following:
 - 520 mR/hr (gamma) 3 feet from the surface at the top centerline.
 - 190 mR/hr (gamma) 3 feet from the surface of the neutron shield at the mid-height centerline.

Basis:

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The technical specification multiple of "2 times", which is also used in PD-AU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Security-related events for ISFSIs are covered under ICs PD-HU1 and PD-HA1.

Additional SONGS Site Specific Bases Information:

SONGS storage cask Technical Specifications are based on values three feet from the top and mid-height surfaces.

Basis Reference(s):

1. NEI 99-01 Rev 6, E-HU1
2. ISFSI Admin Tech Spec 5.2.4.d, Radiation Protection Program, S023-I-30.9 rev 20 (Step 6.7.26)

Enclosure 3

Emergency Action Level (EAL) Comparison Table
Nuclear Energy Institute 99-01 Rev 6 Defueled EALs versus
San Onofre Nuclear Generating Station
Permanently Defueled Emergency Plan EALs

EAL Comparison Table

NEI 99-01 Rev 6 Appendix C Defueled EALs versus SONGS PDEP EALs

NEI 99-01, Rev 6, Appendix C Permanently Defueled Station EALs	SONGS Proposed Permanently Defueled EALs	Difference/Deviation	Explanation
PD-AU1 Release of gaseous or liquid radioactivity greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer. <i>Op. Modes: Not Applicable</i> 1. Reading on ANY effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer. 2. Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer.	PD-AU1 Release of gaseous or liquid radioactivity greater than 2 times the <u>ODCM</u> limits for 60 minutes or longer. <i>Op. Modes: Not Applicable</i> 1. Reading on ANY effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer. 2. Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the <u>ODCM</u> limits for 60 minutes or longer.	Reference to the SONGS ODCM vs. (site-specific effluent release controlling document)	The ODCM is SONGS site-specific effluent release controlling document
PD-AA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: Not Applicable</i> 1. Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values) 2. Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point). 3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point) for one hour of exposure. 4. Field survey results indicate EITHER of the following at or beyond (site-specific dose receptor point):	PD-AA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: Not Applicable</i> 1. Reading on ANY of the following radiation monitors equal to or greater than the reading shown for 15 minutes or longer: <ul style="list-style-type: none"> Plant Vent (2RE7865) 1.0E+8 µCi/sec Plant Vent (3RE7865) 1.0E+8 µCi/sec 2. Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond <u>the EAB</u> . 3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond <u>the EAB</u> for one hour of exposure. 4. Field survey results indicate EITHER of the following at or beyond <u>the EAB</u> :	Specific SONGS Instrumentation listed. Plant Vent (2RE7865) 1.0E+8 µCi/sec Plant Vent (3RE7865) 1.0E+8 µCi/sec The EAB is provided as the site-specific dose receptor point in each of the EALs PD-AA1.2, PD-AA1.3, and PD-AA1.4.	Specific SONGS instrumentation and site-specific dose receptor point provided to support the EAL

EAL Comparison Table

NEI 99-01 Rev 6 Appendix C Defueled EALs versus SONGS PDEP EALs

NEI 99-01, Rev 6, Appendix C Permanently Defueled Station EALs	SONGS Proposed Permanently Defueled EALs	Difference/Deviation	Explanation
<ul style="list-style-type: none"> Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer. Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation. 	<ul style="list-style-type: none"> Closed window dose rates greater than 10 mr/hr expected to continue for 60 minutes or longer. Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation. 		
<p>PD-AU2</p> <p>UNPLANNED rise in plant radiation levels.</p> <p><i>Op. Modes: Not Applicable</i></p> <p>1. a. UNPLANNED water level drop in the spent fuel pool as indicated by ANY of the following: (site-specific level indications).</p> <p>AND</p> <p>b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors. (site-specific list of area radiation monitors).</p> <p>2. Area radiation monitor reading or survey result indicates an UNPLANNED rise of 25 mR/hr over NORMAL LEVELS.</p>	<p>PD-AU2</p> <p>UNPLANNED rise in plant radiation levels.</p> <p><i>Op. Modes: Not Applicable</i></p> <p>1. a. UNPLANNED water level drop in the spent fuel pool as indicated by ANY of the following:</p> <ul style="list-style-type: none"> <u>local level indicator</u> <p>AND</p> <p>b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.</p> <ul style="list-style-type: none"> <u>2(3)RE7850, Fuel Handling Building Spent Fuel Cask Area Radiation Monitor</u> <p>2. Area radiation monitor reading or survey result indicates an UNPLANNED rise of 25 mr/hr over NORMAL LEVELS.</p>	<p>Specific SONGS Instrumentation listed.</p> <ul style="list-style-type: none"> local level indicator provided 2(3)RE7850, Fuel Handling Building Spent Fuel Cask Area Radiation Monitor 	<p>Specific SONGS instrumentation provided to support the EAL</p>

