The Light company
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April 4, 1996
ST-HL-AE-5336
File No.: G09.17
10CFR50

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

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN-50499
Compliance of Refueling Practices With Licensing Basis

The South Texas Project NRC Project Manager recently visited the site to review our refueling practices. In support of that review, we are providing this letter confirming the acceptability of our practices.

The South Texas Project generally performs a full core off-load during the refueling of the South Texas Project units. We have confirmed that we have remained within the licensing basis defined in the Updated Final Safety Analysis Report (UFSAR).

The temperatures of the Spent Fuel Pool in the last outage for each South Texas Project unit remained below the Normal Maximum described in Table 9.1-1 of the South Texas Project UFSAR. Since these two outages imposed the greatest demand on Spent Fuel Pool cooling, the South Texas Project concludes that we have complied with the UFSAR Normal Maximum temperature limits in past outages. In addition, the South Texas Project performed an evaluation in accordance with 10CFR50.59 confirming that routine performance of full core off-loads is acceptable. The evaluation is attached for your information and we will clarify the UFSAR accordingly.

South Texas Project administrative controls on the heat load in the Spent Fuel Pool will ensure that we will continue to operate within the Normal Maximum licensing basis described in the UFSAR. Calculations will be performed to predict spent fuel pool temperatures during the off-load so that the pool temperature will not exceed the current single cooling train normal maximum temperature of 150.7°F and so that the time to boil is greater than the existing limit of 2.86 hours. In addition, the temperature alarm for the Spent Fuel Pool will be set so that action can be taken before the pool reaches the present single cooling train maximum temperature of 150.7°F.

A001

We believe this information and the attached safety evaluation adequately confirm the acceptability of past and future full core off-loads at the South Texas Project.

If you have any questions, please contact Mr. A. W. Harrison at (512) 972-7298 or me at (512) 972-7795.

D. A. Leazar
Director,
Nuclear Fuel and Analysis

AWH/lf

Attachment: USQE 96-0008, Revision 1

c:

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Form 2	Unreviewed Safety Question Evaluation Form (Sample)	Page 1 of 4

Unreviewed Safety Question Evaluation # 96-0008 Rev. No. 1 Page 1 of 4

Originating Document: LCN 2005 Rev. No. 0

NOTE: Attach 10CFR50.59 Screening Form or License Compliance Review Form to this USQE.

NOTE: Use additional sheets as necessary to provide the bases.

A.1 I Does the subject of this evaluation increase the probability of occurrence of an accident previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: As discussed in Section 6.0 of the attached evaluation, the subject of this evaluation does not increase the probability of occurrence of an accident previously evaluated in the Safety Analysis Report.

II Does the subject of this evaluation increase the consequences of an accident previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: As discussed in Section 6.0 of the attached evaluation, the subject of this evaluation does not increase the consequences of an accident previously evaluated in the Safety Analysis Report.

III Does the subject of this evaluation increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: A full core off-load uses the same equipment in the same manner as a fuel shuffle. The equipment remains within it's design parameters. Therefore, there is no increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report.

IV Does the subject of this evaluation increase the consequences of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: As discussed in Section 6.0 of the attached evaluation, the proposed change does not increase the consequences of a malfunction of equipment important to safety previously evaluated in the Safety Analysis Report.

Unreviewed Safety Question Evaluation # 96-0008 Rev. No. 1 Page 2 of 4

Originating Document: LCN 2005 Rev. No. 0

A.2 I Does the subject of the evaluation create the possibility of an accident of a different type than any previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The proposed change does not introduce an evolution not already addressed in the UFSAR. No changes to plant equipment are proposed. Therefore, the proposed change does not create the possibility of an accident of a different type than any previously evaluated in the Safety Analysis Report.

II Does the subject of this evaluation create the possibility of a different type of malfunction than any previously evaluated in the Safety Analysis Report?

☐ YES ☒ NO

Bases: The proposed change does not introduce an evolution not already addressed in the UFSAR. No changes to plant equipment are proposed. Therefore, the proposed change does not create the possibility of a different type of malfunction than any previously evaluated in the Safety Analysis Report.

