BEFORE THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY for a Class 104(b) License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 1 of the San Onofre Nuclear Generating Station	))))))	DOCKET NO. 50-206 Amendment Application No. 211

SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY, pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 211.

This amendment consists of Proposed Change No. 262 to Possession Only License No. DPR-13. Proposed Change No. 262 proposes that Permanently Defueled Technical Specifications (PDTS) be incorporated into Appendix A of the Possession Only License. The proposed PDTS are intended to replace the existing Appendix A Technical Specifications in their entirety. A license condition concerning the San Onofre, Unit 1, Fire Protection Program is also proposed in accordance with Generic Letters 86-10 and 88-12.

The PDTS proposed by this amendment application ensure the safe, long-term storage of irradiated fuel in the spent fuel pool. The proposed PDTS reflect the reduced number of postulated accidents against which the defueled plant must be protected.

In the event of conflict, the information in Amendment Application No. 211 supersedes the information previously submitted.

Based on the significant hazards analysis provided in the Description and Significant Hazards Consideration Analysis of Proposed Change No. 262, it is concluded that: (1) the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: Harold B. Ray
Harold B. Ray
Senior Vice President

State of California
County of Orange

On 5/12/93 before me, BARBARA A. McCARTHY/NOTARY PUBLIC, personally appeared HAROLD B. RAY, personally known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

OFFICIAL SEAL
BARBARA A. MC CARTHY
Notary Public-California
ORANGE COUNTY
My Commission Expires
March 31, 1995

Signature Barbara A. McCarthy

James A. Beoletto
Attorney for Southern
California Edison Company

By: James A. Beoletto
James A. Beoletto

DESCRIPTION AND SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS OF PROPOSED CHANGE NO. 262 TO POSSESSION ONLY LICENSE NO. DPR-13

This proposed change requests that Permanently Defueled Technical Specifications (PDTS) be established for the San Onofre Nuclear Generating Station, Unit 1 (SONGS 1). The PDTS are necessary since SONGS 1 was permanently defueled on March 6, 1993. The defueled plant is being maintained in accordance with the existing Technical Specifications, as described in Reference 1 (references are listed in Section 4.0), until the PDTS are approved by the NRC.

EXISTING TECHNICAL SPECIFICATIONS

The existing Technical Specifications that are included as Appendix A to the SONGS 1 Possession Only License (which became effective on March 9, 1993, in accordance with the terms specified by Reference 2) remain in force until the PDTS are approved by the NRC.

PROPOSED TECHNICAL SPECIFICATIONS

See Attachment 1.

EXISTING LICENSE CONDITION

None.

PROPOSED LICENSE CONDITION

See Attachment 2.

1.0 DESCRIPTION OF CHANGE

This proposed change requests the approval of PDTS to define the requirements for maintaining SONGS 1 in a permanently defueled condition until the final decommissioning of the plant. A new license condition concerning the SONGS 1 Fire Protection Program is also proposed in accordance with Generic Letters 86-10 and 88-12 (see Section 2.5 of this proposed change). Upon NRC approval, the PDTS will be followed during the permanently defueled condition in lieu of the existing Technical Specification requirements.

The PDTS specify a new safety limit, limiting conditions for operation (LCO), and surveillance requirements to ensure the safe storage of irradiated fuel assemblies in the spent fuel pool (SFP). Administrative controls are also included in the PDTS for overall safe operation of the permanently shut down plant. The PDTS are based on a new operational mode, the Permanently Defueled Mode, which applies when no fuel is located in the reactor and fuel is stored in the SFP.

2.0 **DISCUSSION**

The existing SONGS 1 Technical Specifications ensure the plant is safely operated under a wide range of conditions and can satisfactorily withstand all credible accidents. The proposed PDTS included in Attachment 1 ensure the safe, long-term storage of irradiated fuel in the SFP. The proposed PDTS reflect the reduced number of postulated accidents against which the defueled plant must be protected.

Only two of the accidents that have been previously analyzed in Chapter 15 of the SONGS 1 Updated Final Safety Analysis Report (UFSAR) remain relevant: (1) a loss of offsite power (LOP) and (2) a fuel handling accident. As discussed in Section 3.0 of this proposed change, the safety significance of both of these accidents is reduced during the Permanently Defueled Mode. Section 3.0 also addresses why the other Chapter 15 accidents are not relevant during the defueled condition and establishes the continued ability of the SONGS 1 fuel storage facility to withstand other applicable UFSAR events, natural phenomena, and fires. No new accidents are introduced by permanently defueling the plant.

A new safety limit is proposed in PDTS D2.1 to protect the integrity of the fuel cladding during the defueled condition. The proposed safety limit ensures adequate cooling of the stored fuel to guard against the uncontrolled release of radioactivity. The PDTS specify LCOs and surveillance requirements which are necessary to ensure the proposed safety limit is maintained at all times. The new safety limit is discussed in Section 2.1.

The PDTS are composed, in part, of existing Technical Specifications which apply during a normal refueling outage. Some of the existing shutdown related requirements will no longer apply since all of the fuel has been removed from the reactor and, therefore, have been excluded from the PDTS. For example, the decay heat removal requirements of Technical Specification 3.8.A are unnecessary since removal of decay heat from the reactor is not needed since the reactor has been defueled. All existing Technical Specifications which are needed only for power operations have also been omitted from the PDTS. Additionally, requirements concerning auxiliary electrical supply, fire protection, shock suppressors, the control room emergency air treatment system, and radiation monitoring instrumentation are not included in the PDTS since those items will be administratively controlled during the Permanently Defueled Mode. Sections 2.4, 2.5, 2.7, 2.8, and 2.9 provide the justification for handling these topics in accordance with administrative controls. Section 2.6 discusses why inservice inspection requirements are not included in the PDTS.

The PDTS also include several new requirements for providing cooling for the SFP and for maintaining the integrity of the spent fuel cladding during long-term storage. Specifically, new requirements are included for SFP temperature and cooling (PDTS D3.1.1), water chemistry (PDTS D3.1.3), and makeup water supply (PDTS D3.2).

The following topics are discussed in Sections 2.2 through 2.12 to support the significant hazards consideration analysis that is presented in Section 3.0:

- Spent Fuel Storage Facility Design

- SFP Thermal Conditions
- Auxiliary Electrical Supply
- Fire Protection
- Inservice Inspection
- Shock Suppressors
- Control Room Emergency Air Treatment System
- Radiation Monitoring Instrumentation
- Operator Qualification
- Disposition of Existing Technical Specifications in the PDTS
- Disposition of NRC Identified Topics to be Considered for Inclusion in the PDTS

2.1 Safety Limit

The safety limits that are defined in Section 2.1 of the existing SONGS 1 Technical Specifications are relevant only for an operating reactor and, therefore, are not applicable during the Permanently Defueled Mode. The PDTS propose a new safety limit for the SONGS 1 fuel storage facility. The proposed safety limit protects the integrity of the fuel cladding to guard against the uncontrolled release of radioactivity. The new safety limit ensures that the stored fuel is cooled sufficiently to avoid critical heat flux conditions. Overheating during such conditions could damage the fuel cladding and potentially cause uncontrolled release of fission products to the environment. Additionally, the preliminary conclusions of the ongoing SFP structural analyses indicate that the thermodynamic limit on SFP water temperature ensures the stresses in the SFP liner and concrete are acceptable. The conclusions of those evaluations will be confirmed or, if necessary, revised in a forthcoming submittal to the Commission.

