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San Onofre Nuclear Generating Station

Thomas J. Palmisano
Vice President Decommissioning &
Chief Nuclear Officer

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10 CFR 50.90

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

Subject: **Docket Nos. 50-361 and 50-362**
Amendment Applications 270 and 255
Proposed Changes to Specific Regulatory Guide Commitments
San Onofre Nuclear Generating Station, Units 2 and 3

References:

(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

(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

(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

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Southern California Edison (SCE) hereby submits license amendment application 270 to operating license NPF-10 for San Onofre Nuclear Generating Station (SONGS) Unit 2 and license amendment 255 to operating license NPF-15 for SONGS Unit 3. These License Amendment Requests consist of Proposed Change Number (PCN)-609.

In Reference 1, SCE provided certification of SONGS Units 2 and 3 permanent cessation of power operation. In References 2 and 3, SCE submitted certifications of permanent removal of fuel from the reactor vessels for SONGS Units 3 and 2. Consequently, the 10 CFR Part 50 licenses for SCE no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel, as specified in 10 CFR 50.82(a)(2).

The amendment proposes revisions to Appendix 3A of the Updated Final Safety Analysis Report to more fully reflect the permanently shutdown status of SONGS Units 2 and 3. The revision will include a limited set of exceptions and clarifications of referenced Regulatory Guides to reflect the significantly reduced decay heat loads in the SONGS Units 2 and 3 Spent Fuel Pools and to support corresponding design basis changes. Because these changes are limited in scope, and beneficial to the safety of decommissioning personnel, SCE is requesting approval of this amendment within six months.

A001
NRR

P.O. Box 430
San Clemente, CA 92674
(949) 368-6575
Fax: (949) 368-9881
Tom.Palmisano@sce.com

There are no new regulatory commitments in this letter or the Enclosure.

Should you have any questions, or require additional information, please contact Mr. Jim Kay, Manager, Nuclear Regulatory Affairs at (949) 368-7418.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 8/20/15

Sincerely,

Enclosures:
PCN-609 with Attachments

cc: M. Dapas, Regional Administrator, NRC Region IV
T. Wengert, NRC Project Manager, SONGS Units 2 and 3
R. Kellar, NRC Region IV, Branch Chief, Repository and Spent Fuel Safety
M. Vaaler, NMSS Project Manager
S. Y. Hsu, California Department of Public Health, Radiologic Health Branch

ENCLOSURE

EVALUATION OF AMENDMENT PCN-609
Proposed Changes to Specific Regulatory Guide Commitments
Spent Fuel Pool Cooling and Make-up Design

1.0 SUMMARY DESCRIPTION

Introduction

Southern California Edison Company (SCE) intends to implement a series of modifications to SONGS Units 2 and 3 to implement 'cold and dark' as noted in the Post-Shutdown Decommissioning Activities Report (PSDAR). The fundamental purpose of achieving 'cold and dark' is to improve site personnel safety by reducing the possibility of interactions with energized electrical equipment or in-service piping or tubing. The following systems are among those necessary to be installed in order to implement all the 'cold and dark' activities: 1) Independent Spent Fuel Pool Cooling Systems (ISFPCS or also referred to as the Spent Fuel Pool 'Island'), 2) Enhanced Spent Fuel Pool Makeup System, and 3) Decommissioning Power Ring System. Substantive delays in these modifications impact other aspects of 'cold and dark' as discussed in Section 3.5.

The Spent Fuel Pool Island is designed to Seismic Category III requirements. The Enhanced Spent Fuel Pool Makeup System is designed to Seismic Category I. This is consistent with NUREG-0800, Standard Review Plan (SRP), Section 9.1.3 – Spent Fuel Pool Cooling and Cleanup System as detailed in Section 3.1.

The Spent Fuel Pool Island provides cooling to the spent fuel pools using a configuration that eliminates reliance on support systems. The Make-up System provides water to the spent fuel pool to compensate for evaporative losses or inadvertent draining. Both of these and other 'cold and dark' systems will be powered by a new non-safety, Seismic Category III electric system. To implement these modifications as designed, SCE will need to take exceptions to some of the Regulatory Guides as listed in the SONGS Units 2 and 3 Updated Final Safety Analysis Report (UFSAR). SCE is requesting that these exceptions to the Regulatory Guides be reviewed and approved by the NRC. These additional exceptions to the Regulatory Guides are based on the following:

- The current decommissioning plant status,
- The reduction in spent fuel pool heat loads,
- Significantly increased required response times for implementing mitigating actions,
- Potential radiation dose release to the public that is now well below current acceptance criteria, and
- The remaining safety function is protection of the spent fuel cladding which is achieved by maintaining water level in the pool.

Description of the License Amendment Request (LAR)

SCE is proposing to take additional exceptions to Regulatory Guides 1.13, 1.29, and 1.76 beyond those currently listed in Appendix 3A of the UFSAR to more fully reflect the decommissioning plant status; particularly the significantly reduced spent fuel decay heat load. Appendix 3A contains a compiled list of NRC Regulatory Guides which SONGS utilized in the original design of SONGS Units 2 and 3. In particular the introduction to the Appendix states:

> *"This appendix discusses the conformance of plant design with the guidelines presented in certain NRC Regulatory Guides. A reference to the FSAR section in which the applicable design features are described is also provided. Where the design differs from*

the Regulatory Guide, alternate methods of providing an equivalent level of safety have been utilized; these differences are discussed or reference is made to the appropriate FSAR section for detailed implementation.

In general, compliance with Regulatory Guides 1.1 through 1.96 was assessed during the design and construction phase of Units 2 and 3. Subsequently, Regulatory Guides have been assessed on a case-by-case basis."

This Appendix currently addresses Regulatory Guides through 1.197.

Current Installation Plan

The Spent Fuel Pool Island will be installed under a System Temporary Modification using 10 CFR 50.59 and administratively processed in compliance with appropriate plant procedures. This will allow authorized work to continue in parallel to the review of this LAR. Once the Island is in operation, the current Spent Fuel Pool cooling system will remain available until approval of this LAR. Once this LAR is approved, the Island will be made permanent and the existing system removed from operation and eventually retired.

The intent is to install, test and provide run-in time with the Island prior to removing the current system from operation. Plant procedures will address the transition between systems which involves pump start/stop and the repositioning of valves to direct the in-service system through the common discharge. The significant reduction in spent fuel decay heat levels and offsite dose consequences allows for alternative design requirements relative to the cooling system used during operation without increasing the likelihood or consequences of accidents. Appropriate description for the ISFPCS and enhanced Spent Fuel Pool Makeup System is provided in Attachment A for information and as background and context for the LAR.

Therefore, this LAR requests NRC acceptance of the proposed exceptions to referenced Regulatory Guides to allow the ISFPCS to fully replace and allow the eventual retirement of the SFPCS and support systems. In particular, the scope of this LAR encompasses and is limited to the following proposed exceptions:

- The change from a Seismic Category I SFPCS to a Seismic Category III (California Building Code) ISFPCS that is potentially subject to impact from tornado missiles.

- The change from a configuration with diesel backed Seismic Category I electrical power sources for the spent fuel pool cooling and make-up system to a diesel backed power source which is designed to Seismic Category III criteria and not fully protected from tornado missiles.

2.0 DETAILED DESCRIPTION

2.1 Regulatory Guide 1.13, 1.29, and 1.76 Exceptions

Regulatory Guides 1.13, 1.29, and 1.76 identify design and quality criteria for various systems, including the spent fuel cooling and make-up systems and the associated power supplies. The following provides excerpts from the revision of the Regulatory Guides that SONGS Units 2 and

3 are currently conformed with and also details what SCE is proposing to change or take exception to the current content.

Regulatory Guide 1.13, Revision 1, "Spent Fuel Storage Facility Design Basis"

Discussion includes the following statements:

"General Design Criterion 61, "Fuel Storage and Handling Criteria for Nuclear Power Plant," of Appendix A, "General Design Criteria for Nuclear Power Plants, " to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that fuel storage and handling systems be designed to assure adequate safety under normal and postulated accident conditions."

"If spent fuel storage facilities are not located within the primary reactor containment or provided with adequate protective features, radioactive materials could be released to the environs as a result of either loss of water from the storage pool or mechanical damage to fuel within the pool."

"A permanent fuel-pool-coolant makeup system with a moderate capability, and with suitable redundancy or backup, could prevent the fuel from being uncovered if such leaks should occur."

Regulatory Position includes the following statements:

C.8

"A Seismic Category I makeup system should be provided to add coolant to the pool. Appropriate redundancy or a backup system for filling the pool from a reliable source, such as a lake, river, or onsite Seismic Category I water-storage facility, should be provided. If a backup system is used, it need not be permanently installed system. The capacity of the makeup systems should be such that water can be supplied at a rate determined by consideration of the leakage rate that would be expected as the result of damage to the fuel storage pool from the dropping of loads, from earthquakes, or from missiles originating in high winds."

Proposed SONGS Units 2 and 3 Exceptions and Clarifications
C.8

The Decommissioning-Phase Spent Fuel Pool Inventory Make-up System will be hard-piped and designed to Quality Group III-AQ and Seismic Category I. The enhanced Spent Fuel Pool Make-up System will be powered by a commercial Seismic Category III Decommissioning Power Ring System.

As discussed in detail below, these classifications are acceptable because the current and future decay heat conditions in the SONGS Units 2 and 3 pools afford much greater time to respond to any threats to functional capability of the ISFPCS or enhanced Spent Fuel Pool Make-up System, with proven manual action mitigation measures being able to be implemented in less than two hours.

Regulatory Guide 1.29, Revision 1, "Seismic Design Classification"

Introduction includes the following statements:

"General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10, Part 50, of the Code of Federal Regulations (10 CFR Part 50), "Domestic Licensing of Production and Utilization Facilities" (Ref. 1), requires that nuclear power plant structures, systems, and components (SSCs) important to safety must be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions."

"These plant features are those necessary to assure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of 10 CFR Part 100."

Regulatory Position includes the following statements:

Regulatory Position C.1

"The following structures, systems, and components of a nuclear power plant, including their foundations and supports, are designated as Seismic Category I and should be designed to withstand the effects of the SSE and remain functional. The pertinent quality assurance requirements of Appendix B to 10 CFR Part 50 should be applied to all activities affecting the safety-related functions of these structures, systems, and components.

(d) Systems or portions of systems that are required for (1) reactor shutdown, (2) residual heat removal, or (3) cooling the spent fuel storage pool.

(g) Cooling water, component cooling, and auxiliary feedwater systems or portions of these systems, including the intake structures, that are required for (1) emergency core cooling, (2) post-accident containment heat removal, (3) post-accident containment atmosphere cleanup, (4) residual heat removal from the reactor, or (5) cooling the spent fuel storage pool.

(l) The spent fuel storage pool structure, including the fuel racks.

(r) The Class 1E electrical systems, including the auxiliary systems for the onsite electric power supplies, that provide the emergency electric power needed for functioning of plant features included in items 1.a through 1.q above."