A.3 I Does the subject of this evaluation reduce the margin of safety as defined in the basis for any Technical Specification?

☐ YES ☒ NO

Bases: As discussed in Section 3.0 of the attached evaluation, the proposed change will not result in the spent fuel pool temperature exceeding the 150.7°F discussed in the SER. In addition, the resulting dose from the boiling in the SFP event will remain bounding. Therefore, the proposed change does not reduce the margin of safety as defined in the basis for any Technical Specification.

Unreviewed Safety Question Evaluation # 96-0008 Rev. No. 1 Page 3 of 4

Originating Document: LCN 2005 Rev. No. 0

SAFETY EVALUATION SUMMARY

See attached evaluation.

Unreviewed Safety Question Evaluation # 96-0008 Rev. No. 1 Page 4 of 4

Originating Document: LCN 2005 Rev. No. 0

B. 1. YES All of the above questions were answered No; therefore, the originating document does not involve an Unreviewed Safety Question.

2. ____ One or more of the above questions was marked YES; therefore, the originating document involves an Unreviewed Safety Question. The originating document, as presented, shall NOT be implemented without prior approval by the NRC. Provide a recommendation for disposition of the Unreviewed Safety Question below. Refer to 0PGP05-ZN-0004 for processing licensing amendments. Further processing of this form to the PORC, Plant Manager and NSRB is not required. Notify Procedure Control that the evaluation involved an Unreviewed Safety Question so that Procedure Control can close the USQE number.

RECOMMENDED DISPOSITION:
Approve the UFSAR change

PREPARED BY:	C. R. Albury *Charles R. Albury* ORIGINATOR	4/4/96 Date
REVIEWED BY:	A.W. Harrision *AWHarrison* QUALIFIED REVIEWER	4/4/96 Date
APPROVED BY:	D.A. Leazar *D. G. Leazar* DEPARTMENT MANAGER	4/4/96 Date
PORC MEETING NO.	96-032	4/4/96 Date
APPROVED BY:	*Lew W Myers* PLANT MANAGER	4/4/96 Date

REMARKS:

☐ UNIT #1 ☒ UFSAR CN ☐ DESIGN CHANGE ☐ OTHER ______

☐ UNIT #2

☒ BOTH

ORIGINATING DOCUMENT NO. LCN 2005 REV. NO. 0

DESCRIPTION OF CHANGE

Describe the full core offload practice at STP with regards to the licensing basis of the Spent fuel Pool

PRELIMINARY SCREENING

		YES	NO
1.	Does the proposed change represent a change to the Plant Technical Specifications?	☐	☒
2.	Is an Unreviewed Safety Question known to be associated with the subject change?	☐	☒

NOTE: If "YES" to either questions 1 or 2 refer to 0PGP05-ZN-0004.

Does the proposed change represent:

		YES	NO
3.	A change to only correct a typographical, editorial or drafting error?	☐	☒
4.	A change which is identical to and addressed in its entirety by an existing approved 10CFR50.59 Screening/USQE or NRC approved licensing submittal?	☐	☒
5.	A spare or replacement part/component change with an equivalent part/component? (See Section 2.3 for a definition of equivalent)	☐	☒
6.	A configuration change within existing design specifications?	☐	☒

If all answers to the above questions are "NO" perform the final screening and mark N/A in the approval blocks below.
If the answer to any question (3) through (6) is "YES" a final screening is not necessary.
Sign approval blocks below and discard pages 2 and 3.
Provide a justification and references if any of items (3) through (6) is answered "YES".

Prepared by: C.R. Albury *Charles R. Albury* — Originator — Date: 4/4/96

Approved by: N/A — Qualified Reviewer — Date: ______

Originating Document No. LCN 2005 Rev. No. 0

FINAL SCREENING

In response to the questions below, if the change involves something that is not described in the SAR and is not part of the licensing basis, the "NO" is appropriate. However, this decision must be clearly documented with adequate technical justification for each question and the sections reviewed of applicable documents and applicable attributes reviewed should be indicated. The listing of attributes and documents for 10CFR50.59 screening can be found in Addendum 5.