Fuel overheating will be precluded during the Permanently Defueled Mode by covering the spent fuel with water at all times and thereby maintaining low fuel clad temperatures. The SFP water temperature is thermodynamically limited since the fuel storage building is maintained near standard atmospheric conditions. Therefore, as long as the stored fuel is covered with water and the configuration of the fuel is maintained by the storage racks, the fuel cladding temperature will be significantly less than that experienced during critical heat flux conditions and the potential for fuel overheating is precluded.

PDTS D2.1 establishes a minimum SFP water level safety limit of plant elevation 16 feet to prevent fuel uncovery, fuel overheating, and the subsequent release of radioactivity. PDTS D3.1.2 establishes a more restrictive LCO for SFP water level (plant elevation 40 feet 3 inches) to provide margin and for radiation shielding purposes. PDTS D3.2 provides for a seismically qualified source of SFP makeup water which is sufficient to maintain the required SFP water level.

2.2 Spent Fuel Storage Facility Design

The NRC accepted the adequacy of the SONGS 1 spent fuel storage facility in safety evaluations included in References 3, 4, and 5. Spent fuel is stored in the SFP which is located in the fuel storage building. The SFP provides underwater storage for up to 216 spent fuel assemblies which is sufficient to accommodate one and one third reactor cores. The SONGS 1 SFP is constructed of reinforced concrete and is lined with stainless steel. The fuel storage building, SFP, and the SFP liner are classified as seismic category A. The storage facility's provisions for SFP cooling, water level, makeup water supply, criticality control, and water chemistry are discussed in the following sections.

2.2.1 Spent Fuel Pool Cooling

One of the two trains of SFP cooling will be placed in operation as required to maintain the SFP coolant temperature below 150°F during the Permanently Defueled Mode. This temperature is based on the SFP temperature requirement that was accepted by the NRC in Reference 5 for the maximum normal heat load case. The maximum SFP heat load for the Permanently Defueled Mode will be less than that calculated for the maximum normal heat load case. Conservative analytical predictions for the SFP thermal conditions that will exist during the Permanently Defueled Mode are discussed in Sections 2.3.1 and 2.3.2. (The analytical results included in Sections 2.3.1 and 2.3.2 are preliminary. Those results will be confirmed or, if necessary, revised in a forthcoming submittal after the analyses are complete.)

At least one SFP cooling train will normally be functional (commercial grade) during the Permanently Defueled Mode. If common train maintenance or testing is required, both cooling trains may be removed from service. When such maintenance or testing is planned, the work planning will provide for the return of at least one train to service prior to the time the SFP water temperature would be projected to reach 150°F. Sufficient margin will be maintained in the work planning to accommodate expected problems. As justified in Section 2.3.2, the SFP cooling train will be classified as quality class non-safety related except for those safety-related, seismic category A components and structures which are necessary to maintain the SFP pressure boundary (so that the required SFP water inventory is reliably preserved). The other cooling train will also normally be maintained functional (commercial grade) except when a cooling train is out of service for maintenance or other purposes. Each cooling train is capable of transferring the decay heat generated by the worst case refueling offload or by the worst case full core offload (i.e., the maximum normal heat load case and the maximum abnormal heat load case, respectively) to the Pacific Ocean ultimate heat sink (Reference 6). As discussed later in this section, upgrades to the SFP cooling system were recently completed.

A SFP cooling train features either SFP cooling pump aligned to the SFP heat exchanger, one component cooling water (CCW) pump aligned with the SFP heat exchanger and with either CCW heat exchanger, and either salt water cooling pump aligned with the same CCW heat exchanger. The cooling system provides redundancy for all active components so that cooling can continue even with the occurrence of a single active failure. Additionally, temporary hoses can be used to substitute a CCW heat exchanger for the single SFP cooling heat exchanger, if needed. An alarm annunciates in the control room if the SFP temperature reaches 125°F.

The adequacy of the SFP cooling system, as modified during the 1990-1991 refueling outage to shorten the time required to place the spare SFP cooling pump in operation, was accepted by the NRC in Reference 5. The NRC also accepted specific future modifications of the SFP cooling system. Those modifications included upgrading the electrical power supply and the controls for the second SFP cooling pump and adding a check valve in the discharge piping for each of the two SFP cooling pumps. The upgrades of the SFP cooling system were completed prior to initiating the defueling of the plant.

2.2.2 Spent Fuel Pool Water Level

The water level in the SFP is procedurally maintained above plant elevation 40 feet 6 inches whenever fuel is stored in the pool. A low-level alarm is annunciated in a control room if the water level lowers to 40 feet 6 inches so that actions can be taken to prevent the level from dropping below the minimum existing Technical Specification required level of 40 feet 3 inches (included in proposed PDTS D3.1.2). This minimum water level provides sufficient shielding to limit the direct radiation dose rate from the fuel to 2.5 mrem/hr at the water surface, with the pool completely filled with 216 fuel assemblies. This level also ensures that at least 23 feet of water would be available to remove 99% of the iodine gap activity that is assumed to be released in the event of a dropped and damaged fuel assembly. Additionally, the minimum level ensures that at least ten feet of water is above the top of a fuel assembly when it is fully withdrawn from the storage racks and in the transport position. (The Basis section of existing Technical Specification 3.8, "Fuel Loading and Refueling," inaccurately states the minimum level ensures that at least 12 feet of water is above the top of a fully withdrawn fuel assembly. As stated in UFSAR Section 9.1.2.2.2, the correct figure is ten feet of water. This amount of water is consistent with the requirements of Standard Review Plan Section 9.1.3, "Spent Fuel Pool Cooling and Cleanup System.") As discussed in Section 2.3, the minimum required water level also provides an adequate heat sink in the SFP so that, if SFP cooling is ever interrupted, cooling can be reinitiated before the pool temperature exceeds 150°F.

The design of the SFP piping connections protects against the loss of SFP water inventory due to a failure in the SFP cooling piping loop. The piping design is such that the loss of water inventory could not drop the SFP water level by more than approximately 12 feet, since neither the suction nor the return lines extend below that level (plant elevation 28 feet). If such an event were to occur, fuel handling operations would not be permitted until the pool level was restored above elevation 40 feet 3 inches.

2.2.3 Spent Fuel Pool Makeup

The following three sources of SFP makeup water will normally be available during the permanently defueled condition: primary plant makeup tank, service water reservoir, and the auxiliary feedwater storage tank (AFWST). Makeup water is normally supplied to the SFP from the primary plant makeup tank. However, if that tank became unavailable and SFP makeup was needed, the AFWST would be aligned to the SFP. As discussed in Reference 8, the AFWST serves as the seismically qualified source of SFP makeup water during the defueled condition.

Since a piping connection does not presently exist between the AFWST and the SFP, a flexible, non-collapsible wall hose has been provided so that water can be gravity fed from the AFWST into the SFP. The hose would be connected to an existing connection on the tank's outlet piping and routed to the SFP only if the primary plant makeup tank became unavailable and makeup to the SFP was needed. Administrative controls are in place which provide specific instructions to the operators for aligning the AFWST. A sufficient water level is maintained in the AFWST to ensure 50,000 gallons of water can be gravity fed from the AFWST to the SFP at a flow rate of at least 12 gpm. By August, 1993 (the earliest assumed approval date for the PDTS), the SFP evaporation rate that could result from a loss of cooling would be less than approximately 4.5 gpm (see Section 2.3.2). SFP total water losses from evaporation and leakage will be administratively monitored to ensure that, even under loss of cooling conditions, the AFWST represents over a five day supply of makeup water for the SFP. Five days is sufficient time to either restore cooling or to connect another water source to the SFP in order to avoid dropping the SFP water level below the minimum required level of 40 feet 3 inches.