Proposed SONGS Units 2 and 3 Exceptions and Clarifications

C.1

Based on the relatively low levels of decay heat being generated by the spent fuel stored in the spent fuel pools and the substantial amount of time to take mitigating actions in the event of loss of spent fuel pool cooling, the spent fuel pool cooling systems; associated support systems; and associated power systems are Seismic Category III.

Additionally, the ISFPCS will be designed to Seismic Category III standards. Such standards require protection against the earthquakes specified in the California building code, which provides an adequate degree of seismic restraint.

Regulatory Guide 1.76, Revision 0, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants"

Introduction includes the following statements:

"General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, - "Licensing of Production and Utilization Facilities," requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as tornadoes without loss of capability to perform their safety functions. Criterion 2 also requires that the design bases for these structures, systems, and components reflect (1) appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding region, with sufficient margin for the limited accuracy and quantity of the historical data and the period of time in which the data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (3) the Importance of the safety functions to be performed."

Regulatory Position includes the following statements:

"I. Nuclear power plants should be designed to withstand the Design Basis Tornado (DBT). The values of the parameters specified in Table I for the appropriate regions of Figure I are generally acceptable to the Regulatory staff for defining the DBT for a nuclear power plant. Sites located near the general boundaries of adjoining regions may involve additional consideration."

Proposed SONGS Units 2 and 3 Exceptions and Clarifications

SONGS proposes to take exception to this Regulatory Guide for the ISFPCS secondary cooling components because they will not perform a safety-related function. Based on the relatively low levels of decay heat being generated by the spent fuel stored in the spent fuel pools and the substantial amount of time available to take mitigating actions (which can be implemented in less than two hours) in the event of loss of spent fuel pool cooling, it is not necessary for the spent fuel pool cooling systems, associated support systems, or associated power systems to withstand tornado missiles. In addition, due to the reduced SFP makeup functional requirements included above, it is not necessary for the associated SFP makeup power systems to withstand tornado missiles.

The ISFPCS has some inherent protection against tornados. The ISFPCS (Island) primary loop equipment is protected against tornado missiles. However, the secondary cooling system is outside at grade level. It is sheltered on East and West by a hill and building respectively. To the North and South, the Secondary Cooling equipment is located in a recess between the two Fuel Handling Buildings reducing the vulnerability to tornado missiles. The cooling units are designed to the California Building Code wind loading requirement of 115 mph.

The design basis wind speed results in a failure probability of less than 6 E-4 per year. This is based on ASCE 7-10 (Reference 6.21) Figure 26.5-1B, wind speeds correspond to approximately a 3% probability of failure in 50 years (or 6 E-4 per year).

2.2 Discussion on Applicability of Regulatory Guide 1.26

Regulatory Guide 1.26 provides criteria for designating the Quality Group of various plant SSCs. Existing changes in SSC classifications have been made consistent with the guidance presented in the Regulatory Guide and the SONGS Units 2 and 3 permanently defueled state. As discussed below, NRC has approved a change in the Quality Group of plant SSCs. The exceptions to Regulatory Guide 1.26 in UFSAR Appendix 3A are shown in Appendix B to reflect that approval.

In the Permanently Defueled Technical Specification (PDTS) License Amendment Request (Reference 6.8) SCE provided the following as the basis for deleting TS 5.5.2.10, Inservice Inspection and Testing Program:

> *"...is being deleted because the Inservice Inspection and Testing Program is no longer required in a permanently defueled condition. There are no longer any ASME Code Class 1, 2, or 3 components or Code Class CC and MC components that are required to perform a specific function in mitigating the consequences of an accident when in a permanently defueled condition."*

The NRC Safety Evaluation (Reference 6.4) supporting the Amendment issued in response to the PDTS LAR responded as follows:

> *"TS 5.5.2.10, "Inservice Inspection and Testing Program," establishes the controls for periodic inspection and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves in accordance with the ASME Operation and Maintenance Code. These code classes protect equipment relied upon to prevent and mitigate DBAs. The licensee proposed to delete this program since there is no longer any ASME Code Class 1, 2 or 3 pumps and valves, or Code Class CC or MC components in the SONGS Units 2 and 3 inservice inspection and testing program that continue to operate and perform a specific function in mitigating the consequences of a reactor accident due to the permanently shutdown and defueled status of the plants. Because the licensee is prohibited from operating the plant or placing fuel in the reactor vessel, in accordance with 10 CFR 50.82(a)(2), there are no longer any ASME Code class pumps and valves that remain in operation and are to be relied upon to mitigate a DBA. As such, the inservice inspection and testing program is no longer relevant to SONGS Units 2 and 3, given the permanently shutdown and defueled status of these facilities. The NRC staff also notes that the licensee shall continue to monitor the*

performance and condition of all SSCs associated with the storage, control, or maintenance of spent fuel in in a safe condition and with reasonable assurance that these SSCs are capable of fulfilling their intended functions, pursuant to 10 CFR 50.65, ""Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Therefore, the NRC staff finds that the licensee's proposed change to delete TS 5.5.2.10, Inservice Inspection and Testing Program, appropriately reflects the change in plant status, and is acceptable."

Thus, the NRC has already approved the change in ASME class and Quality Group classification of plant SSCs using the change in plant status as an adequate basis for no longer classifying pumps and valves or components in accordance with the ASME code. It is appropriate to modify the existing exceptions to Regulatory Guide 1.26 as proposed in the mark-up to Appendix 3A as shown in Attachment B to this LAR for conformance with the approval of the PDTS. These Regulatory Guide 1.26 changes are provided for completeness of the discussion only and further NRC approval is not needed or requested as part of this LAR.

3.0 TECHNICAL EVALUATION

3.1 Background

As previously noted, the fundamental reason for seeking NRC acceptance of these changes is to facilitate the transition from the current Spent Fuel Pool Cooling System (and its support systems) to a new Independent Spent Fuel Pool Cooling System (and its support systems).

Design details and description of the ISFPCS are attached in Appendix A. These design details are consistent with SCE responses to NRC staff's questions during its review of the Permanently Defueled Emergency Plan (PDEP) to address the adequacy of the then current and proposed Spent Fuel Pool cooling systems in RAI-16 (Reference 6.7).

UFSAR Appendix 3A, as is the case for the historic design and licensing basis of SONGS, is generally based on operating plant conditions. Spent fuel pool conditions change when fuel is no longer being irradiated and discharged to the pools. Instead of a relatively stable cyclic set of circumstances from one refueling outage to another involving relatively high decay heat loads. Following permanent removal of the fuel from the reactors, the pools transition over time to a relatively low decay load with no new spent fuel being added to the pools. Challenges based almost completely on the impact of the most recently discharged fuel or the potential need for a full-core off-load are no longer present. This beneficially impacts response times, heat-up rates and radiological dose consequences.

The scope and radiological consequences of accidents possible at SONGS Units 2 and 3 are substantially lower than those at an operating plant. There are at least two primary reasons for this reduction in radiological consequences.

1. Analyses of accidents in spent fuel pools are generally dominated by the impacts from recently discharged fuel (last refueling batch and a full-core off-load), because radioactive decay of spent fuel decreases rapidly following shutdown of the reactor. The latest discharge to the SONGS Units 2 and 3 pools was sufficiently long ago (more than 3½ years ago) as to greatly reduce these contributions from the most recently discharged spent fuel.

2. All the fuel stored has passed its initial decay. Short lived isotopes are no longer present in anything above negligible values. This reduces their contribution to radiation source term and decay heat.

These changes are a natural outgrowth of the changes in fuel characteristics since its last irradiation. The NRC has acknowledged these changes generically (Reference 6.9) and on a plant-specific basis. The discussion below focuses on the plant-specific aspects.

In the SER (Reference 6.5) approving the PDEP, the NRC indicated the following relative to their review of the PDEP in response to RAI 16:

> "*3.2.1.1 Licensee Control of Changes During Decommissioning*
>
> *In the enclosure to the SCE letter dated November 3, 2014, the licensee responded to the NRC staff's RAI regarding control of changes to spent fuel storage conditions throughout the decommissioning process, including conformance with the Industry Decommissioning Comments (IDCs) and Staff Decommissioning Assumptions (SDAs). The licensee stated that design changes and installation activities would be controlled in compliance with standard design change processes including 10 CFR 50.59, which applies to changes to the facility design and operation as described in the SONGS UFSAR. The licensee also stated that the NUREG-1738 SDAs and IDCs are included in the SONGS UFSAR, and are thereby addressed by the design change processes. Furthermore, the licensee detailed planned changes to the design of systems interfacing with the SFP, including the redundancy, electric power supply, seismic design class, and quality group applicable to the SFP forced cooling and primary makeup systems. The NRC staff has reviewed the licensee's response and finds that the proposed change control mechanism would be in compliance with 10 CFR 50.59, which is the appropriate NRC regulation for that activity, and the planned changes affecting the reliability of systems interfacing with the SFP are commensurate with the reduced likelihood of fuel overheating should the function of those systems be impaired.*"

The Spent Fuel Pool 'Island' and the Enhanced Spent Fuel Pool Makeup System has been designed to meet the intent of the applicable parts of NUREG-0800, Standard Review Plan, Section 9.1.3 – Spent Fuel Pool Cooling and Cleanup System. These changes provide the basis for taking the exceptions to requirements in Regulatory Guides 1.13 and 1.76. Details addressed in this LAR include:

- The spent fuel pool Make-up System and its source is Seismic Category I and the SFP Island is designed to Seismic Class III. However, based on recently approved classification changes at SONGS, the SFP Make-up System, current SFP cooling system, and SFP Island are all classified as Quality Group D, Quality Class III-AQ (Augmented Quality).

- New SFP Island purification equipment is designed to remove soluble and insoluble foreign matter from the SFP water and dust from the pool surface.

- Inadvertent draining of the SFP, including siphoning, below approximately 23 feet above the stored fuel is not adversely impacted by replacing the SFPCS with the ISFPCS. Any leakage is detected as a result of reduction in pool inventory. A sump with adequate capacity is provided to collect system leakage. A high level alarm is provided to annunciate in the control room when a high sump level is reached.

- The Fuel Handling Building including its missile barriers, the Spent Fuel Pool and Liner, and related Fuel Pool structural components remain safety-related Seismic Category I.

- The existing Fuel Handling Building HVAC equipment has sufficient margin available to appropriately control the environment to within design limits with the introduction of additional heat loads from the ISFPCS equipment.

- The enhanced Spent Fuel Pool Makeup System will all be contained within a building providing protection against tornados.

- The ISFPCS is designed, constructed and supported in conformance with California Building Code (CBC) requirements which require both seismic and wind-loading capability. The ISFPCS primary cooling loop will be installed on the refueling floor in the new fuel area, making it protected from tornados by the Fuel Building missile shields. Most equipment for the secondary loop will be installed outdoors between the Unit 2 and 3 fuel handling buildings, with some inherent shelter against tornados as discussed in Section 2. Also, the recorded historical data suggests the low likelihood of a tornado occurring at the SONGS site. The seismic design details are covered in Section 3.4 below. A number of these details support response to potential tornado damage as well including the fact that most equipment is modular with readily available replacements.