Inter-discipline Coordination Required? ☐ YES ☒ NO
If "yes", obtain appropriate concurrence.

☐ Risk and Reliability Analysis ☐ Thermal Hydraulics ______ ☐ Reactor Engr. ______

☐ Civil ______ ☐ Mech ______ ☐ Elect ______ ☐ EQ ______ ☐ Other ______

	YES	NO
1. Does the subject of this review involve a change to the facility as described in the Safety Analysis Report?	☐	☒

The proposed change describes impact on the Spent Fuel Pool of performing a full core offload. No physical changes to facility are proposed.

	YES	NO
2. Does the subject of this review involve a change to the procedures as described in the Safety Analysis Report? Refer to 0PAP01-ZA-0103.	☒	☐

The proposed change revises the description of a normal fuel load practice from one third of a core to a full core as disucssed in UFSAR Section 9.1.3.2 and UFSAR Table 9.1-1. This represents a change to procedure as described in the UFSAR

Originating Document No. LCN 2005 Rev. No. 0

	YES	NO
3. Does the subject of this review propose the conduct of test or experiments not described in the Safety Analysis Report? The Proposed change does not conduct any tests or experiments	☐	☒
4. Does the proposed change affect conditions or bases assumed in the Safety Analysis Report or safety-related functions of equipment/systems, even though the proposed change does not entail any physical change in existing structures, systems, or procedures as described in the SAR? The proposed change revises the assumption that a normal fuel load consists of one third of the core to a full core offload.	☒	☐

If any answer is affirmative, complete the screening form and perform an Unreviewed Safety Question Evaluation.

If all answers are negative, no Unreviewed Safety Question Evaluation is required.

Prepare by: C.R. Albury *Charles R. Albury* Originator — *4/4/96* Date

Approved by: A.W. Harrision *[signature]* Qualified Reviewer — *4/4/96* Date

Change Number CN-2005 Date 4/1/96

Originator Charles R. Albury Dept NF&A

Change Description Revise UFSAR description of Refueling Practices to Address Full Core Offloads

Initiating Documentation CR 96-3462

USQE Number 96-0008

Unit(s) Affected: Unit 1 ✓ Unit 2 ✓

Implementation Status: Unit 1 Completion Date ______________

Unit 2 Completion Date ______________

Reviewed and Approved by ______________
Supervising Engineer, Nuclear Licensing Date

Reviewed and Approved by (ER, UFSAR 2.1, 2.2, 2.3) ______________
Manager, Effluent and Waste Management Date

Reviewed by (OQAP changes only) ______________
General Manager, Nuclear Assurance & Licensing Date

Spent Fuel Pool Demineralizers

The two flushable demineralizers are designed to provide adequate spent fuel cooling water purity for unrestricted access of plant personnel to the spent fuel storage areas.

Spent Fuel Pool Filters

A filter is located in each purification train, downstream of the demineralizer, to collect possible particulates and resin fines passed by the demineralizer. The filter assembly utilizes a disposable cartridge filter and is readily accessible for filter change.

Spent Fuel Pool Skimmer Filter

The SFP skimmer filter is used to remove particles swept from the spent fuel pool surface which are not removed by the skimmer/strainer assembly. The filter assembly utilizes a disposable cartridge filter and is readily accessible for filter change.

Spent Fuel Pool Strainers

A strainer is located in each SFP pump suction line from the SFP to prevent introduction of relatively large particles that might clog the spent fuel demineralizers or damage the SFP pumps.

Spent Fuel Pool Skimmer/Strainer Assemblies

Two assemblies are provided. These assemblies make it possible to take suction from the pool surface and remove debris from the skimmer process flow.

Fuel Transfer Canal Skimmer/Strainer Assembly (Future Expansion)

Piping is provided for future addition of one assembly which would take suction from the transfer canal surface. Debris would be removed via the skimmer filter.

In-Containment Storage Area Strainer

A strainer is located in the SFP pump suction line from the in-Containment storage area to prevent introduction of relatively large particles that might clog the SFP demineralizers or damage the SFP pumps.