2.2.4 Spent Fuel Pool Criticality Control

Spent fuel is stored under water in the SFP storage racks that are classified as seismic category A. The racks are free standing on the floor and are supported horizontally by the walls of the SFP. Each spent fuel assembly is stored in an individual storage compartment, is supported at the bottom, and is restrained in the horizontal direction. Each compartment is accessible only through its open top. The storage racks have cross bars which span the spaces between fuel locations to physically prevent a fuel assembly from being inserted in other than design locations.

The spent fuel racks are designed on 20-inch centers with 12 inches between fuel assemblies. The separation between the spent fuel assemblies ensures that the array remains noncritical with a K_{eff} of less than 0.95. As discussed in Reference 9, the maximum calculated K_{eff} for fuel stored in the SONGS 1 spent fuel storage racks is 0.896 which is less than the acceptance criteria of 0.95. The maximum K_{eff} was calculated assuming unborated SFP water, fresh fuel having 4.0 weight per cent of U-235 and 95% theoretical density, and SFP water temperatures ranging from 68°F to 212°F. The analysis also included the effects of a misplaced fuel assembly and a fuel assembly drop accident. Additional evaluations have confirmed that the calculated shutdown margin is unaffected by the four mixed oxide fuel assemblies which are stored in the SFP.

The calculated results were accepted by the NRC in a safety evaluation report included in Reference 3 as bounding criticality conditions that could exist in the SFP during the operating life of the plant. The results are very conservative for the defueled condition since the stored spent fuel has undergone significant burnup and is less reactive than the fresh fuel assumed in the analysis of record. Therefore, consistent with the unborated water assumption made in the criticality analysis, neither the SFP nor any of its makeup sources need to be borated during the permanently defueled condition.

2.2.5 Spent Fuel Pool Water Chemistry

Water chemistry limits for the SFP are included in PDTS D3.1.3 to ensure the long-term integrity of the stored fuel assemblies, storage racks, and SFP liner. Each of these components contain stainless steel which may be susceptible to localized corrosion in the presence of chloride or fluoride ions. The limits specified in PDTS D3.1.3 have been established to minimize localized corrosion and reduce the potential for failure due to stress corrosion. The proposed chemistry limits conform to the requirements for SFP water that are specified in Westinghouse NSSS Standard Information Package 5-1, "Chemistry Criteria and Specifications," Revision 4, dated August, 1985.

2.3 Spent Fuel Pool Thermal Conditions

Conservative analytical calculations for the thermal conditions that will exist in the SFP during the Permanently Defueled Mode are being completed. Preliminary results of the analyses for the SFP heat load and the impact of losing all SFP forced cooling are discussed in Sections 2.3.1 and 2.3.2, respectively. These preliminary results will be confirmed or, if necessary, revised in a forthcoming submittal to the Commission.

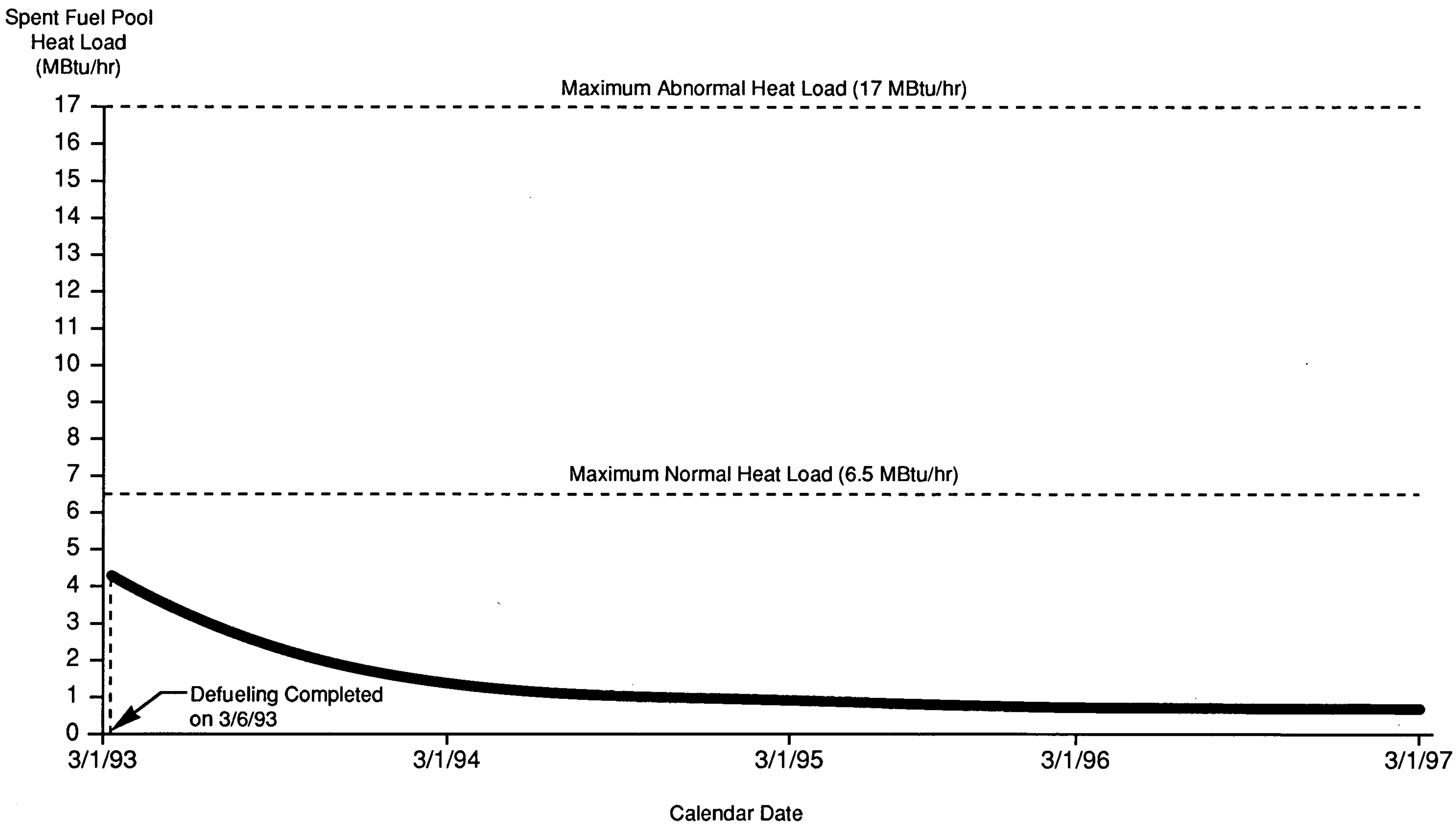
2.3.1 Spent Fuel Pool Heat Load

As discussed in Reference 5, the existing licensing basis for the SFP cooling system is, in part, to maintain the SFP coolant temperature below 150°F for the maximum normal heat load case and below boiling for the maximum abnormal heat load case. Standard Review Plan, Section 9.1.3, "Spent Fuel Pool Cooling and Cleanup System," defines the maximum normal heat load as the decay heat generated by one refueling load after 150 hours of decay and from one refueling load after one year of decay. The maximum abnormal heat load case is defined as the decay heat from one full core offload after 150 hours of decay and from one refueling load after 36 days of decay. The calculated maximum normal and maximum abnormal heat loads for the SONGS 1 SFP are 6.5 MBtu/hr and 17.0 MBtu/hr, respectively. These heat loads were calculated in accordance with the recommendations of Branch Technical Position ASB 9-2, "Residual Decay Energy for Light-Water Reactors for Long-Term Cooling."