- The configuration of the ISFPCS cannot adversely impact the Seismic Category I qualification of the current system. The new intake is completely separate. The discharge shares diffuser hardware but the interconnection includes flexible hardware to avoid any transfer of loads between the two systems. Should a failure occur in the Seismic Category III Island it can be isolated through manipulation of the valves used to transfer between systems. Further, should such failures lead to leakage in the primary system(s) the fluid will not be lost but would be spilled back onto the Spent Fuel Pool operating deck(s) and return to the pool(s). Should a failure occur in the Island secondary system, the failures be in the Island's secondary system there is no interaction with the current system.

3.2 Discussion

10CFR50.82(a)(2) specifies that the 10 CFR 50 license no longer authorizes operation of the reactor or emplacement or retention of fuel in the reactor vessel after docketing the certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel.

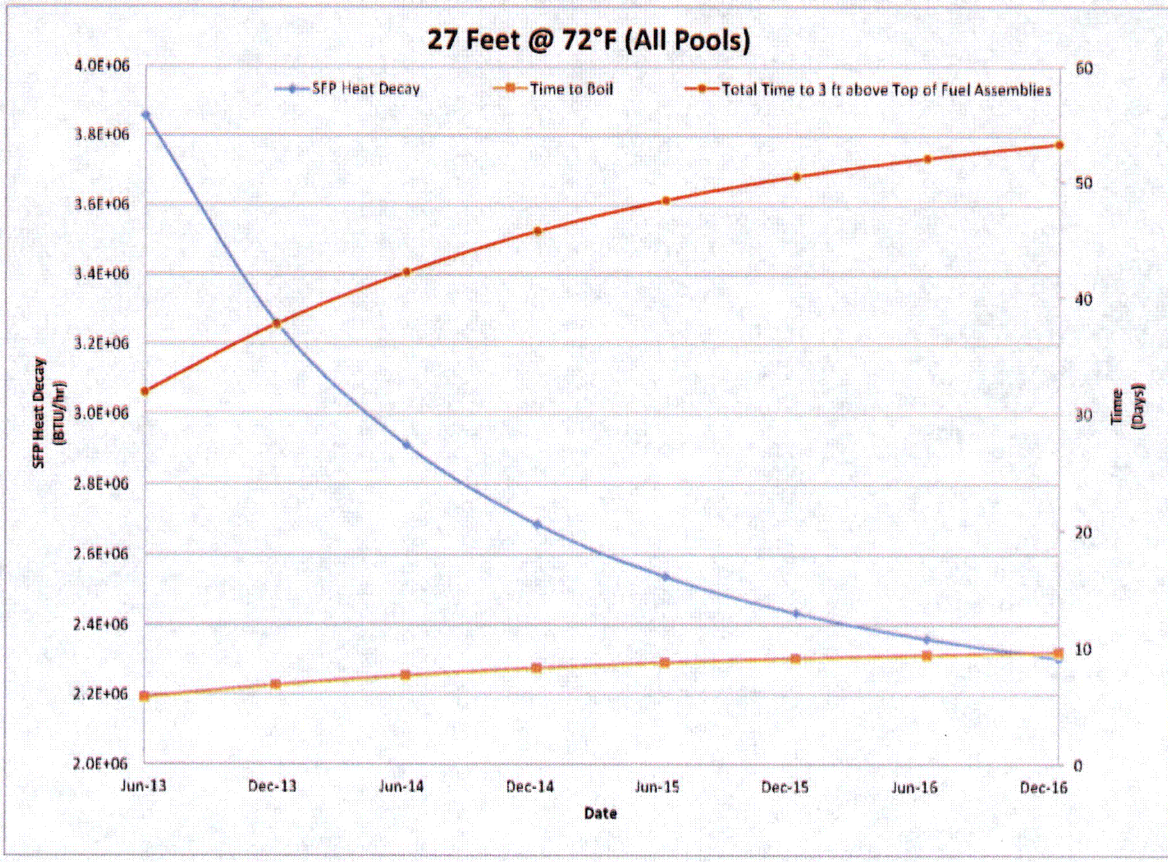
After the formal termination of reactor operations at SONGS the UFSAR Chapter 15 Accident Analyses were revised to eliminate those accidents no longer possible and to revise dose calculations for those remaining. The UFSAR was revised to reflect the new analysis and the Chapter submitted initially as a separate submittal (Reference 6.10) and with the last revision to the UFSAR (Reference 6.11). These analyses only credited the reduction in decay heat in the first 17 months of decay. The decay heat from the fuel in the pools currently has been further reduced since the fuel has been decaying for over 3 ½ years. Therefore, the accident analyses in the current revision of Chapter 15 are conservative with regard to decay heat levels and accident consequences relative to the current state of the fuel.

As part of its request for approval of the Permanently Defueled Emergency Plan, SCE used the following metrics: (1) demonstrating no Design Basis Accident could have radiological consequence which exceed EPA Protective Action Guidelines; and (2) >10 hours before stored fuel could reach a peak clad temperature of 900 °C in the limiting stored fuel assembly with no water present in the pool and no air cooling. SONGS demonstrated >17 hours under adiabatic conditions (no heat losses of any kind) at the time the request was submitted (Reference 6.22). Further, SONGS demonstrated that with air-cooling (normal HVAC in service) the peak clad temperature did not reach 565°C. The NRC reviewed a summary of the SONGS Units 2 and 3 analyses and performed confirmatory calculations using the same conservative inputs. Based on the provided analysis and the results of previous studies, the NRC staff concluded air cooling to be a credible method to maintain the fuel cladding temperature below that associated with the onset of cladding damage (Reference 6.5).

The NRC staff's review addressed the adequacy of the then current and proposed Spent Fuel Pool cooling and make-up systems (References 6.6 and 6.7) as well as current and proposed Mitigating Strategies for Beyond Design Basis Accidents associated with the Spent Fuel Pools. SCE supplied a summary of the current and future spent fuel pool cooling and make-up systems, their quality and seismic classifications and related information in response to Permanently Defueled Emergency Plan (PDEP) RAI-16.

Based in large part on these analyses and the current and proposed Spent Fuel Pool Cooling Systems, SFP Primary and Backup Makeup Systems, and Mitigating Strategies, the NRC granted the requested relief regarding certain emergency planning requirements (Reference 6.5).

SCE has revised its calculations to more completely assess the effects of the reduced need for spent fuel pool cooling due to reduced decay heat load. SCE has documented decay heat loads from June 30, 2013 through the end of 2016 as shown in the figure below. This new calculation uses a more accurate representation of pool geometry to include all pools (SFP, Cask Storage Pool, and Fuel Transfer Pool). Using nominal conditions the heat-up to boiling would take over a week and evaporation down to 3 feet above stored fuel would in addition take well over a month (Reference 6.12). While the plant was operational, boiling could take place in less than two and one half hours requiring a much shorter plant response time to restore cooling. With the current plant conditions it is reasonable to expect that any potential impact to SFP cooling could be resolved by operating staff well within the timeframe described above. NRC confirmed the time available to initiate mitigative actions consistent with current plant conditions as part of the granting exemptions listed in the PDEP.



SCE has had an independent assessment of dose results performed. That assessment (Reference 6.14) confirmed that the projected doses reported in UFSAR Chapter 15 for the "Spent Fuel Pool Boiling" event remained bounding (and orders of magnitude below any applicable limits). Those previous results and applicable limits as shown in UFSAR Table 15.7-8, are repeated here:

Table 15.7-8
RADIOLOGICAL CONSEQUENCES OF SPENT FUEL POOL BOILING

DOSE RECEPTOR	SFP BOILING DOSE (REM TEDE)	ACCEPTANCE CRITERION (REM TEDE)
Control Room (30-day accident duration)	11.96E-03 (11.96 mRem TEDE)	5
EAB (Maximum 2-hour dose -- 0.0 to 2.0 hours)	0.08E-03 (0.08 mRem TEDE)	6.3
LPZ (30-day accident duration)	0.25E-03 (0.25 mRem TEDE)	6.3

3.3 Remaining Safety Function

Review of Spent Fuel Pool Cooling

Per the 10 CFR 50.2 definition of safety-related, the spent fuel pool cooling system has been reclassified to non-safety related because there are no UFSAR Chapter 15 accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in 10 CFR 50.34 (a)(1), 10 CFR 100.11 or 10 CFR 50.67 (Accident Source Term). Thus the SFPCS and ISFPCS do not perform a safety-related function. Because SONGS Units 2 and 3 are undergoing decommissioning, the only remaining fission product barrier that requires protection is the spent fuel cladding of the stored fuel assemblies in the pools. Consequently, the only safety function(s) remaining relates to maintaining the structural integrity of the spent fuel pool and water level to allow for passive cooling of the fuel assemblies (active cooling from the SFP cooling system no longer provides a safety-related function as defined in the updated Chapter 15 Fuel Pool Boiling Accident Analysis, only maintaining water level – Reference 6.12). Thus, the only remaining safety related SSCs at SONGS are the Spent Fuel Pool and related structural components (pool liner, structure, and racks).

The Make-up System will ensure that sufficient water is supplied to the SFPs in the event of loss of cooling. In addition to the Seismic Category I make-up source, there are currently numerous other sources of makeup for the SFPs, including:

- As provided in SONGS Units 2 and 3 procedures, the Nuclear Service Water connections located on the SFP operating level can be used via hoses to fill the pool. These connections are QC III, Seismic Category II.

- As provided in SONGS Units 2 and 3 Mitigation Strategies, water from Fire Water Tanks T-102 and T-103 via Fire Pumps P-220 (diesel driven), P-221 or P-222 (both of which are motor driven) can be provided through the installed fire system piping to 2 fire hose cabinets located on the Spent Fuel Pool Operating level. The tanks, pumps and piping are QC III-FPS and Seismic Category II.

- As provided in SONGS Units 2 and 3 Mitigation Strategies, makeup to the SFPs can be provided using water from one or more of the following sources: Demineralized Water Tanks T-266, T-267 or T-268, all are located at a higher elevation at the Makeup Demineralizer Area at the south end of the plant. Skid mounted pump P-1058 delivers water from these sources to the seismic standpipe and from the standpipe to the SFP. T-266, T-267 and T-268 are QC III, Seismic Category II. P-1058 is QC III-FPS and Seismic Category III.

- As discussed in SONGS Units 2 and 3 Mitigation Strategies, the 10" City Water Line Supply Line can be used as an alternate source of SFP makeup water.

- Another makeup path is available using the Seismic Category I Demineralized Water Storage Tank (T-351) located in the North Industrial Area along with Seismic Category I portable diesel driven Fire Pump (P-1065) using strategically staged hoses between the tank, pump, Seismic Category I standpipe and the Spent Fuel Pool. The hoses are pressure tested annually and are inspected for location quarterly per SONGS Units 2 and 3 procedures.

The Mitigation Strategies are sequenced to assure the strategies can be deployed in 2 hours or less (Reference 6.23). The capability to achieve this time was evaluated in a formal study and further demonstrated in the field using actual staff, procedures and equipment.