Reactor Cavity Filtration System

The Reactor Cavity Filtration System is a skid-mounted package system including a horizontal, centrifugal pump with an electric motor driver, four filter housings with cartridge-type filters, suction screen, and the necessary valves, instrumentation, and piping.

Insert

INSERT for UFSAR Change

9.1.3.2.2 Spent Fuel Pool Cooling During Refueling Operations

During refueling operations, either a full core offload or fuel shuffle is considered routine practice. During full-core offload conditions at STP, to provide protection against single failure, the backup train of SFP cooling is administratively required to be either available or able to be restored to service within an analyzed time frame consistent with the time required to reach licensing basis temperature limits. At least one SFP cooling train will be available at all times backed by an on-site power source. When required, the second cooling train will at least be functional, backed by either an on-site power source or a power source available from the switchyard.

Table 9.1-1 gives the SFP temperature limits for various fuel load and SFP cooling configurations. For either full core offloads or fuel shuffles, the UFSAR Normal Maximum temperature is not exceeded with two trains of spent fuel pool cooling in operation. This ensures that the maximum single train limit temperature is not exceeded in case of a failure of a train of spent fuel pool cooling. Cycle specific calculations are typically performed prior to fuel offload to ensure the spent fuel pool temperature will not exceed the temperature limits and ensure the heat load for the SFP boiling analysis remains bounding. In addition, the SFP TROUBLE alarm is set to ensure that the appropriate spent fuel pool temperature limits are not exceeded in the event of a failure of a spent fuel pool cooling train.

ATTACHMENT TO USQE 96-0008

Safety Evaluation for Full Core Offloads During Routine Refueling Operations

1.0 INTRODUCTION

The purpose of this attachment is to provide supplemental information for USQE 96-0008. The USQE safety evaluation demonstrates that the practice of performing full core offloads does not represent an Unreviewed Safety Question by answering "NO" to all of the seven questions. A UFSAR change is presented to document this practice into the licensing basis.

As part of a review of fuel offload practices, the NRC noted that the current STP UFSAR does not address offloading of the entire core as part of normal refueling practices. The current UFSAR identifies that only one third of the core is typically offloaded during a refueling outage. STP had identified this discrepancy and submitted a licensing amendment (ST-HL-AE-5015), Dated May 30, 1995. The submittal also increased the heat load in the spent fuel pool to reflect the increase in the number of fuel assemblies required to support 18 month fuel cycles. This submittal was amended to address additional issues (ST-HL-AE-5233) on February 8, 1996. The licensing submittal identifies that HL&P performs full core offloads and provides the proposed acceptance limits, but has not been approved as of this date. The license amendment is required to document the acceptability of the increased heat loads later in plant life. The description of a full core offload practice was included as clarification and is not regarded as part of the unreviewed safety question requiring NRC approval.

Section 2 of this attachment discusses the licensing basis for refueling practices. The discussion in Section 2 is presented to support the acceptance limit discussion in Section 3 and address question A.3.I of the USQE concerning the reduction in margin to safety. Section 4 discusses the single failure criteria as it applies to the need for ESF diesel backed trains required during refueling operations. Section 5 discusses the precautions being proposed to ensure the licensing basis is satisfied during refueling operations. Section 6 discusses the impact of the proposed change on the safety analysis. This discussion supports the answers to Questions A.1.I, A.1.II and A.I.IV concerning the increase in probability and consequences of accidents and equipment important to safety discussed in the UFSAR. Section 7 presents the reference documents used in this evaluation.

2.0 LICENSING BASIS

The licensing requirements for spent fuel pool cooling is discussed in Section 9.1.3 of the Standard Review Plan. HL&P's compliance with these requirements is in UFSAR Section 9.1.3. The NRC's acceptance of the HL&P position is discussed in Appendix BB of Supplement 6 to the SER. The following provides a brief discussion of each of these documents.

2.1 Standard Review Plan

Section 9.1.3.II of the Standard Review Plan identifies that the spent fuel pool cooling system must satisfy the requirements of General Design Criteria 61 (Fuel storage and handling and radioactivity control) as it relates to decay heat removal. General Design Criteria 44 (Cooling Water) must also be satisfied under the heat loads and temperature conditions specified in this section of the Standard Review Plan.