The SFP heat load is being calculated as a function of time during the permanently defueled condition according to the recommendations of Branch Technical Position ASB 9-2. The preliminary results of the analysis are shown in Figure 1 and demonstrate that the SFP heat load during the Permanently Defueled Mode will be less than that calculated for the maximum normal heat load case (6.5 MBtu/hr). The calculated SFP heat load was greatest when the defueling was first completed (being a maximum of approximately 4.3 MBtu/hr) and will decrease with time as the fuel continues to cool (reaching approximately 2.3 MBtu/hr by August, 1993). The analysis also indicates that the SFP steady state coolant temperature, with cooling in operation, will normally be less than 100°F.

Preliminary

Figure 1. Spent Fuel Pool Heat Load During Permanently Defueled Condition



2.3.2 Spent Fuel Pool Heatup Upon Loss of Cooling

The impact of losing all SFP cooling during the Permanently Defueled Mode is also being analyzed. Such an event is highly improbable due to the redundancy and reliability of the offsite power sources and the ability of the cooling system to maintain cooling capability even with the assumption of a single active failure. The loss of SFP cooling was evaluated as input to the significant hazards consideration analysis provided in Section 3.0.

The loss of SFP cooling evaluation is focused on two areas: (1) the time for the SFP to heat up to 150°F after a loss of cooling and (2) SFP equilibrium conditions (temperature and evaporation rate) assuming no SFP cooling was in operation. The time to heat up to 150°F is of interest to ascertain how rapidly cooling must be restored (after either a single active failure or an LOP) before the 150°F temperature specified by PDTS D3.1.1 is reached. The SFP equilibrium temperature and evaporation rate are necessary to evaluate the potential for pool boiling and to determine the adequacy of the SFP makeup water sources. The loss of cooling analysis is being performed by conservatively assuming the SFP water level was at the minimum required level of plant elevation 40 feet 3 inches when cooling was interrupted.

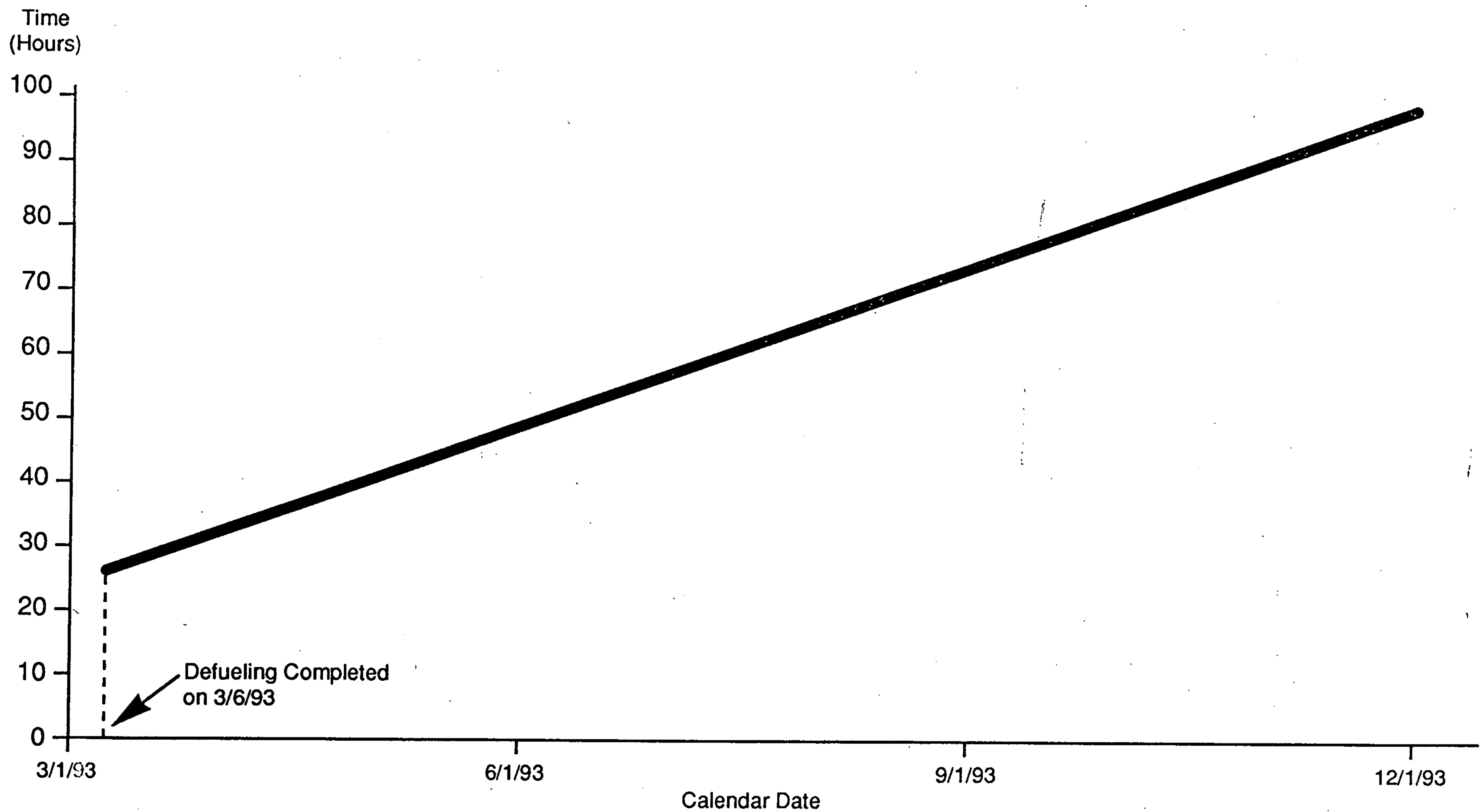
Figure 2 shows the preliminary results for the calculated time required for the SFP to heat up to 150°F if cooling were lost during the initial months of the permanently defueled condition. The heatup timing contained in Figure 2 is conservative since (1) the actual SFP heat load is lower than the conservative predictions given in Figure 1, and (2) the heatup timing is being calculated by assuming that none of the spent fuel decay heat is rejected from the SFP. In any case, by August, 1993, over 65 hours would be required for the SFP temperature to reach 150°F if cooling were interrupted. Therefore, adequate time is available to restore cooling by either placing a second train of cooling in service, by restoring a source of offsite power, or by placing the commercial grade emergency diesel generator (EDG) in service (see Section 2.4 for discussion of the auxiliary electrical supply to be provided during the Permanently Defueled Mode).

In the unlikely event that SFP cooling could not be restored as described above, the fuel storage building rollup and personnel access doors would be opened, as necessary, to promote passive cooling and remain within 10 CFR 20 requirements. Portable tools would be used to assist in opening the fuel storage building, if necessary due to the effects of a seismic event. The existing procedure that provides corrective actions for a loss of SFP cooling event will be revised to include instructions for evaluating and, if necessary, implementing the option of opening the fuel storage building.