Given the number and diversity of makeup sources, and the time available to supply makeup to the SFPs in the loss of spent fuel pool cooling, it is not credible to postulate a complete loss of makeup to a SFP. The NRC's June 30, 2014 letter concerning San Onofre Nuclear Generating Station, Units 2 and 3 – Rescission of Order EA-12-049 (Reference 6.13), states in part:

> *"[T]he time to boil off water inventory in the SFP to a level of 10 feet above the spent fuel will be sufficiently long to obviate the need for additional strategies to restore SFP cooling. The NRC staff concludes that given the low decay heat levels and the long time to boil off, the reliance on the SFP inventory for passive cooling provides an equivalent level of protection as that which would be provided by the initial phase of the guidance and strategies for maintaining or restoring SFP cooling capabilities that would be necessary for compliance with Order EA-12-049 using installed equipment. The staff further concludes that the long time to boil off the SFP inventory to a point at which makeup would be necessary for radiation shielding purposes obviates the need for the transition phase of the guidance and strategies that would be necessary for compliance with Order EA-12-049 using on-site portable equipment. The staff also concludes that the low decay heat and long boil-off period provides sufficient time for the licensee to obtain off-site resources on an ad hoc basis to sustain the SFP cooling function indefinitely, obviating the need for the final phase of the guidance and strategies that would be necessary for compliance with Order EA-12-049."*

Similarly, as described in NRC's 2015 exemption from certain emergency planning requirements for SONGS Units 2 and 3 (Reference 6.5):

> *"Additionally, in its letters to the NRC dated October 6, 2014, and December 15, 2014, SCE described the SFP makeup strategies that could be used in the event of a catastrophic loss of SFP inventory. The multiple strategies for providing makeup water to the SFP include: using existing plant systems for inventory makeup; an internal strategy that relies on installed fire water pumps and service water or fire water storage tanks; or an external strategy that uses portable pumps to initiate makeup flow into the SFPs through a seismic standpipe and standard fire hoses routed to the SFPs or to a spray nozzle. These strategies will continue to be required as a license condition. Considering the very low probability of beyond-design-basis accidents affecting the SFP, these diverse strategies provide defense-in-depth and time to provide additional makeup or spray water to the SFP before the onset of any postulated offsite radiological release."*

It is not necessary to postulate both a loss of spent fuel pool cooling in conjunction with a loss of spent fuel pool makeup. Concurrent failures are not postulated in UFSAR Section 15.7.3.8 related to SFP boiling and are not credible given the number of diverse sources of makeup and the time available to supply makeup. Further, loss of cooling is the initiating event mitigated by either the fully installed make-up system or available mitigating strategies.

Spent fuel pool boiling, although unlikely, will not adversely affect the integrity of the SFPs. The reinforced concrete temperature differences and gradients were determined based on an inside face temperature of 230°F (water temperature of 212°F and gamma heating of 18°F). That analysis indicates that the SFP walls have sufficient structural capability to accommodate this thermal loading.

Review of Enhanced Spent Fuel Pool Makeup

SCE intends to modify existing equipment to provide enhanced SFP makeup capability during decommissioning. To ensure the SFP inventory makeup is maintained, the enhanced SFP Makeup design will include features for makeup function reliability including redundancy, redundant power sources, and system cross-tie capabilities, as discussed above.

In response to various requirements, SCE has proceduralized the use of multiple and diverse means to provide backup spent fuel pool makeup to support the function of maintaining level within the pool. The robust design and construction of the spent fuel pool, multiple and diverse means for makeup (less than two hours to implement makeup mitigation strategy with minimum staffing), and the available time for response measures should a challenge to the stored fuel occur provide adequate defense-in-depth measures to protect public health and safety.

Review of Power Supply

As discussed above, the bases for the original design requirements for electrical power to spent fuel pool and makeup systems are no longer necessary given the following:

- The spent fuel pool cooling no longer serves a safety-related function and the equipment is not safety-related,
- The remaining safety function is to protect spent fuel cladding by maintaining water level in the pool,
- Spent fuel pool heat loads are reduced and response times for mitigating actions have increased significantly, and
- Potential radiation doses to the public are now well below current acceptance criteria.

Therefore, SCE processed and approved a design change and associated 50.59 reviews that found that the bases for licensing commitments described in the UFSAR for electrical SSCs no longer apply. This change allowed SONGS to reduce the quality assurance requirements of 10CFR50 Appendix B related to maintenance, testing, procurement, etc. This change reclassified all safety related electrical SSCs from QC II (Class 1E) to non-safety related QC III (non-Class 1E). Based on the change in safety class and the current plant status of the spent fuel pool cooling and makeup systems (including diverse makeup systems that do not depend on electrical power), SCE is proposing that the seismic requirements for the power system be reduced as well. The new Power Ring that will supply electrical power to the remaining plant systems has been designed as Seismic Category III, as listed in this LAR for specific exception to Regulatory Guide 1.29 criteria.

Summary of Seismic Classification Impact on Regulatory Guide 1.29

The above discussion forms the basis for the seismic classifications of the ISFPCS and electrical power systems. Based on the current characteristics of spent fuel stored in the spent fuel pools, SCE has evaluated the decay heat loads and determined that it is not necessary for the spent fuel pool cooling systems and associated power systems to meet Appendix B quality assurance requirements or Seismic Category I requirements because the system does not perform a safety-related function.

Seismic design requirements ensure that SSCs can continue to perform their safety function without the loss of capability after an earthquake. For a site that has permanently ceased operations and removed fuel from the reactor vessel, safety is afforded by preventing and mitigating the consequences of accidents that could result in offsite exposures comparable to the applicable guideline exposures set forth in 10 CFR 50.34 (a)(1), 10 CFR 100.11 or 10 CFR 50.67 (AST). Analyses of postulated events at SONGS indicate that there are no accidents that result in sufficient offsite exposures at or above these limits. Also, the time required to mitigate a loss of spent fuel pool cooling and make-up is significantly increased given the reduced decay heat levels of the fuel.

The SONGS Spent Fuel Pool and related structural components (pool liner, structure, and racks) provide for the integrity of the spent fuel pool, and thus, are Seismic Category I. The spent fuel pool cooling systems, the associated support systems, and components to supply power to support these systems are designed to meet Seismic Category III requirements

3.4 Seismic Category III Design Details

All new ISFPCS equipment anchorage, piping and support infrastructure have been designed to meet the seismic requirements of the California Building Code (CBC), which is described in more detail in the following paragraphs. Additionally, a supply of replacement parts is readily available to facilitate any needed repairs if the system were damaged in a major earthquake or tornado.

The 2013 CBC requires that non-structural components (including architectural, mechanical, electrical and plumbing equipment) and their supports and attachments that are permanently attached to a structure be designed and constructed to resist the effects of earthquake motions in accordance with design loads and other requirements contained in the American Society of Civil Engineers *Minimum Design Loads and Requirements for Buildings and other Structures* (Reference 6.21). CBC Section 1613 and ASCE 7 lay out specific procedures for determining seismic design criteria for different site classes (determined by soil properties) and structure/component risk categories based on probabilistic analysis of seismic loading (i.e., ground acceleration) for a specific location. The CBC mandates the use of USGS Maximum Considered Earthquake Ground Motion Response Acceleration maps for seismic design analysis. The USGS also provides an on-line, georeferenced Risk Targeted Ground Motion Calculator for the purposes of calculating ground motion parameter values in accordance with ASCE 7 standards for building and non-structural design.

SCE has conducted seismic design analysis for the ISFPCS following the procedures and requirements of ASCE 7, generating a set of horizontal and vertical ground-shaking intensities (spectral accelerations (SA)) defining the design seismic loads for the proposed system. The design seismic response spectrum encompasses ground-shaking intensities of 0.820 g at a 0.2

second period (0.2 sec SA) and 0.471 g at a 1.0 second period (1.0 sec SA), corresponding to a Peak Ground Acceleration (PGA) of approximately 0.35 g – 0.45 g. These ground-shaking intensities correspond to an average return period of approximately 1,500 – 2,000 years. The ISFPCS, including mechanical, electrical, piping and support components, will be designed and installed to withstand this level of ground-shaking, without collapsing or resulting in damage to adjacent equipment. In the unlikely event that the system was to fail, protection of the fuel cladding will be preserved through passive cooling through makeup.

In summary, the ISFPCS will be designed and constructed in accordance with applicable state (the CBC) and national (ASCE 7) seismic standards and will be inspected and maintained to assure the reliability of system components. Compliance with these standards will minimize the impact of geologic hazards and assure structural stability that will support any necessary repairs post earthquake.

3.5 Schedule and Resource Impacts

SCE is requesting approval of this amendment within six months. This LAR was initiated following discussions with NRC subsequent to an on-site inspection of modifications and the 10 CFR 50.59 process documentation.

The Post-Shutdown Decommissioning Activities Report (PSDAR), Section II, provides an overview of the planned decommissioning activities. These activities include site modifications as necessary to support future decommissioning and decontamination efforts. SCE plans to implement a series of 'cold & dark' modifications to support future plant decommissioning work. To dismantle and dispose of the permanent plant equipment, temporary equipment must be provided to support various ongoing functions as well as the associated electrical power and ventilation needed to support decommissioning activities. SONGS Units 2 and 3 'cold & dark' modifications include the SFP Island. Based on industry decommissioning experience, the use of independent non-plant systems for providing SFP cooling and make-up will reduce the potential for decommissioning activities to inadvertently damage installed plant SFP-related components which could result in a loss of SFP cooling or pool inventory.

The primary reason for pursuing "cold and dark" conditions is to reduce current personnel safety hazards (it also advances the schedule, which is a benefit to the Decommissioning Trust Fund). The personnel safety benefit is to allow the removal of power and other energy sources from as much of the plant as possible. Operations, security, maintenance and radiation protection personnel come into contact with most parts of the plant on a daily basis. The equipment installed to replace current plant equipment for appropriate functions (like spent fuel pool cooling) can be located and labelled (conduits color-coded, etc.) to make them very readily recognized, making all personnel contact with equipment much safer. Everything else can be removed (except for the existing Spent Fuel Pool Cooling System and its support systems pending NRC approval of this LAR). While intended interactions can be done safely either way; unintended ones have less potential safety risk since unmarked cables and piping will not be energized or pressurized.

The Spent Fuel Pool Cooling System relies directly on the Component Cooling and Saltwater Cooling Systems to transfer heat from the pool inventory to the Ultimate Heat Sink (the Pacific). These two systems alone are fairly extensive. They, in turn, rely on a number of AC and DC electrical sources, main busses and associated distribution. They also require some HVAC, Compressed Air and other equipment. Finally, a number of the other seemingly unrelated 'cold and dark' modifications repurpose equipment or power sources such that their unavailability delays those modifications as well.

Therefore, approval of this License Amendment is critical path to much of 'cold and dark' and delays the removal from service of a number of systems that had been pending issuance of the Permanently Defueled Emergency Plan and Technical Specifications. These delays significantly complicate the reduction in resources supporting such efforts which adversely impacts the Decommissioning Trust Fund.

3.6 Precedents

There have been several plants which have previously implemented a spent fuel pool cooling island as part of decommissioning. For the sake of brevity, the following focuses on three examples: Zion, Maine Yankee, and Connecticut Yankee. All three plants downgraded the classifications of their spent fuel pool cooling systems. NRC was aware of the downgrade in classification of the spent fuel pool cooling systems at Maine Yankee and Connecticut Yankee, since the licensee and NRC conducted public meetings on that topic as discussed below. In the case of Maine Yankee and Zion, the licensee justified the lack of safety-related cooling and makeup on the ground that there were numerous and diverse methods of makeup, that the radiological impacts of pool boiling were low, and that boil-off of the pool water would not occur for many days allowing sufficient time to provide makeup.