Section 9.1.3.III.1.d identifies the following:

> "For the maximum normal heat load with normal cooling systems in operation, and assuming a single active failure, the temperature of the pool should be kept at or below 140°F and the liquid level in the pool should be maintained. For the abnormal heat load (full core unload) the temperature of the pool water should be kept below boiling and the liquid level maintained with the normal systems in operation. A single active failure need not be considered for the abnormal case."

Section 9.1.3.III.1.h provides the following guidance for the calculation of the heat loads:

h. The calculation for the maximum amount of thermal energy to be removed by the spent fuel cooling system will be made in accordance with Branch Technical Position ASB 9-2, "Residual Decay Energy for Light-Water Reactors for Long-Term Cooling" (located in SRP Section 9.2.5) under the following assumed conditions.

   i. The uncertainty factor K is set equal to 0.1 for long-term cooling (greater than 10^7 seconds).

   ii. The normal maximum spent fuel heat load is set at one refueling load at equilibrium conditions after 150 hours decay and one refueling load to equilibrium conditions after one year decay. (Maximum pool temperature 140°F)

   iii. The spent fuel pool cooling system should have the capacity to remove the decay heat from one full core at equilibrium conditions after 150 hours decay and one refueling load at equilibrium conditions after 36 days decay, without spent fuel pool bulk water boiling. Cooling system single failure need not be considered concurrent for this condition.

   iv. For pools with greater than 1-1/3 core capacity, one additional refueling batch at equilibrium conditions after 400 days decay should be included in the cooling requirements.

2.2 UFSAR

The discussion of the spent fuel pool cooling is provided in Section 9.1.3.1.1 of the UFSAR. Results of the analysis supporting this evaluation are provided in Table 9.1-1, which is attached to this evaluation. The following is taken from the UFSAR.

> 9.1.3.1.1 Spent Fuel Cooling: The SFPCCS is designed to remove the amount of decay heat produced by the number of spent fuel assemblies that are stored following refueling. The system design incorporates two trains of equipment. Each train is capable of removing 100 percent of the normal maximum design heat load and 50 percent of the abnormal maximum design heat load. The system can maintain the spent fuel cooling water temperature at or below the maximum allowable temperatures specified by Table 9.1-1. This temperature is based on the heat exchangers (HXs) being supplied with component cooling water (CCW) at the design flow and temperature. The flow through the spent fuel storage areas provides sufficient mixing to maintain uniform water conditions.
>
> If it is necessary to remove a complete core from the reactor, the system can maintain the spent fuel cooling water below the maximum allowable temperature specified by Table 9.1-1. Makeup water requirements will be provided by either reactor makeup water, demineralized water, or refueling water. The makeup flowpath from the reactor makeup wa torage tank (RMWST) is seismic Category I. The flowpaths from the demineralized water storage tank (DWST) and from the RWST are nonseismic Category I.

Table 9.1-1 provides the results of analysis as required by the Standard Review Plan. In addition, the results from other cases are provided. The additional cases are presented to (1) reflect the increased heat load associated with the extra fuel assemblies because STP does not ship fuel offsite and (2) reflect the fact that STP can offload fuel faster than the 150 hours discussed in the Standard Review Plan. The results for the normal maximum case using STP specific numbers exceed the 140°F limit identified in the Standard Review Plan, but were found acceptable by the NRC as discussed in the Safety Evaluation Report.

2.3 Safety Evaluation Report

The capabilities of the spent fuel pool cooling system as it relates to full core offloads is discussed in Section 5.1 and 5.2 of Appendix BB in Supplement 6 to the SER. The following provides the pertinent parts of this discussion as it relates to full core offloads.