The capability to passively cool the SFP is being evaluated by assuming an open fuel storage building and determining the equilibrium conditions for which the decay heat generated by the spent fuel is balanced by the heat transferred from the SFP. The analysis assumes SFP cooling is not in service and credits the following heat transfer mechanisms: natural convection from the pool surface, evaporation at the pool surface, conduction through the pool walls and bottom, and heatup of the makeup water added to the pool to balance the evaporative water loss. The preliminary calculated quasi-steady state SFP thermal conditions after a loss of SFP cooling are shown in Figure 3. These

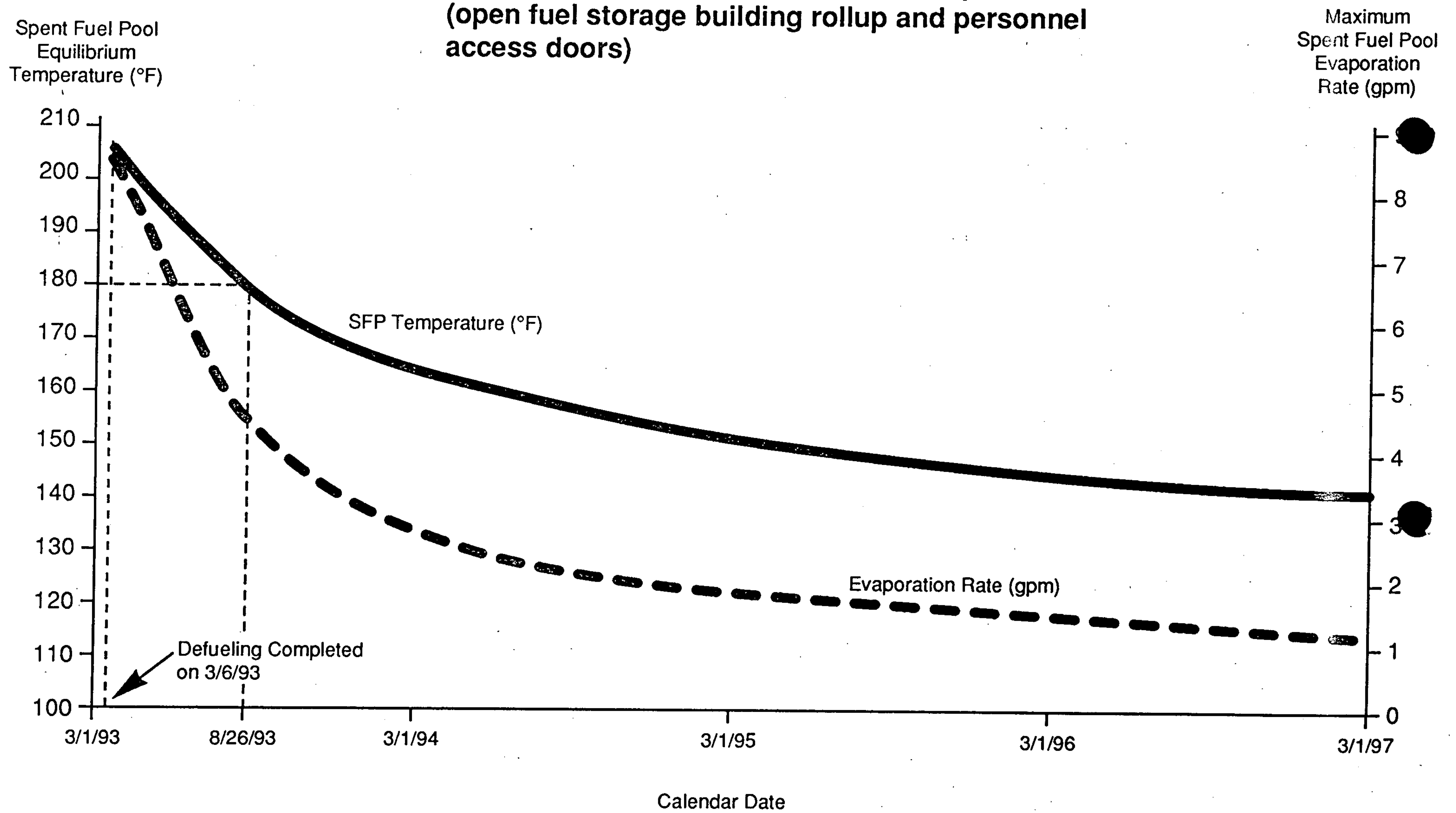
Preliminary

Figure 2. Time for Spent Fuel Pool Temperature to Reach 150°F After a Loss of Spent Fuel Pool Cooling (no heat loss from spent fuel pool)



Preliminary

Figure 3. Spent Fuel Pool Equilibrium Temperature and Maximum Evaporation Rate With No Cooling in Operation (open fuel storage building rollup and personnel access doors)



results demonstrate that, even if SFP cooling were completely lost during the Permanently Defueled Mode, the SFP would not boil. For example, by August, 1993, if SFP cooling were lost and remained unavailable, the SFP would stabilize at an equilibrium temperature of less than approximately 180°F if the fuel storage building were opened to promote passive SFP cooling. Additionally, the SFP evaporation rate would be less than approximately 4.5 gpm. As discussed in Section 2.2.3, the contents of the AFWST are sufficient to makeup that water loss and maintain the required SFP water level. Since the spent fuel could be sufficiently cooled by passive means, most of the SFP cooling system will be classified as quality class non-safety related. However, the cooling system components and structures that are part of the SFP pressure boundary will be maintained as quality class safety-related and seismic category A to ensure that the required SFP water inventory is reliably preserved.

2.4 Auxiliary Electrical Supply

The potential adverse safety consequences of an LOP occurring during the Permanently Defueled Mode are limited to a loss of SFP cooling. However, adequate time (over 65 hours) is available to restore power from either the Southern California Edison (SCE) or San Diego Gas and Electric (SDG&E) electrical grids so that the SFP temperature can be maintained below 150°F. Even if it were postulated that power from the grids remained unavailable, the SFP could be adequately cooled through passive means. Therefore, the existing SONGS 1 electrical power sources and distribution systems are not essential for the safe, long-term storage of irradiated fuel in the SFP.

Since the SONGS 1 electrical supply system will not be performing a safety-related function during the Permanently Defueled Mode, operability and surveillance requirements for that system were not included in the proposed PDTS. However, administrative controls will be established to ensure the availability of certain electrical supply systems so that the plant status can be maintained and monitored during the Permanently Defueled Mode.

Specifically, administrative controls will be established consistent with good engineering and maintenance practices to maintain the following equipment functional (commercial grade): one of the eight existing offsite high voltage lines to the switchyard (four from the SCE electrical grid and four from the SDG&E grid), one transmission circuit from the switchyard to the onsite distribution system, one EDG capable of manual start and its associated 125 volt DC bus, and one train of the onsite electrical distribution system. Existing backup capability will also be maintained for each of these electrical supply systems and components as necessary to support equipment maintenance. Additionally, the minimum EDG fuel supplies that are specified in existing Technical Specification 3.7.2, "Electrical Supply: Shutdown," i.e., at least 290 gallons of fuel in the day tank and at least 37,500 gallons of fuel in the EDG fuel storage system, will normally be maintained. The administrative controls for the auxiliary electrical supply system will be implemented concurrently with the PDTS.

These provisions are similar to the existing electrical supply requirements that apply during a normal refueling outage except that the systems will be maintained as commercial grade, rather than safety-related, equipment (i.e., the use of non-safety related spare parts will be permissible and major EDG overhauls and inspections will not be required). The EDG and associated fuel supply will be maintained functional (commercial grade), as described above, until such time that the SFP temperature would not exceed 150°F even if the SFP cooling system was not in service (estimated to be May, 1995, based on conservative engineering calculations described in Section 2.3.2).

2.5 Fire Protection

The limiting conditions for operation and surveillance requirements for fire detection systems, fire suppression systems, and fire barriers, and requirements for fire brigade staffing in the existing Technical Specifications have been excluded from the proposed PDTS. These requirements will be incorporated into the SONGS 1 Fire Protection Program procedures in accordance with the guidance provided in NRC Generic Letters 86-10 and 88-12. The SONGS 1 fire protection program is described in the Updated Fire Hazards Analysis (UFHA). The next annual update of the UFHA will reflect the relocation of the requirements from the Technical Specifications to the Fire Protection Program procedures.