Zion

- The 2000 Defueled Safety Analysis Report (DSAR) for Zion (Reference 6.15), Section 3.2.2 indicates that the spent fuel pool is Seismic Category I. Section 3.9.4.4 discusses the various sources of makeup for the spent fuel pool, and concludes that "Sufficient time exists from the time cooling is lost and boiling occurs that compensatory measures can be taken, including supplying make-up water, to prevent fuel damage and off-site releases that exceed USEPA Protective Action Guidelines or 10CFR100 limits." Section 3.10.1 discusses the secondary cooling loop which provides for air cooling through use of cooling towers, which is classified as "important to the defueled condition." In contrast, as indicated in Table 3-3, the spent fuel pool cooling loop pump, strainers, valves, and piping are Seismic Category I to the extent they are in Seismic Category I structures or concrete.

Maine Yankee

- As discussed in the 1998 DSAR for Maine Yankee(Reference 6.16), pages 3-11 and 3-13, the spent fuel pool was Seismic Category I. As discussed on page 3-12, Maine Yankee used the 10 CFR 50.59 process to reclassify SSCs, and Section 3.1.2.1 discusses in detail the process that Maine Yankee used to reclassify certain SSCs from safety-related to "important to the defueled condition." Section 3.3.1.3 contains a detailed evaluation of loss of cooling for the spent fuel pool, concluding on pages 3-74 and 3-75 that a loss of cooling would not result in doses exceeding a small fraction of the limits in 10 CFR 100.11, that only the passive pool needs to be credited, and that there is ample time for operators to restore cooling or provide makeup prior to uncovering the spent fuel. In particular, the DSAR emphasizes that sufficient makeup capacity exists through diverse sources, including the town water supply and fire water pump, and that the active components of the cooling and makeup system are not safety-related. Section 5.5 evaluates several accidents involving loss of cooling, and again relies upon multiple and diverse sources of non-safety-related makeup.

- As discussed in NRC's summary of a 1998 meeting (Reference 6.17), Maine Yankee discussed the reclassification of the spent fuel pool cooling system and other SSCs. Page 15 of the slides states that accidents would not have consequences comparable to the Part 100 limits, and that SSCs with a fuel protection function that were previously classified as safety-related would be reclassified as "Important to the Defueled Condition." Maine Yankee also discussed in detail its plans for a spent fuel pool island, including severing ties to the ultimate heat sink and existing off-site power supplies.

- The 2001 DSAR for Maine Yankee (Reference 6.18) is similar in approach to the 1998 DSAR, but relies upon the spent fuel pool island rather than the normal spent fuel pool cooling system.

Connecticut Yankee

- As discussed in NRC's summary of a 1998 meeting (Reference 6.19), Connecticut Yankee discussed reclassification of the spent fuel pool cooling system. Page 17 of the slides states that spent fuel pool island cooling system would be classified as non-safety-related and Seismic Category II (but that special QA requirements would be applied, which are discussed in more in detail on Slide 23). In contrast, SSCs needed for the integrity of the spent fuel pool would be safety-related and Seismic Category I. Slide 22 indicates that there would be 26 days for the pool water to evaporate within 8 feet of the racks (there would be no boiling absent forced cooling).

- Connecticut Yankee's 1999 Summary of Changes per 10 CFR 50.59, Evaluation SY-EV-97-0102 (Reference 6.20), discusses the reclassification of the spent fuel pool cooling system and electrical distribution system from safety-related to non-safety-related (the emergency makeup system remained safety-related). The evaluation concluded that the change only affects testing, inspection, modification and maintenance of SSCs that are not required for the safe storage of spent fuel or storage of emergency makeup water to the Spent Fuel Pool, and that loss of Spent Fuel Pool Cooling forced flow is not an accident initiating event. Additionally, in the decommissioned state, the function which is required for safe storage of spent fuel is to keep the fuel covered with sufficient water for cooling and shielding, and that all equipment that prevents the escape of water from the Spent Fuel Pool are classified and will be maintained as QA Category I and seismic.

In summary, it appears that Zion, Maine Yankee, and Connecticut Yankee all took very similar approaches to SONGS Units 2 and 3, in that each used a spent fuel pool island, each continued to classify the spent fuel pool as Seismic Category I, and each reclassified all or portions of the spent fuel pool cooling system as non-safety-related (but with augmented quality).

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

Pursuant to RIS 00-017: Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff, and NEI 99-04 "Guideline for Managing NRC Commitment Changes," SCE is requesting commitment changes to Regulatory Guides in the UFSAR. In particular, reclassifying the seismic classification of spent fuel cooling, reclassifying the seismic classification of electrical power system for both the spent fuel cooling and makeup systems, and potentially causing the spent fuel cooling and electrical power system to be subject to impact from tornado missiles, was determined to be a change in Regulatory Guide 1.13, 1.29, and 1.76 commitments.

The proposed changes in commitments to Regulatory Guide 1.13, 1.29, and 1.76 are consistent with NRC regulations. Specifically:

- The change from a Seismic Category I spent fuel pool cooling system to a Seismic Category III ISFPCS without full tornado protection is consistent with General Design Criterion (GDC) 2 in Appendix A to 10 CFR Part 50 and Appendix A to 10 CFR Part 100. GDC 2 requires that SSCs important to safety be designed to withstand the effects of natural phenomena such as earthquakes and tornadoes. Appendix A to Part 100 provides more details for compliance with GDC 2. It states that SSCs shall be designed to remain functional in the event of a safe shutdown earthquake (i.e., Seismic Category) if they are necessary to assure: (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures in 10 CFR 100.11. Because the ISFPCS is not part of the reactor coolant pressure boundary and does not relate to safe shutdown of the reactor, and because failure of ISFPCS would not result in exposures comparable to those in 10 CFR 100.11, it does not need to be designed to be Seismic Category I or withstand design basis tornados.
- The change from a Seismic Category I electrical power system for power to the spent fuel pool cooling system and make-up system to a Seismic Category III electrical power system is consistent with GDC 2 and Appendix A to Part 100. As a support system for the ISFPCS, the electrical power system does not need to have any greater seismic classification than the ISFPCS. Furthermore, given the large number of make-up systems and the large amount of time available to provide make-up, it is not credible to postulate a complete loss of make-up and uncovering of the spent fuel even in the event of a safe shutdown earthquake. Therefore, the electrical power system does not need to be Seismic Category I.

4.2 No Significant Hazards Consideration

The proposed changes identify exceptions to Regulatory Guides 1.13, 1.29, and 1.76 to reflect the permanently defueled condition. Specifically, the proposed changes permit the Independent Spent Fuel Pool Cooling Systems (ISFPCS) to be approved as the remaining operational QA Class III-AQ and Seismic Category III spent fuel cooling system, and to retire the current cooling system from operation. In addition, the proposed changes define the Spent Fuel Pool Make-up

System to be QA Class III-AQ and Seismic Category I, and associated electrical modifications for installation of a non 1E, non-seismic power supply to these systems.

Southern California Edison (SCE) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

The only accident previously evaluated, is the Spent Fuel Pool Boiling Event. The initiating event (loss of cooling) would no longer lead to a rapid increase in pool temperature to the boiling point or to a relatively short-term reduction in pool level due to evaporative losses. Currently a loss of cooling would lead to a very slow heat-up toward the boiling point taking at least a week or more. From that point the slower evaporative losses would take several weeks to reduce inventory to unacceptable levels.

The most likely cause of a loss of function of the Spent Fuel Pool Cooling System (SFPCS) is not a failure of components in the cooling system, but instead a loss of electrical power. The probability of a loss of power is substantially higher than the probability of a contemporaneous common cause failure of active components in the cooling system. For example, NRC has collected operating experience on loss of Spent Fuel Pool (SFP) cooling for nuclear plants in the U.S., which includes both safety-related and non-safety-related SFP cooling systems. As indicated in NUREG-1275, Volume 12, the causes of loss of SFP cooling were the loss of the SFP cooling pumps due to loss of electrical power (39 of 56 events), loss of suction from the spent fuel pool, flow blockage, loss of the heat sink, and one case of inadequate configuration control. As concluded by the NRC: "The dominant cause of the actual loss of SFP cooling events was loss of electrical power to the SFP cooling pumps." There were no cases involving a common cause failure mode, such as seismic events or tornados. Given this operating experience, any increase in the probability of a spent fuel pool boiling event due to the seismic reclassification of the system would be minimal in comparison to the failure rate due to loss of electrical power.

The change in commitment does not affect the consequences of the spent fuel pool boiling accident (which by definition assumes loss of the spent fuel pool cooling system). Revised dose calculations were completed to support the changes to the Updated Final Safety Analysis Report (UFSAR) Chapter 15 Accident Analysis, and the UFSAR was revised to reflect the new analysis. These were recently reviewed to verify they remain bounding for the much slower event even if it is not terminated (through restored cooling or adequate make-up) prior to reaching levels approaching the top of the stored fuel. This reevaluation confirmed the doses previously calculated remain bounding and several orders of magnitude below applicable limits.

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

2. **Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?**

The only accident relevant to this proposed change would be an unmitigated Spent Fuel Pool Boiling Event (i.e., boiling without restoration of cooling or makeup prior to uncovering of the spent fuel). The initiating event (loss of cooling) would no longer lead to a rapid increase in pool temperature to the boiling point and a relatively short-term reduction in pool level due to evaporative losses. Currently a loss of cooling would lead to a very slow heat-up toward the boiling point taking at least a week or more. From that point the slower evaporative losses would take several weeks to reduce inventory to unacceptable levels. The only safety function remaining relates to maintaining the fuel cladding in the SFP (cooling is not a safety-related function as defined in the updated Chapter 15 Fuel Pool Boiling Accident Analysis, only maintaining water level – Reference 6.12). The only remaining safety related SSCs at SONGS Units 2 and 3 are the Spent Fuel Pool and related structural components (pool liner, structure, and racks).

The Make-up System will ensure that sufficient water is supplied to the SFPs in the event of loss of cooling. In addition to the Seismic Category I make-up source, currently there are numerous other diverse sources of makeup for the SFPs, including:

- As provided in SONGS Units 2 and 3 procedures, the Nuclear Service Water connections located on the SFP operating level can be used via hoses to fill the pool. These connections are QC III, Seismic Category II.
- As provided in SONGS Units 2 and 3 Mitigation Strategies, water from Fire Water Tanks T-102 and T-103 via Fire Pumps P-220 (diesel driven), P-221 or P-222 (both of which are motor driven) can be provided through the installed fire system piping to 2 fire hose cabinets located on the Spent Fuel Pool Operating level. The tanks, pumps and piping are QC III-FPS and Seismic Category II.
- As provided in SONGS Units 2 and 3 Mitigation Strategies, makeup to the SFPs can be provided using water from one or more of the following sources: Demineralized Water Tanks T-266, T-267 or T-268, all are located at a higher elevation at the Makeup Demineralizer Area at the south end of the plant. Skid mounted pump P-1058 delivers water from these sources to the seismic standpipe and from the standpipe to the SFP. T-266, T-267 and T-268 are QC III, Seismic Category II. P-1058 is QC III-FPS and Seismic Category III.
- As discussed in SONGS Units 2 and 3 Mitigation Strategies, the 10" City Water Line Supply Line can be used as an alternate source of SFP makeup water.
- Another makeup path is available using the Seismic Category I Demineralized Water Storage Tank (T-351) located in the North Industrial Area along with Seismic Category I portable diesel driven Fire Pump (P-1065) using strategically staged hoses between the tank, pump, Seismic Category I standpipe and the Spent Fuel Pool. The hoses are pressure tested annually and are inspected for location quarterly per SONGS Units 2 and 3 procedures.