Section 5.1 of Appendix BB in Supplement 6 to the SER
Decay Heat Generation Rate

HL&P stated in the March 8, 1988 submittal that the calculation of the decay heat generation rate was in accordance with the guidelines of NUREG-0800, SRP Section 9.1.3 and Branch Technical Position (BTP) ASB 9-2. For the normal maximum heat load case HL&P assumed the pool was filled with one-third core refuelings every 12 months (maintaining a full core discharge capability) with the final one-third core being placed in the pool at 140 hours (Case A) and at 80 hours (Case B) after shutdown. The two cases of 140 hours and 80 hours were calculated because the South Texas plant has a fast refueling option which has the capability to offload one-third of a core in 80 hours. Both numbers are conservative with respect to the specific recommendations in SRP Section 9.1.3 which is 150 hours (Case C). HL&P calculated heat loads and fuel pool temperatures (one pool cooling train and two pool cooling train operation) for both the 140 hour and 80 hour cases and for the SRP Section 9.1.3 assumptions of one-third core after 150 hours, one-third core at one year, plus one-third core after 400 days. The maximum calculated pool temperatures with one and two trains operating are:

	1 Cooling Train	2 Cooling Train
Case A	145.7°F	126.0°F
Case B	150.7°F	129.2°F
Case C	131.2°F	118.7°F

For the abnormal maximum heat load case (Case D), HL&P assumed the same conditions as in Cases A and B except that the last one-third core offload had been in the pool for 36 days plus a full core offload 120 hours after shutdown. These assumptions are also conservative compared to the recommendations of SRP Section 9.1.3 which are one-third core in the pool for 400 days, one-third for 36 days and one full core at 150 hours after shutdown. The calculated pool water temperature for Case D is 155.4°F with two pool cooling trains operating.

To verify HL&P's calculated spent fuel heat loads, the staff performed an independent calculation for the maximum abnormal storage condition of Case D using BTP ASB 9-2 guidelines. The staff calculated a heat load of 58.03 MBtu/hr compared to the licensee's calculated value of 63.15 MBtu/hr. Because the calculated value is conservative compared to the staff's - (HL&P assumed last refueling was greater than 1/3 core leaving no empty storage spaces) and not appreciably different based on the high rate of decay heat energy, the staff finds that HL&P has properly calculated the heat generation rate in accordance with the SRP.

Section 5.2 of Appendix BB in Supplement 6 to the SER
Spent Fuel Pool Cooling System

The spent fuel pool cooling system (SFPCS) consists of two seismic Category I, Quality Group C cooling water trains each with one pump and one heat exchanger. After the spent fuel pool water is cooled in the heat exchangers, it is purified by the non-seismic Category I cleanup system. In the event of a loss of the SFPCS, there are several sources of pool makeup water available including a seismic Category I source from the low-head safety injection pumps.

In its April 1986 Safety Evaluation Report (SER), NUREG-0781, for South Texas Units 1 and 2, the staff concluded that the SFPCS met the acceptance criteria of SRP Section 9.1.3 including GDC 2 and was acceptable. The bases for this conclusion have not changed as a result of the proposed reracking, except with regard to the requirements of GDC 44, "Cooling Water". The change in the basis for GDC 44 is due to the new decay heat loads which are higher for the increased storage capacity.

As indicated in Section 5.1, the design of the SFPCS still meets the 140°F fuel pool water temperature recommendation of SRP Section 9.1.3 when calculating the maximum normal heat load using the assumptions identified in the SRP. Under the higher heat load conditions identified using HL&P's more conservative assumptions for South Texas, the recommended pool temperature of 140°F for single train operation is acceptable because:

a. The assumptions used in the calculations are more conservative than staff guidelines;
b. The SFPCS is a safety-related system;
c. For the worst case (Case A) the 140°F could be exceeded for only 11.5 days;
d. With two trains operating, the pool temperature for Cases A and B are well below 140°F;
e. The 140°F is a recommended limit and the likelihood of exceeding that recommendation is low given the conditions and conservatisms assumed in the calculation; and
f. The effect of pool water temperature slightly above 140°F on spent fuel storage safety is negligible.

For the abnormal maximum heat load (Case D), the SFPCS will maintain pool water temperature at or below 155.4°F with two trains of cooling which is well below the recommended no boiling limit of SRP Section 9.1.3 under these conditions.

As a result of its review, the staff finds that the SFPCS still meets the requirements of GDC 44 with respect to providing adequate pool cooling under maximum normal heat load conditions following a single failure.