As specified by Generic Letter 88-12, a request to add an appropriate fire protection license condition to the SONGS 1 POL is included in this proposed change (Attachment 2). The wording of the proposed license condition is consistent with that specified in NRC Generic Letter 86-10, but has been modified to reflect the plant's permanently defueled condition and the relationship of the UFHA to the applicable safety evaluation reports (References 10, 11, 12, and 13).

Consistent with the guidance provided in Generic Letter 88-12, the Administrative Controls section of proposed PDTS requires: periodic audits and inspections of the fire protection program and its implementing procedures (PDTS D6.5.3.5 f through h), as well as written procedures for implementation of the Fire Protection Program and administrative controls (PDTS D6.8.1 f and j).

The proposed PDTS also exclude the existing Technical Specifications which concern the capability for safe plant shutdown following a fire. These specifications are applicable only in Modes 1 through 4. Therefore, the existing Technical Specification requirements for dedicated and alternate shutdown systems and for emergency lighting were not included in the PDTS.

2.6 Inservice Inspection

With the exception of CCW hydrostatic tests, the second ten-year inservice inspection (ISI) interval inspections for systems and equipment that are required beyond core offload for long-term SFP cooling were completed prior to plant shutdown. A relief request was submitted to the NRC (Reference 14), proposing an inservice leak test in lieu of some of the CCW hydrostatic tests which are required by Section XI of the ASME Code. The NRC approved the relief request (Reference 15) and the CCW inservice leak test was completed.

A relief request for not performing any third ten-year ISI interval inspections (Reference 16) was approved by the NRC (Reference 17). Therefore, ISI requirements were not included in the proposed PDTS.

2.7 Shock Suppressors

Operation and surveillance requirements for shock suppressors (snubbers) have also been excluded from the proposed PDTS. All but 13 of the existing SONGS 1 snubbers have been retired from service during the defueled condition since they are part of systems which are permanently out of service. The remaining 13 snubbers (six on each EDG and one on the CCW system) will be maintained functional (commercial grade) and surveilled in accordance with administrative controls during the Permanently Defueled Mode. Administratively controlling snubber surveillance is adequate since these snubbers are not required to be operable to ensure the safe storage of irradiated fuel in the SFP. As discussed in Section 2.3.2, the SFP heat load will be sufficiently low during the Permanently Defueled Mode so that the SFP could be cooled through passive means even if SFP cooling and/or electrical power were permanently out of service.

The administrative controls for snubber surveillance will be consistent with the requirements specified in existing Technical Specification 4.14. Specifically, the remaining 13 snubbers will be surveilled during the Permanently Defueled Mode as follows: (1) each of the 13 snubbers will be visually inspected in accordance with the schedule specified in existing Technical Specification 4.14.A, and (2) functional testing will be performed at least once every 18 months on the single CCW snubber and on one snubber from each of the two types of EDG snubbers for each EDG (i.e., at least five snubbers will be functionally tested every 18 months). These administrative controls will remain in force until the SFP temperature would not exceed 150°F even if SFP cooling were permanently out of service (estimated to be May, 1995).

2.8 Control Room Emergency Air Treatment System

The Control Room Emergency Air Treatment System (CREATS) will remain functional (commercial grade) during the Permanently Defueled Mode even though existing Technical Specification 3.12 only requires the system to be operable when the reactor is critical. The system will be maintained consistent with good engineering and maintenance practices for commercial grade equipment. The CREATS will be maintained by administrative controls rather than the PDTS since the CREATS will not be performing a safety-related function.

The CREATS is not needed to allow continuous manning of the control room for the Unit 1 UFSAR Chapter 15 accidents which are credible during the Permanently Defueled Mode. The radiological doses to control room operators during these accidents would be within the limits of General Design Criteria 19, even without the use of CREATS, respirators, or potassium iodide pills.

The proposed PDTS allow intermittent manning of the control room to ensure the health and safety of the operators during a severe Unit 2 or 3 accident (e.g., a design basis loss of cooling accident). If such an event were to occur, the operators would be permitted to leave the control room and return intermittently to ensure the continued safe storage of fuel in the SFP. The operators could return to the control room at least once per day for 30 days without receiving exposures in excess of General Design Criteria 19 limits. The actual frequency of intermittent manning would be determined based on existing conditions. Respirators and potassium iodide pills would be used, if necessary, to ensure operator safety during the periodic monitoring of plant performance.

Once a day monitoring during Unit 2 or 3 accident conditions is acceptable due to the long time period available to recover from any Unit 1 equipment malfunction. As discussed previously, over 65 hours would be required for the SFP temperature to reach 150°F if cooling became unavailable after August, 1993. Operating instructions will be established to provide specific criteria and procedures for control room evacuation and subsequent periodic monitoring of plant conditions.

2.9 Radiation Monitoring Instrumentation

The proposed PDTS do not include operation and surveillance requirements for radiation monitoring instrumentation. Operability of that equipment is not required for the safe, long-term storage of spent fuel in the SFP. However, several of the radiation monitors which are included in existing Technical Specifications 3.5.10 and 4.1.11 will be administratively maintained functional consistent with good engineering and maintenance practices for commercial grade equipment. Monitors will be maintained in the control room (R-1231), SFP area (R-1236), and the plant vent stack (wide range gas monitor, R-1254). The other radiation monitors that are required by existing Technical Specifications 3.5.10 and 4.1.11 (inside containment and for main steam dump and safety valves) will not be maintained. Those monitors are not needed since the fuel has been removed from the containment and the Main Steam System will be out of service during the Permanently Defueled Mode.

2.10 Operator Qualification

Proposed PDTS D6.1, D6.2, D6.3, D6.4, and D6.8 include revised requirements for shift manning and operator qualification which are consistent with those proposed in Reference 18. Reference 18 proposed the elimination of the existing Technical Specification requirements for use of 10 CFR 55 licensed operators, and proposed the use of Certified Fuel Handlers qualified in accordance with an NRC approved site specific program.

As discussed in Reference 18, operators licensed in accordance with 10 CFR 55 are unnecessary during the Permanently Defueled Mode since they are required only for the conditions and activities identified in 10 CFR 50.54(i) through (m), such as plant operation, core alteration, or whenever fuel is in the reactor. Since these conditions and activities will no longer occur at the defueled plant, requirements for licensed operators have been eliminated in Reference 18 and have been excluded from the PDTS. Reference 19 also provided a description of Fuel Handler Certification program for NRC approval. This program will ensure that the Certified Fuel Handlers possess the expertise necessary to perform the plant operations which are necessary for safe spent fuel storage and handling.

2.11 Disposition of Existing Technical Specifications in Proposed PDTS

Most of the existing Technical Specifications are relevant only for power operations and/or refueling outages and, therefore, do not apply to a permanently defueled plant. Those Technical Specifications which remain applicable, even when defueled, typically need revision to clarify their applicability during the Permanently Defueled Mode. Attachment 3 provides a section by section description of how the existing Technical Specifications were dispositioned in the PDTS. For ease of reference, the existing Technical Specification numbering is listed first for each entry in Attachment 3 followed parenthetically by the new PDTS numbering, as applicable.

2.12 Disposition of NRC Identified Topics to be Considered for Inclusion in the PDTS

Reference 1 discussed the operation and surveillance requirements that apply when SONGS 1 is defueled but prior to NRC approval of the PDTS. The NRC concluded in Reference 19 that Reference 1 provided a good base from which the PDTS could be developed. Additionally, the NRC letter identified systems and limiting conditions for operation that should be considered for inclusion in the SONGS 1 PDTS. The disposition of the NRC identified items is provided in Attachment 4.