The Mitigation Strategies are sequenced to assure the strategies can be deployed in 2 hours or less. The capability to achieve this time requirement was evaluated in a formal study and further demonstrated in the field using actual staff, procedures and equipment.

Given the number and diversity of makeup sources, and the time available to supply makeup to the SFPs in the loss of spent fuel pool cooling, it is not credible to postulate a complete loss of makeup to a SFP. As discussed in NRC's June 30, 2014 letter concerning San Onofre Nuclear Generating Station, Units 2 and 3 – Rescission of Order EA-12-049:

> *"[T]he time to boil off water inventory in the SFP to a level of 10 feet above the spent fuel will be sufficiently long to obviate the need for additional strategies to restore SFP cooling. The NRC staff concludes that given the low decay heat levels and the long time to boil off, the reliance on the SFP inventory for passive cooling provides an equivalent level of protection as that which would be provided by the initial phase of the guidance and strategies for maintaining or restoring SFP cooling capabilities that would be necessary for compliance with Order EA-12-049 using installed equipment. The staff further concludes that the long time to boil off the SFP inventory to a point at which makeup would be necessary for radiation shielding purposes obviates the need for the transition phase of the guidance and strategies that would be necessary for compliance with Order EA-12-049 using on-site portable equipment. The staff also concludes that the low decay heat and long boil-off period provides sufficient time for the licensee to obtain off-site resources on an ad hoc basis to sustain the SFP cooling function indefinitely, obviating the need for the final phase of the guidance and strategies that would be necessary for compliance with Order EA-12-049."*

Similarly, as described in NRC's 2015 exemption from certain emergency planning requirements for SONGS Units 2 and 3:

> *"Additionally, in its letters to the NRC dated October 6, 2014, and December 15, 2014, SCE described the SFP makeup strategies that could be used in the event of a catastrophic loss of SFP inventory. The multiple strategies for providing makeup water to the SFP include: using existing plant systems for inventory makeup; an internal strategy that relies on installed fire water pumps and service water or fire water storage tanks; or an external strategy that uses portable pumps to initiate makeup flow into the SFPs through a seismic standpipe and standard fire hoses routed to the SFPs or to a spray nozzle. These strategies will continue to be required as a license condition. Considering the very low probability of beyond-design-basis accidents affecting the SFP, these diverse strategies provide defense-in-depth and time to provide additional makeup or spray water to the SFP before the onset of any postulated offsite radiological release."*

It is not necessary to postulate both a loss of spent fuel pool cooling in conjunction with a loss of spent fuel pool makeup, and such an event is not postulated in UFSAR Section 15.7.3.8 related to SFP boiling and is not credible given the number of diverse sources of makeup and the time available to supply makeup.

As currently discussed in UFSAR 9.1.2.3, spent fuel pool boiling also will not adversely affect the integrity of the SFPs. The reinforced concrete temperature differences and gradients were determined based on an inside face temperature of 230°F (water temperature of 212°F and gamma heating of 18°F). That analysis indicates that the SFP walls have sufficient structural capability to accommodate this thermal loading.

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

3. Do the proposed changes involve a significant reduction in a margin of safety?

The proposed changes do not alter any design basis or safety limits for the plant. The applicable limits are spent fuel clad temperature and spent fuel pool level. The spent fuel cladding temperature is assured by maintaining water level to support natural circulation cooling within the spent fuel racks. Forced cooling keeps evaporative losses and Fuel Handling Building environs within nominal limits. Thus, the SSCs that support the design and safety limits are limited to those that maintain inventory (Spent Fuel Pool and related structural components (pool liner, structure, and racks) and sufficient equipment to replace evaporative or other losses. Complete loss of make-up in not credible given the existence of numerous sources of makeup and the time available to provide makeup. No changes to the pool and its structures are proposed and make-up capability remains assured.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, SCE concludes that the proposed changes present no significant hazards consideration, and, accordingly, a finding of "no significant hazards consideration" is justified.

4.3 Conclusions

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 operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, 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.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9), because the proposed exemption involves: (i) no significant hazards consideration; (ii) no significant change in the types or significant increase in the amounts of any effluent that may be released offsite; and (iii) no significant increase in individual or cumulative occupational radiation exposure.

Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed changes.

6.0 REFERENCES

6.1. Letter from M. Peter T. Dietrich (SCE) to Document Control Desk (USNRC), dated June 12, 2013, Certification of Permanent Cessation of Power Operations, San Onofre Nuclear Generating Station, Units 2 and 3 (ML131640201)

6.2. Letter from Mr. Peter T. Dietrich (SCE) to Document Control Desk (USNRC), dated June 28, 2013, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station, Unit 3 (ML13183A391)

6.3. Letter from Mr. Peter T. Dietrich (SCE to Document Control Desk (USNRC), dated July 22, 2013, Permanent Removal of Fuel from the Reactor Vessel, San Onofre Nuclear Generating Station, Unit 2 (ML13204A304)

6.4. Letter from Thomas J. Wengert (NRC) to Thomas J. Palmisano (SCE), July 17, 2015: Subject: San Onofre Nuclear Generating Station, Units 2 and 3 - Issuance of Amendment for Permanently Shutdown and Defueled Operating License and Technical Specifications.

6.5. Letter from Thomas J. Wengert (NRC) to Thomas J. Palmisano (SCE), June 4, 2015: Subject: San Onofre Nuclear Generating Station, Units 1, 2 and 3 and Independent Spent Fuel Storage Installation – Exemptions from Emergency Planning Requirements and Related Safety Evaluation.

6.6. E-mail from T. J. Wengert (NRC) to A. L Sterdis (SCE) dated October 2, 2014; Subject: Draft Request for Additional Information (RAI-16) Re: Emergency Planning Exemption Request (TAC NOS 3835, 3836 and 3837), ADAMS Accession No. ML 14286A025.

6.7. Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated November 3, 2014; Subject: Response to Request for Additional Information Number 16 Regarding Emergency Planning Exemption Request 10 CFR 50.12 San Onofre Nuclear Generating Station, Units 1, 2, 3 and ISFSI.

6.8. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated March 21, 2014; Subject: Permanently Defueled Technical Specifications San Onofre Nuclear Generating Station, Units 2 and 3.

6.9. NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shut down Nuclear Power Plants," issued in August 1997.

6.10. Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated September 17, 2014; Subject: Updated Final Safety Analysis Report Chapter 15, San Onofre Nuclear Generating Station, Units 2 and 3

6.11. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated February 11, 2015; Subject: Updated Final Safety Analysis Report San Onofre Nuclear Generating Station, Units 2 and 3

6.12. SONGS Calc. No. N-0220-037, Spent Fuel Pool Time to Boil, including Appendix B - All Pools Time to Boil.

6.13. Letter from Eric J. Leeds (NRC) to Thomas J. Palmisano (SCE), June 30, 2014: Subject: San Onofre Nuclear Generating Station, Units 2 and 3 – Rescission of Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events"

6.14. Anatech Corporation Report Number 1500960.401, Evaluation of Spent Fuel Pool Boiling Accident Dependence on Spent Fuel Pool Water Level, July 2015.

6.15. Letter from R. M Krich (Commonwealth Edison Company) to the U. S. Nuclear Regulatory Commission (NRC) dated October 30, 2000; Subject: Zion Nuclear Power Station, Units 1 and 2, Submittal of Defueled Safety Analysis Report Update.

6.16. Letter from Maine Yankee Atomic Power Company to the U. S. Nuclear Regulatory Commission (NRC) dated February 4, 1998; Subject: Maine Yankee Nuclear Power Station, Submittal of Defueled Safety Analysis Report.

6.17. Letter from Ronald R Bellamy (NRC) to Michael B. Sellman (Maine Yankee Atomic Power Company), February 20, 1998: Subject: Meeting Summary- Maine Yankee Atomic Power Company, Meeting No. 98-02, JANUARY 28, 1998.

6.18. Letter from Thomas L. Williamson (Maine Yankee Atomic Power Company) to the U. S. Nuclear Regulatory Commission (NRC) dated July 18, 2001; Subject: Submittal of the Maine Yankee Defueled Safety Analysis Report Rev. 18.

6.19. Letter from Ronald R Bellamy (NRC) to R. A. Mellor (Connecticut Yankee Atomic Power Company), April 16, 1998: Subject: Meeting Summary- Connecticut Yankee Atomic Power Company, Meeting No. 98-14, MARCH 11, 1998.

6.20. Letter from R. A. Mellor (Connecticut Yankee Atomic Power Company) to the U. S. Nuclear Regulatory Commission (NRC) dated February 26, 1999; Subject: Submittal of the Haddam Neck Plant 10CFR50.59 Annual Report

6.21. American Society of Civil Engineers ASCE 7-10 - Minimum Design Loads and Requirements for Buildings and other Structures, 2013 Edition, January 1, 2013.

6.22. Letter from Thomas J. Palmisano (SCE) to the U. S. Nuclear Regulatory Commission (NRC) dated March 31, 2014; Subject: Amendment Application Numbers 223, 267, and 252, Permanently Defueled Emergency Plan, San Onofre Nuclear Generating Station, Units 1, 2, and 3, respectively, and Independent Spent Fuel Storage Installation.

6.23. SONGS ERO Onshift Staffing Analysis for Mitigating Strategies for Catastrophic Loss of Spent Fuel Pool Water Inventory, October 1, 2014.

Attachment A
Spent Fuel Pool 'Island' Description

Background

Due to the significant reduction in Spent Fuel Pool (SFP) heat load since final plant shutdown and the reduction in potential boundary dose consequences for the few remaining credible events, the SFP cooling functional requirements are reduced. Based on industry decommissioning experience, the use of independent non-plant systems for providing SFP cooling will reduce the potential for decommissioning activities to inadvertently damage installed plant SFP-related components which could result in a loss of SFP cooling or pool inventory. San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 will design and install an independent SFP cooling and purification system. This SFP cooling and purification system is referred to as the SFP Island. To safely maintain SFP cooling, the SFP Island design includes features that support cooling function reliability including component redundancy, redundant power sources, and system cross-tie capabilities.

Current SFPCS

Each unit of the current Spent Fuel Pool Cooling System (SFPCS) consists of two loops, the Spent Fuel Pool (SFP) cooling loop and the purification loop. The SFPCS is normally controlled manually from the main control panel. Main Control Room alarms for high SFP temperature, high and low SFP level, low SFP pump discharge pressure and, high radiation in the SFP area, are provided to alert the operator to abnormal circumstances. A local alarm for low SFP level is also provided.