Per telephone conversation with Tom Alexion, NRC Project Manager for STP, the NRC staff considers the 150.7°F value in the UFSAR to be the maximum temperature for the normal maximum single cooling train case (ST-HS-HS-33956).

3.0 ACCEPTANCE LIMITS FOR FULL CORE OFFLOADS

The standard review plan identifies that the decay heat from one refueling load at equilibrium conditions needs to be considered in the calculation of the maximum spent fuel pool temperature. In the SER, Appendix BB, Section 5.2, the NRC defined the Normal Maximum case with a pool temperature limit of 150.7°F with one cooling train as the maximum temperature acceptable. Therefore, a full core offload is acceptable as long as the resulting maximum temperature remains below 150.7°F with a single cooling train. To ensure the acceptance limit for one train of operation is met, the maximum allowable temperature with two trains in operations is 129.2°F.

4.0 SINGLE FAILURE CRITERIA

Section 9.1.3.II of the Standard Review Plan infers that single failure criteria applies during the Normal Maximum case. To ensure protection against single failure, two trains of spent fuel pool cooling are required during refueling operations when spent fuel is in the pool. One of the SFP cooling trains must have the capability of being powered by an ESF diesel and associated safety train to ensure protection against a loss of power event. The second SFP cooling train may be powered from a non-ESF power source assuming sufficient diversity to preclude a common mode failure of both SFP cooling trains. The second train of SFP cooling does not require a ESF diesel backup because the Standard Review Plan does not require a single failure coincident with a station blackout event.

5.0 PRECAUTIONS TO ENSURE COMPLIANCE WITH PROPOSED LIMITS.

STP has reviewed the SFP temperatures for the last refueling outage for each unit (1RE05 and 2RE04). In both cases, a full core offload was performed. During 1RE05, the maximum SFP temperature with one train of cooling was 108°F. For 2RE04, the maximum temperature was 120°F. STP believes these two cases to bound previous refueling due to the pool inventory and the relatively short times for the offload. Consequently, STP concludes that both units have remained well within the limits for the Normal Maximum Case.

To ensure that licensing basis is satisfied during future refueling operations, calculations will be performed to demonstrate the pool temperatures will not exceed 129.2°F during operations with two trains of SFP cooling and 150.7°F with one train of SFP cooling. In addition, the calculations will ensure that the heat load for the spent fuel pool boiling analysis (discussed in Section 6.0) remains bounding. These calculations will be completed prior to refueling operations and included as a requirement in 0POP08-FH-0009, "Core Refueling."

In addition, the SFP TROUBLE alarm will be set to ensure that appropriate UFSAR spent fuel pool temperature limits are not exceeded in the event of a failure of a spent fuel pool cooling train.

6.0 IMPACT ON SAFETY ANALYSIS

The proposed change to describe full core offloads as a normal practice has the potential of impacting the Fuel Handling accident and the dose analysis for boiling in the spent fuel pool. These accidents are described in UFSAR Section 15.7.4 and 9.1.3.3.4 respectively. Calculations NC-6006, NC-6007, and NC-6056 document the dose consequences for these accidents. The change may also impact the spent fuel pool structure. The following provides a discussion of the impact of the proposed change on each of these each issues and shows that there is not a safety issue.

6.1 Fuel Handling Accident

The fuel handling accident is defined as the dropping of a spent fuel assembly during fuel handling, resulting in the rupture of the cladding of the fuel rods in the assembly, resulting in a radioactive release. A review of the operations required for fuel shuffling versus a full core offload show that approximately the same number of manipulations are required. The amount of decay heat is the same. Therefore, the change from fuel shuffling to a full core offloads does not increase the probability of an accident described in the UFSAR.