3.0 SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS

As required by 10 CFR 50.91(a)(1), this analysis is provided to demonstrate that this proposed change does not represent a significant hazards consideration. As discussed below, in accordance with the three factor test of 10 CFR 50.92(c), implementation of the proposed change was analyzed using the following standards and was found not to: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

1. **Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No

Only two of the accidents that are evaluated in Chapter 15 of the UFSAR remain applicable for the permanently defueled plant: (1) an LOP and (2) a fuel handling accident. Attachment 5 provides the reasons for why the other Chapter 15 accidents are not applicable during the defueled condition. As discussed below, maintaining the permanently defueled plant in accordance with the proposed PDTS does not affect the probability of occurrence of an LOP, but the probability of a fuel handling accident will be reduced. The consequences of both accidents will be reduced during the Permanently Defueled Mode. Additionally, the ability of the fuel storage facility to withstand other applicable UFSAR events, natural phenomena, and fires is either unchanged from the existing licensing basis or is improved during the defueled condition.

Loss of Offsite Power

The probability of occurrence of an LOP is unaffected by the permanent defueling of the plant. Administrative controls will be implemented to ensure the availability of the existing Mode 6 provisions for providing offsite power from either the SCE or SDG&E transmission networks. That is, one SCE or one SDG&E high voltage transmission line will always be available during the Permanently Defueled Mode. Additionally, at least one EDG will be maintained in a functional (commercial grade) status, until the SFP temperature would remain below 150°F even if offsite electrical power sources were lost without restoration (approximately May, 1995).

The potential adverse safety consequences due to an LOP occurring during the Permanently Defueled Mode are limited to the loss of SFP cooling. However, such an event is of minimal safety significance due to the low heat load that will exist in the SFP. The low heat load allows sufficient time to successfully recover from the event before any appreciable heatup of the SFP. By August, 1993, over 65 hours would be required for the SFP temperature to reach 150°F after a loss of cooling (a local, non-powered means of determining SFP water temperature is provided so that water temperature can be surveilled even during LOP conditions). This is sufficient time to either restore electrical power from the grid or manually start the available EDG so that cooling can be re-initiated.

In the unlikely event that electrical power and/or SFP cooling were not restored, the SFP could be satisfactorily cooled by opening the fuel storage building to promote passive cooling. By August, 1993, the spent fuel will have cooled sufficiently so that the SFP could be stabilized at an equilibrium temperature of less than approximately 180°F if the fuel storage building were opened. Since the resulting SFP evaporation rate would be less than approximately 4.5 gpm, the required water inventory in the AFWST is sufficient to make up that water loss and maintain the required SFP water level (surveillance of the AFWST and SFP water levels is performed locally, using non-powered means, during LOP conditions). The AFWST provides 50,000 gallons of makeup water that can be gravity fed from the AFWST at a flow rate of at least 12 gpm. Based on the maximum projected evaporative losses from the SFP, the AFWST represents over a five day supply of SFP makeup. Five days is more than enough time to either restore power/cooling or provide an alternate source of water. The analytical results cited above (65 hours, 180°F, and 4.5 gpm) are preliminary and will be confirmed or, if necessary, revised in a forthcoming submittal.

In summary, the safety significance of an LOP is reduced for the Permanently Defueled Mode since (1) the consequences of an LOP are limited to a loss of SFP cooling, (2) sufficient time is available to restore power before the SFP reaches 150°F, and (3) the SFP temperature can be adequately cooled by passive means even if electrical power remained unavailable for an extended period.

Fuel Handling Accident

The analysis of record for a fuel handling accident at SONGS 1 is discussed in UFSAR Section 15.17. The analysis conservatively calculated that a two hour thyroid dose of 99 rem and a two hour whole body dose of less than one rem could result in the unrestricted area from a fuel handling accident. The NRC concluded in Reference 20 that those doses were appropriately within the guidelines of 10 CFR 100 since the thyroid dose was less than 100 rem and the whole body dose was less than 25 rem.

The analysis of record conservatively bounds the consequences of a fuel handling accident during the Permanently Defueled Mode. The safety significance of a fuel handling accident is reduced for the permanently defueled plant since the extent and frequency of fuel handling operations will be very limited. In addition, the dose consequences of any accident that could occur will be reduced since fuel handling operations are not expected for many years. Therefore, the fuel will have experienced significantly more radioactive decay prior to any fuel movement during the Permanently Defueled Mode than was assumed in the analysis of record (i.e., fuel handling accident assumed to occur after the fuel has decayed for 148 hours).

Despite the reduced probability of occurrence and consequences of this accident during the Permanently Defueled Mode, the proposed PDTS have conservatively retained the SFP load handling limit and minimum water level that are specified in the existing Technical Specifications for refueling operations. Consistent with existing Technical Specification 3.8.B.1, PDTS D3.3 prohibits loads in excess of 1500 lbs from being handled over the SFP during the Permanently Defueled Mode. PDTS D3.1.2 specifies a minimum SFP water level of plant elevation 40 feet 3 inches, the same level specified for refueling operations in existing Technical Specification 3.8.B.2.

Other Applicable UFSAR Events, Natural Phenomena, Fires

In addition to the above two Chapter 15 accidents, the UFSAR evaluated other events, natural phenomena, and fires that are relevant during the Permanently Defueled Mode. Specifically, the loss of SFP cooling (UFSAR 9.1.3) and spent fuel cask drop (UFSAR 9.1.2 and 9.1.4.5) events, natural phenomena (earthquakes, floods, tornadoes, tornado missiles), and fires (UFSAR 3.3, 3.4, 3.5, 3.7, and 9.5) remain applicable during the defueled condition.

The probability and consequences of all of these events are either reduced during the defueled condition or remain unchanged from the current licensing basis. As discussed above for the LOP accident, the consequences of a loss of SFP cooling event are reduced since the SFP heat load (approximately 2.3 MBtu/hr by August, 1993) is significantly lower than that calculated for the maximum normal heat load case (6.5 MBtu/hr). The probability and consequences of a spent fuel cask drop event are unchanged during the defueled condition. The impact limiter and 2 1/4 inch thick plate described in UFSAR 9.1.2.2 will continue to be used in the cask handling area when the cask is in use. The impact limiter protects the concrete slab in the cask handling areas in the event the cask was dropped. The 2 1/4 inch thick stainless steel plate is positioned at the bottom of the SFP to protect the SFP liner during cask movement.

The probability and consequences of natural phenomena and fires are also unchanged from the current licensing basis since all equipment necessary to mitigate those events for the fuel storage facility remain in place in accordance with current regulatory requirements (see Section 2.5 of this proposed change).

2. **Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No

Operating the permanently defueled plant in accordance with the proposed PDTS does not create the possibility of a new or different kind of accident from any previously considered. Most of the existing plant systems and functions will not be operational during the Permanently Defueled Mode since power operations are not allowed and all of the fuel at SONGS 1 is stored in the SFP. However, all systems and components that are necessary for safe fuel handling and storage activities will be maintained operable during the permanently defueled condition. The proposed PDTS provide operation and surveillance requirements and administrative controls which are sufficient to ensure that the required systems and components will be operable during the Permanently Defueled Mode.

3. **Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?**

Response: No

The proposed PDTS are sufficient to ensure no reduction in a margin of safety, in part, because of the reduced range of design basis accidents against which the plant must be protected once the plant is permanently defueled. Only the LOP and fuel handling Chapter 15 accidents are relevant during the Permanently Defueled Mode. As discussed below, the margins of safety for both of these accidents will be improved by maintaining the plant in accordance with the proposed PDTS. As discussed in Attachment 6, none of the other Chapter 15 accidents are applicable since power operation will not occur during the defueled condition. Additionally, the margins of safety for other applicable UFSAR events, natural phenomena, and fires are either improved during the Permanently Defueled Mode or remain unchanged from the plant's current licensing basis.