The SFPCS consists of two 100% capacity SFP pumps and two 100% capacity SFP heat exchangers. The SFP pumps are connected to a common suction header and a common return header. The SFPCS also includes appropriate valves, piping, and instrumentation. SFP water is circulated by the SFP pumps through the SFP heat exchangers where it is cooled. The heat is rejected to the Component Cooling Water (CCW) System, which, in turn, rejects heat to the Salt Water Cooling system and ultimately to the Pacific Ocean. Neither the CCW nor SWC systems are otherwise impacted by this modification. The SFPCS includes a purification loop that has been administratively removed from service and the resin removed.

The Independent Spent Fuel Pool Cooling System (ISFPCS) will be installed, tested and provide run-in time prior to removing the current system from operation. Thus, the ISFPCS will be operating and the current Spent Fuel Pool Cooling System will be maintained as a fully-functional back-up.

SFP Island System Overview

ISFPCS is shown in the attached schematic. The design will include one primary loop per SFP. Each primary loop includes two 100% capacity pumps and a single heat exchanger. Replacement heat exchangers are readily available. There will be one secondary loop per SFP. The secondary loop is a closed system that uses air cooled chillers to cool the secondary side water. Each secondary loop will consist of two 100% capacity pumps. To provide increased reliability, the chiller units on the secondary loops include excess capacity with the ability to cross-tie between each SFP's secondary loops. All equipment for the secondary loop (which includes two chillers, a surge tank, two secondary pumps, electrical distribution panel, piping, valves, electrical wiring, conduit and instrumentation) is new, and except for some conduit, wiring and the small portion of piping to and from the primary heat exchanger, will be installed outdoors between the Unit 2 and 3 fuel handling buildings. Piping installation and inspections will be performed per ANSI B3.1-2007.

The ISFPCS primary cooling loop will be installed on the refueling floor in the new fuel area. The ISFPCS primary loop takes suction from the upender pit area of the SFP, pumps the warm water through a stainless steel, plate and frame, heat exchanger for cooling and then returns it to the SFP through the existing sparger. The ISFPCS suction has been located separate from that of the SFPCS to facilitate construction and testing without impacting SFPCS operation.

The SFP Island will be all new equipment and is independent of the SFPCS except for the small portion of the suction piping from the upender area of the SFP to the primary pump and a portion of the primary discharge piping from the heat exchanger to the sparger connection. The new equipment will be installed inside the existing New Fuel Room. The primary pumps will add to the heat loading in the room. However, the existing HVAC equipment has sufficient margin available to appropriately control the environment to within its design temperature.

To support fuel movement during future pool-to-pad campaigns or otherwise the ISFPCS includes a side-stream purification loop including a new ion exchanger for purification.

SFP Island Redundancy

The SFP Island includes two 100% capacity primary loop pumps. One heat exchanger is available, with a replacement heat exchanger readily available for installation in either SFP. The secondary loop provides two 100% capacity pumps and two chillers with excess capacity. Cross-tie capability is provided such that two chillers provide sufficient capability for both SFPs.

SFP Island Electrical Power

The SFP Island primary and secondary pumps, chillers, and other components will initially be powered from the existing plant electrical distribution system that have EDG backup power.

Separately from the ISFPCS, Southern California Edison (SCE) is planning to install a non-safety Seismic Category III Decommissioning Power Ring System to facilitate decommissioning of various plant systems. This ring will be powered from offsite sources with a manual backup diesel generator. The Decommissioning Power Ring System will also power the ISFPCS. The transition to powering the ISFPCS from the Decommissioning Power Ring System will not occur until a manual diesel back-up is available.

SFP Island Seismic Design

The SFP Island is designed to be non safety-related and Seismic Category III. The SFP Island will be designed and installed such that the potential failure of any of its components (e.g. a suction or return piping) during a seismic event will not damage safety-related SSCs (e.g., the spent fuel storage racks) nor have an effect on the SFP water inventory resulting in uncovering of the spent fuel.

SFP Island Quality Class

The SFP Island is designed to meet the same Quality Group and Quality Class as the existing configuration. The SFP Island will be Quality Group D and Quality Class III-AQ.

System Capacity

The SFPCS primary heat exchangers are capable of removing 31 M-BTU/hr. They were sized based on decay heat loads associated with an operating plant and therefore are far in excess needed currently for SONGS Units 2 and 3.

The new ISFPCS primary heat exchanger is capable of removing 3.0 M-BTU/hr. It was sized based on current heat loads as reported in Table 9.1-1B of the UFSAR. The current heat load from all stored fuel and one dry storage container is conservatively projected to be approximately 2.6 M- BTU/hr for the limiting pool (SONGS Unit 2) and will continue to decrease over time as the fission products decay further.

Instrumentation and Controls

The current SFPCS provides Main Control Room alarms for high SFP temperature, high and low SFP level, low SFP pump discharge pressure and high radiation in the SFP area to alert the operator to abnormal circumstances. Additional level indication is available locally and in the Main Control Room/Command Center.

Control for the primary and secondary loops of the ISFPCS is provided via the programmable logic controllers (PLCs) and local manual operation. Indications for primary loop process pressure, temperature and flow, ion exchanger flow, and SFP level will be provided in the Main Control Room/Command Center. The cooling water supplied by the chiller system is maintained at least 5 psid above the primary side pressure in the heat exchanger. If the differential pressure falls below 5 psid the primary pump is automatically shutdown to prevent migration of radioactivity from the primary to secondary side of the ISFPCS in the event of a leak in the heat exchanger. This trip also prevents the dilution of the SFP boron concentration by unborated water from the secondary side. If the temperature in the secondary side exceeds 100°F, the secondary pump shuts off. All other ISFPCS control functions are performed manually and locally.

SFP Make-up

Due to the significant reduction in SFP heat load since the final plant shutdown, and the reduction in potential boundary dose consequences in the few remaining credible events, the

SFP makeup functional requirements are reduced. Based on industry decommissioning experience, the use of independent systems for providing SFP cooling and inventory makeup, will reduce the potential for decommissioning activities to inadvertently damage installed plant SFP-related components which could result in a loss of SFP cooling or pool inventory. SCE will modify existing equipment to provide independent SFP makeup capability during decommissioning. To ensure the SFP inventory makeup is maintained, the SFP Enhanced Inventory Makeup design will include features that enhance makeup function reliability including redundancy, redundant power sources, and system cross-tie capabilities. The SONGS Units 2 and 3 permanent SFP Enhanced Inventory Makeup system will be seismically-qualified, and also has proceduralized the use of multiple and diverse means to provide backup spent fuel pool makeup to support the function of maintaining level within the pool. The robust design and construction of the spent fuel pool, multiple and diverse means for makeup, and the available time for response measures should a challenge to the stored fuel occur provides adequate defense-in-depth to protect public health and safety allowing the SFP Make-up system to be classified as Quality Group D, important to safety.

The SFP Makeup system proposed for the SFP island is shown in the attached schematic. The seismically qualified permanent SFP Enhanced Inventory Makeup system relies on a permanently installed Demineralized Water Storage Tank (DWST) located in the North Industrial Area, with a combination of re-purposed and permanently installed new seismic qualified electric pumps and piping. This tank (previously for Unit 1) was designed and constructed to ASME Rules and has a capacity of 150,000 gallons. The backup mitigation makeup includes a dedicated 2500 gpm Diesel driven Pump, on wheels that is located directly adjacent to the tank and positioned for use. The diesel driven pump equipment was purchased with seismic qualification. The mitigation system also includes hose connects from the fire pump to a Seismic Category I Fire Riser via a connection accessible through a door on the plant east road at grade (el. 30 ft). Another hose from a Fire Riser connection located adjacent to the door into the Fuel Pool Operating Deck (at elevation 60 ft.) directs the water into the Spent Fuel Pool. The hoses between the Tank and Pumper and Pumper and Riser are safely stored to preclude any damage during a seismic event. These hoses are routinely inspected and tested, procedures are in place for setup and use, and dry runs have been conducted showing installation of the backup mitigation makeup system can be done in less than 2 hours. All components are either installed or safely stored for use with minimal manual action. The previous Unit 2/3 Makeup Source, the Refueling Water Storage Tank (RWST) also required manual actions to align the system. The manual action for the previous SONGS Units 2 and 3 RWST could be accomplished in approximately one half hour when boiling could occur within two and one half hours, and the manual action for the current Unit 1 DWST is less than two hours when boiling could occur after one hundred hours.

In addition to the Seismic Category I make-up source, currently there are numerous other sources of makeup for the SFPs, including:

- As provided in SONGS Units 2 and 3 procedures, the Nuclear Service Water connections located on the SFP operating level can be used via hoses to fill the pool. These connections are QC III, Seismic Category II.
- As provided in SONGS Units 2 and 3 Mitigation Strategies, water from Fire Water Tanks T-102 and T-103 via Fire Pumps P-220 (diesel driven), P-221 or P-222 (both of which are motor driven) can be provided through the installed fire system piping to 2

fire hose cabinets located on the Spent Fuel Pool Operating level. The tanks, pumps and piping are QC III-FPS and Seismic Category II.

- As provided in SONGS Units 2 and 3 Mitigation Strategies, makeup to the SFPs can be provided using water from one or more of the following sources: Demineralized Water Tanks T-266, T-267 or T-268, all are located at a higher elevation at the Makeup Demineralizer Area at the south end of the plant. Skid mounted pump P-1058 delivers water from these sources to the seismic standpipe and from the standpipe to the SFP. T-266, T-267 and T-268 are QC III, Seismic Category II. P-1058 is QC III-FPS and Seismic Category III.