EAL Comparison Table

NEI 99-01 Rev 6 Appendix C Defueled EALs versus SONGS PDEP EALs

NEI 99-01, Rev 6, Appendix C Permanently Defueled Station EALs	SONGS Proposed Permanently Defueled EALs	Difference/Deviation	Explanation
PD-AA2 UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity. <i>Op. Modes: Not Applicable</i> 1. UNPLANNED dose rate greater than 15 mR/hr in ANY of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: (site-specific area list) 2. UNPLANNED Area Radiation Monitor readings or survey results indicate a rise by 100 mR/hr over NORMAL LEVELS that impedes access to ANY of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity. (site-specific area list)	PD-AA2 UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity. <i>Op. Modes: Not Applicable</i> 1. UNPLANNED dose rate greater than 15 mr/hr in ANY of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> • <u>Command Center</u> • <u>Central Alarm Station</u> 2. <u>Survey results that indicate an UNPLANNED rise of 100 mr/hr over NORMAL LEVELS</u> that impedes access to ANY of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity: <ul style="list-style-type: none"> • <u>U2 63' Fuel Handling Building</u> • <u>U3 63' Fuel Handling Building</u> 	Specific SONGS locations and instrumentation listed. Under #1: <ul style="list-style-type: none"> • Command Center • Central Alarm Station Under #2: <ul style="list-style-type: none"> • U2 63' Fuel Handling Building • U3 63' Fuel Handling Building 	Specific SONGS locations provided to support the EAL
PD-SU1 UNPLANNED spent fuel pool temperature rise. <i>Op. Modes: Not Applicable</i> 1. UNPLANNED spent fuel pool temperature rise to greater than (site-specific ° F).	PD-SU1 UNPLANNED spent fuel pool temperature rise. <i>Op. Modes: Not Applicable</i> 1. UNPLANNED spent fuel pool temperature rise to greater than <u>140°F</u>	Specific SONGS threshold temperature listed. 140°F	Specific SONGS threshold temperature provided to support the EAL

EAL Comparison Table

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PD-HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: Not Applicable</i> 1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision). 2. Notification of a credible security threat directed at the site. 3. A validated notification from the NRC providing information of an aircraft threat.	PD-HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: Not Applicable</i> 1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the <u>Security Shift Supervisor</u> . 2. Notification of a credible security threat directed at the site. 3. A validated notification from the NRC providing information of an aircraft threat.	SONGS specific position listed: Security Shift Supervisor	Specific SONGS position provided to support the EAL
PD-HU2 Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling. <i>Op. Modes: Not Applicable</i> 1. a. The occurrence of ANY of the following hazardous events: <ul style="list-style-type: none"> Seismic event (earthquake) Internal or external flooding event High winds or tornado strike FIRE EXPLOSION (site-specific hazards) Other events with similar hazard characteristics as determined by the Shift Manager AND b. The event has damaged at least one train of a SAFETY SYSTEM needed for spent fuel cooling. AND c. The damaged SAFETY SYSTEM train(s) cannot, or potentially cannot, perform its design function based on EITHER : <ul style="list-style-type: none"> Indications of degraded performance VISIBLE DAMAGE 	PD-HU2 Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling. <i>Op. Modes: Not Applicable</i> 1. a. The occurrence of ANY of the following hazardous events: <ul style="list-style-type: none"> Seismic event (earthquake) Internal or external flooding event High winds or tornado strike FIRE EXPLOSION Other events with similar hazard characteristics as determined by the Shift Manager AND b. The event has damaged at least one train of a SAFETY SYSTEM needed for spent fuel cooling. AND c. The damaged SAFETY SYSTEM train(s) cannot, or potentially cannot, perform its design function based on EITHER : <ul style="list-style-type: none"> Indications of degraded performance VISIBLE DAMAGE 	NONE.	N/A.

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PD-HU3 Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Notice of Unusual Event. <i>Op. Modes: Not Applicable</i> 1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	PD-HU3 Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Notice of Unusual Event. <i>Op. Modes: Not Applicable</i> 1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	NONE	N/A
PD-HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: Not Applicable</i> 1. A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the (site-specific security shift supervision). 2. A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.	PD-HA1 HOSTILE ACTION within the <u>VEHICLE BARRIER SYSTEM</u> or airborne attack threat within 30 minutes. <i>Op. Modes: Not Applicable</i> 1. A HOSTILE ACTION is occurring or has occurred within the <u>VEHICLE BARRIER SYSTEM</u> as reported by the Security Shift Supervision. 2. A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.	SONGS has elected to utilize the VEHICLE BARRIER SYSTEM as the boundary for Hostile Action that may adversely affect the security of the SPF or ISFSI. SONGS also provided the site-specific position of Security Shift Supervisor. <u>This is a Deviation.</u>	The VEHICLE BARRIER SYSTEM provides adequate protection for the security of the Spent Fuel Pool and ISFSI. It also reduces the area of concern for hostile actions. The Security Shift Supervisor is the designated site-specific position to report this information to the Shift Manager.
PD-HA3 Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert. <i>Op. Modes: Not Applicable</i> 1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable	PD-HA3 Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert. <i>Op. Modes: Not Applicable</i> 1. Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable	NONE	N/A

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life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.		
E-HU1 Damage to a loaded cask CONFINEMENT BOUNDARY. 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than (2 times the site- specific cask specific technical specification allowable radiation level) on the surface of the spent fuel cask.	E-HU1 Damage to a loaded cask CONFINEMENT BOUNDARY. 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by dose rates greater than either of the following: <ul style="list-style-type: none"> • <u>520 mR/hr (gamma) 3 feet from the surface at the top centerline.</u> • <u>190 mR/hr (gamma) 3 feet from the surface of the neutron shield at the mid-height centerline.</u> 	SONGS added site-specific radiation readings at specific distances and locations on the spent fuel cask.	SONGS reference: ISFSI Admin Tech Spec 5.2.4.d, Radiation protection Program, SO23-I-30.9 Rev 20 (Step 6.7.26)