Loss of Offsite Power

The margin of safety for an LOP will be improved during the Permanently Defueled Mode since the potential adverse safety consequences of that accident are limited to a loss of SFP cooling. Additionally, the heat load in the SFP is less than that calculated for the maximum normal heat load case. Over 65 hours would be required for the SFP to heat up to 150°F if cooling were lost after August, 1993. This compares to 10 hours to reach 150°F for the maximum normal heat load case as described in UFSAR Section 9.1.3.4. In addition, the SFP heat load will be sufficiently low during the defueled condition so that pool boiling would not occur even if an LOP interrupted SFP cooling without restoration.

The SFP evaporation rate, assuming no cooling were in operation, would be significantly less than the 40 gpm maximum boiloff rate assumed in the NRC safety evaluation of the SONGS 1 fuel storage facility (Reference 3). The evaporation rate that could occur if cooling were lost after August, 1993, would be less than approximately 4.5 gpm. Administrative controls will be established for monitoring total SFP water losses from evaporation and leakage to ensure the seismically qualified makeup water supply for the SFP (i.e., 50,000 gallons of usable water in the AFWST) is sufficient to maintain the SFP water level for over five days after a complete loss of cooling. The primary makeup water tank and the service water reservoir are also available as sources of SFP makeup.

Fuel Handling Accident

The margin of safety for a fuel handling accident will also be improved during the Permanently Defueled Mode since (1) a larger shutdown margin exists for the fuel stored in the SFP than was calculated in the analysis of record (References 3 and 9), and (2) the radiological dose consequences of this accident are reduced.

The calculation of record for a fuel handling accident at SONGS 1 determined that the maximum calculated K_{eff} for fuel stored in the SFP is 0.896. That value was obtained, in part, by assuming fresh fuel was stored in the SFP. However, only spent fuel that has undergone significant burnup will be stored in the SFP during the Permanently Defueled Mode. Therefore, the K_{eff} will be less than the 0.896 calculated value since the fuel stored in the SFP will always be significantly less reactive than fresh fuel.

The dose consequences of a fuel handling accident for the Permanently Defueled Mode will be significantly less than those reported in Section 15.17 of the UFSAR. A re-evaluation of the fuel handling accident was performed to quantify the reduction in dose consequences. For conservatism, the re-evaluation assumed the fuel handling accident occurs early in the defueled condition (110 days after reactor shutdown). The results show that the doses at the exclusion area boundary (EAB) for the duration of the release would be approximately 0.015 rem (thyroid) and 0.001 rem (whole body). These doses are significantly less than the two hour EAB doses reported in UFSAR Section 15.17 (i.e., 99 rem thyroid and less than one rem whole body).

Other Applicable UFSAR Events, Natural Phenomena, Fires

As discussed in response to Question 1 above, the probability and consequences of (1) a loss of SFP cooling event, (2) a spent fuel cask drop, and (3) natural phenomena (earthquakes, floods, tornadoes, tornado missiles) and fires are either reduced during the Permanently Defueled Mode or remain unchanged from the current SONGS 1 licensing basis. Therefore, maintaining the defueled plant in accordance with the proposed PDTS does not reduce any margin of safety for these events.

SAFETY AND SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the preceding analysis, it is concluded that: (1) Proposed Change No. 262 does not constitute a significant hazards consideration as defined by 10 CFR 50.92; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

4.0 REFERENCES

1. Letter, R. M. Rosenblum (SCE) to NRC Document Control Desk, "Operation and Surveillance Requirements for Permanently Defueled Condition for San Onofre Nuclear Generating Station, Unit 1," September 21, 1992.

2. Letter, J. O. Bradfute (NRC) to Harold B. Ray (SCE), "Issuance of Amendment for the San Onofre Nuclear Generating Station, Unit 1 (TAC No. M83123)," October 23, 1992.

3. Letter, W. Paulson (NRC) to R. Dietch (SCE), "Systematic Evaluation Program Topic IX-1, Fuel Storage - San Onofre Nuclear Generating Station, Unit 1," December 7, 1982.

4. Letter, T. M. Novack (NRC) to K. P. Baskin (SCE), "San Onofre Nuclear Generating Station, Unit 1, Long Term Service Seismic Reevaluation Program," July 11, 1986.

5. Letter, J. E. Tatum (NRC) to Harold B. Ray (SCE), "Issuance of Amendment No. 132 to Provisional Operating License, San Onofre Nuclear Generating Station, Unit No. 1 (TAC No. 76808)," July 16, 1990.

6. SONGS 1 Updated Final Safety Analysis Report, Section 9.1.3.4.

7. Letter, R. M. Rosenblum (SCE) to NRC Document Control Desk, "Modifications Regarding Spent Fuel Pool Cooling, San Onofre Nuclear Generating Station, Unit 1," September 25, 1992.

8. Letter, R. M. Rosenblum (SCE) to NRC Document Control Desk, "Seismically Qualified Source of Spent Fuel Pool Makeup Water during Permanently Defueled Condition, San Onofre Nuclear Generating Station, Unit 1," March 2, 1993.

9. Letter, R. W. Krieger (SCE) to D. M. Crutchfield (NRC), "Docket No. 50-206, Systematic Evaluation Program Topic IX-1, Fuel Storage," November 16, 1982.

10. Letter, D. L. Ziemann (NRC) to J. H. Drake (SCE) "Amendment No. 44 to Provisional Operating License No. DPR-13 for the San Onofre Nuclear Generating Station, Unit No. 1," July 19, 1979.

11. Letter, D. M. Crutchfield (NRC) to R. Dietch (SCE), "Supplement 1 to Amendment No. 44, Fire Protection Safety Evaluation Report for San Onofre Nuclear Generating Station, Unit 1," February 4, 1981.

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13. Letter, R. F. Dudley (NRC) to K.P. Baskin (SCE), "Appendix R Alternate Shutdown Capability," April 8, 1987.

14. Letter, W. C. Marsh (SCE) to NRC Document Control Desk, "Relief Request Regarding Hydrotesting of CCW System, San Onofre Nuclear Generating Station, Unit 1," November 4, 1992.

15. Letter, T. R. Quay (NRC) to Harold B. Ray (SCE), "San Onofre Nuclear Generating Station, Unit No. 1, Hydrotesting of CCW System Relief Request (TAC NO. M84856)," December 22, 1992.

16. Letter, R. M. Rosenblum (SCE) to NRC Document Control Desk, "Relief Request, Ten-Year Inservice Inspections, San Onofre Nuclear Generating Station, Unit 1," August 7, 1992.

17. Letter, T. R. Quay (NRC) to Harold B. Ray (SCE), "San Onofre Nuclear Generating Station, Unit No. 1 Ten Year Inservice Inspection Relief Requests (TAC No. M84349)," November 30, 1992.

18. Letter, Harold B. Ray (SCE) to NRC Document Control Desk, "Docket No. 50-206, Amendment Application No. 210, Defueled Operator Qualifications and Staffing, San Onofre Nuclear Generating Station, Unit 1," January 15, 1993.

19. Letter, J. O. Bradfute (NRC) to Harold B. Ray (SCE), "Operation and Surveillance Requirements for Permanently Defueled Condition for San Onofre Unit 1 (TAC No. M84567)," October 30, 1992.

20. Letter, D. L. Zeimann (NRC) to R. Dietch (SCE), "Systematic Evaluation Program Topic XV-20, Radiological Consequences of Fuel Damaging Accidents (Inside and Outside Containment)," January 17, 1980.