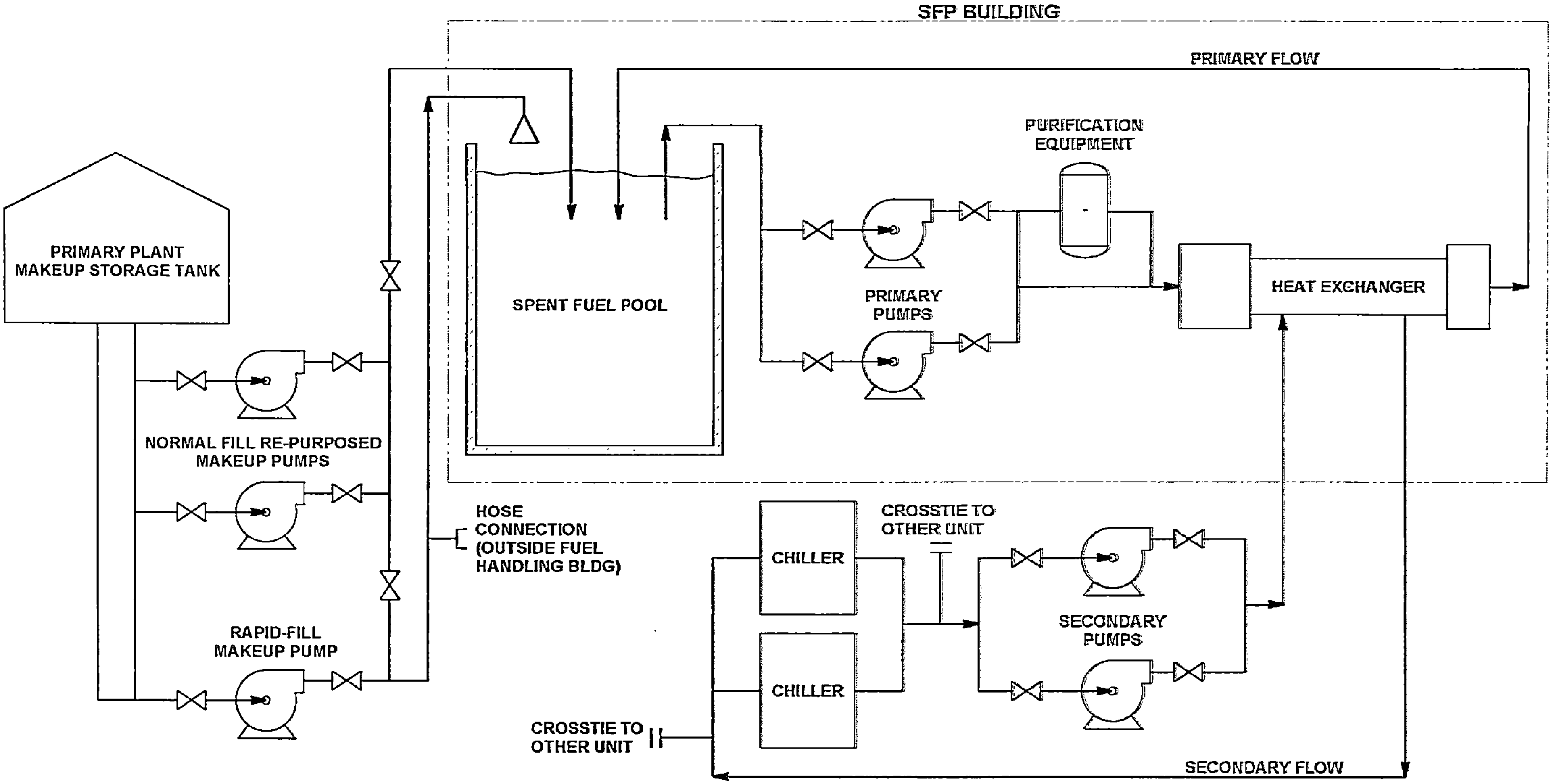
- As discussed in SONGS Units 2 and 3 Mitigation Strategies, the 10" City Water Line Supply Line can be used as an alternate source of SFP makeup water.

- Another makeup path is available using the Seismic Category I Demineralized Water Storage Tank (T-351) located in the North Industrial Area along with Seismic Category I portable diesel driven Fire Pump (P-1065) using strategically staged hoses between the tank, pump, Seismic Category I standpipe and the Spent Fuel Pool. The hoses are pressure tested annually and are inspected for location quarterly per SONGS Units 2 and 3 procedures.

The Mitigation Strategies are sequenced to assure the strategies can be deployed in 2 hours or less. The capability to achieve this time requirement was evaluated in a formal study and further demonstrated in the field using actual staff, procedures and equipment.

Operation

Once the LAR is approved, a turnover to Operations of ISFPCS is acceptable. The SFPCS will remain functional until the complete scope of the modification has been turned over to Operations and both systems may continue to be available for several weeks depending on system performance and other plant conditions.



PROPOSED SPENT FUEL POOL COOLING AND INVENTORY MAKEUP (DECOMMISSIONING)

Attachment B

**Proposed Exceptions to
SONGS Units 2 and 3 Updated Final Safety Analysis Report
Appendix 3A Mark-up**

San Onofre 2&3 FSAR
Updated
APPENDIX 3A
COMPARISON OF DESIGN WITH NRC REGULATORY GUIDES

3A.1.13 REGULATORY GUIDE 1.13, SPENT FUEL STORAGE FACILITY DESIGN BASIS (REVISION 1, DECEMBER 1975)

The San Onofre Units 2 and 3 design is consistent with recommendations of Regulatory Guide 1.13. The subject of this Regulatory Guide is discussed in sections 3.5 and 3.8, and in subsections 9.1.2, 9.1.3, 9.4.2, 15.7.3.4, and 15.10.7.3.4, except for the following:

3A.1.13.1 Paragraph C.8 of the Regulatory Guide

The Enhanced Spent Fuel Pool Make-up System is designed to Quality Group III-AQ and Seismic Category I. The Enhanced Spent Fuel Pool Make-up System will be powered by a Seismic Category III Decommissioning Power Ring System.

3A.1.26 REGULATORY GUIDE 1.26, QUALITY GROUP CLASSIFICATIONS AND STANDARDS (REVISION 2, JUNE 1975)

NOTE: The following is for historical purposes only. Regulatory Guide 1.26 is applicable to safety related systems, structures, and components only.

San Onofre Units 2 and 3 are consistent with the recommendations of Regulatory Guide 1.26 except for the differences indicated below. Implementation is presented in section 3.2.

3A.1.26.1 Paragraphs A and B of the Regulatory Guide ("Important to Safety")

There is a different usage of the term "important to safety" than that used elsewhere in the Regulations and Regulatory Guides. The guide includes components that fall into Quality Group D under the definition of "important to safety," which implies that a quality assurance program in accordance with 10CFR50, Appendix B, should be applied. Quality assurance requirements are not applied to Quality Group D components. The definition of the term "important to safety," insofar as quality assurance is concerned, is considered to be that which appears in the introduction of Regulatory Guide 1.29, and applies to Quality Class I and II structures, systems, and components identified in appendix 3.2A.

Regulatory Guide 1.26 and associated safety-related designation no longer applies to SONGS SSCs except for the Fuel Handling Building including its missile barriers, the Spent Fuel Pool and Liner, and related Fuel Pool structural components. These are the only remaining safety-related SSCs at SONGS while spent fuel remains in the spent fuel pool.

3A.1.26.2 Paragraphs A and B of the Regulatory Guide (Quality Standards)

The guide limits the quality standards application to water and steam containing components. Where applicable, coverage is extended to other process system pressure boundary components such as those in oil or compressed air systems. Coverage is not extended, however, to emergency and normal ventilation and fuel handling systems.

3A.1.26.3 Paragraph C.1.c of the Regulatory Guide

The words "or remote manual" are considered to be inserted after the word "automatic" in the seventh line of the paragraph. This option is included to avoid an unnecessary complication (leading to decreased plant reliability) in lines that would not normally be provided with automatic closing valves.

3A.1.26.4 Paragraph C.2.b of the Regulatory Guide

The motor bearing's oil system for the reactor coolant pumps, including the component cooling water piping and lube oil coolers, is not included in Quality Group C. Since the reactor coolant pumps are not required to perform a safety function during accident conditions, and are not required for safe plant shutdown, the classification of this equipment is included under Quality Group D.

3A.1.26.5 Paragraph C.2.c of the Regulatory Guide

The guide applies Quality Group C to those systems connected to the reactor pressure boundary by two normally closed or automatic closure valves. There are a number of small lines; i.e., drain lines and sample lines, which are Quality Group D beyond the second normally closed valve.

3A.1.29 REGULATORY GUIDE 1.29, SEISMIC DESIGN CLASSIFICATION (REVISION 1, AUGUST 1973)

The San Onofre Units 2 and 3 design is consistent with the recommendations of Regulatory Guide 1.29 except for the differences indicated below. Implementation of this Regulatory Guide is discussed in section 3.2.

3A.1.29.1 Paragraph C.1.d of the Regulatory Guide

The spent fuel pool cooling systems are Seismic Category III.

Systems required for reactor shutdown or residual heat removal must be designed for the DBE. This is interpreted to include only those minimum systems required to shut down the reactor and maintain it in a safe shutdown condition. Those systems that may be used optionally to perform a normal shutdown or those that remove residual heat from the reactor incidentally; i.e., heat removal is not their prime function, are not designed for the DBE. The letdown operation of the chemical and volume control system is an example of this type of system.

3A.1.29.2 Paragraph C.1.g of the Regulatory Guide

The associated support systems to the spent fuel pool cooling system are Seismic Category III.

3A.1.29.~~2~~3 Paragraph C.1.h of the Regulatory Guide

It is considered that the motor bearing's oil system for the reactor coolant pumps, including the component coolant water piping and lube oil coolers, should not be Seismic Category I. Since the reactor coolant pumps are not required to perform a safety function during accident conditions, and are not required for safe plant shutdown, the seismic classification of this equipment is included under Seismic Category II.

3A.1.29.4 Paragraph C.1.r of the Regulatory Guide

The associated power systems supplying the spent fuel pool cooling system and spent fuel pool makeup system are Seismic Category III.

3A.1.29.~~3~~5 Paragraph C.2 of the Regulatory Guide

Items that would otherwise be classified non-Seismic Category 1, "but whose failure could reduce the functioning" of items important to safety "to an unacceptable safety level," are to be "designed and constructed so that the DBE would not cause such failure." In addition, Paragraph C.4 of the guide recommends that the pertinent quality assurance requirement of Appendix B to 10CFR50 should be applied to the safety requirements" of such items. Both of these recommendations are followed by applying the following practices to such items:

A. Design and design control for such items are carried out in a similar manner as that for items directly important to safety. This includes the performance of appropriate design reviews.

B. Field work is performed under the direction of the Responsible Work Organization (RWO) Engineer and is inspected by RWO engineers. The RWO engineers are responsible for verifying that construction is performed in accordance with the design drawings and specifications and with applicable standard codes and specifications.

C. Such items are not included on the "Q" List.

3A.1.29.~~4~~6 Paragraph C.3 of the Regulatory Guide

Seismic Category I design requirements are recommended to be extended "to the first seismic restraint beyond the defined boundaries." Since seismic analysis of a piping system requires division of the systems into discrete segments terminated by fixed points, this means that the seismic design cannot be terminated at a seismic restraint, but is extended to the first point in the system that can be treated as an anchor to the plant structure. In addition, Paragraph C.4 of the guide requires that "the pertinent quality assurance requirement of Appendix B to 10CFR50 should be applied to the safety requirements" of such items. Both these requirements are considered to be met adequately by applying the following practices to such items:

A. Design and design control for such items are carried out in a similar manner as that for items directly important to safety. This includes the performance of appropriate design reviews.

B. Field audits are performed by representatives of the Design Engineering Organization (DEO) to assure that the final installation of such items is in accordance with documents that formed the basis for the seismic analysis of the items.

C. Such items are not included on the "Q" List.

3A.1.76 REGULATORY GUIDE 1.76, DESIGN BASIS TORNADO FOR NUCLEAR POWER PLANTS (REVISION 0, APRIL 1974)

An alternative approach was used to establish the design basis tornado as discussed in paragraph 2.3.1.2.2. In addition, the following exception is taken:

The spent fuel pool cooling systems; associated support systems; and associated power systems are not designed to withstand tornado missiles. In addition it is not necessary for the associated SFP makeup power systems to withstand tornado missiles.