6.2 Spent Fuel Boiling Accident

The Spent Fuel Boiling accident is assumed to occur in the event of a fire or moderate energy line crack in the FHB that disables both trains of SFP cooling. The SFP temperature would begin to rise and, assuming no corrective action, would eventually boil. The analysis assumes that a loss of the SFPCCS occurs after a refueling where a full core has been removed and placed into the SFP 120 Hours after shutdown. The heat loads supplied to the pool are comprised of the following sources: 1) the full core removed prior to the event; 2) 92 assemblies which have decayed 36 days after shutdown; and 3) spent fuel from the previous 20 refueling offloads. The last full core offload fills the SFP to the maximum capacity of 1969 assemblies. For the purpose of this calculation, the pool is conservatively assumed to boil instantaneously after the loss of the SFPCCS. This loss of SFPCCS is assumed to occur at 120 hours after shutdown. Throughout the event, the leakage rate for iodine is assumed to be the normal full power rate (1.3×10^{-8} sec^{-1}). The iodine available for release is based upon the gap activity containing 10 percent of the rod inventory and the leakage occurs from the defective 1 percent of the rods. The activity of the refueling water prior to initiation of the event is assumed to be negligible. Using these assumptions and those found in Table 9.1-6, the thyroid dose consequences of releasing the iodine as a result of SFP boiling are well below the dose requirements of 10CFR, Part 100.

The proposed change will require that a calculation be performed prior to core offload that ensures the heat load in the SFP boiling analysis remains bounding (ie. time to boil is greater than 2.86 hours). Therefore, the proposed change will not increase the consequences of an accident or malfunction of equipment important to safety previously evaluated in the Safety Analysis Report.

6.3 Spent Fuel Pool Structural Consideration

"This proposed change does not change thermal loading conditions from the existing approved design. The existing thermal loading was evaluated at the time the spent fuel pool was re-racked with the high density spent fuel racks. The spent fuel pool concrete and liner were determined to be acceptable as documented in References 4, 11 & 12"

7.0 REFERENCES

1) NC-6006: "Fuel Handling Accident in Containment."
2) NC-6007: "Fuel Handling Accident in the Fuel Handling Building."
3) NC-6056: "Spent Fuel Pool Boiling Iodine Doses."
4) CC-8051 Rev. 3; "Spent Fuel Pool Analysis and Design."
5) ST-HL-AE-5015, Dated May 30, 1995
6) ST-HL-AE-5233) on February 8, 1996
7) NUREG 0800: "Standard Review Plan," Section 9.1.3
8) NUREG-0781: Safety Evaluation Report Related to the Operation of South Texas Project, Units 1 and 2." Supplement 6, Appendix BB.
9) UFSAR Section 9.1.3, 15.7.4
10) 0POP08-FH-0009, "Core Refueling."
11) ST-HL-AE-2417 "Expansion of the Spent Fuel Pool Storage Capacity" dated March 8, 1988
12) ST-AE-HL-91848 "Issuance of Amendment 2 to Facility Operating License NPF-76 - STP Unit 1" dated November 1, 1988.

TABLE 9.1-1

SPENT FUEL POOL COOLING AND CLEANUP SYSTEM
DESIGN PARAMETERS

MODE	FUEL LOAD (PER SRP 9.1.3)	STPEGS FUEL LOAD (ACTUAL)	MAX ALLOWABLE POOL TEMPERATURE (PER SRP 9.1.3)	MAX STPEGS POOL TEMPERATURE (1 COOLING TRAIN)	MAX STPEGS POOL TEMPERATURE (2 COOLING TRAINS)	HEAT LOAD (10^6 BTU/HR)
Normal	1/3 core - 150 hrs 1/3 core - 1 yr 1/3 core - 400 days	N/A	N/A	131.2°F	118.7°F	16.6
Normal Maximum	N/A	1/3 core - 140 hrs 1/3 core - 1 yr 1/3 core - 2 -26 yrs[(1)]	140°F	145.7°F	126.0°F	25.5
	N/A	1/3 core - 80 hrs 1/3 core - 1 yr 1/3 core - 2-26 yrs[(1)]	N/A	150.7°F	129.2°F	29.3
Abnormal Maximum	1 core - 150 hrs 1/3 core - 36 days 1/3 core - 400 days	1 core - 120 hrs 1/3 core - 36 days 1/3 core - 1 yr 1/3 core - 2-26 yrs[(5)]	No Boiling[(2,3)]	N/A	155.4°F[(4)]	63.2

1. Full core discharge capability is maintained, i.e., 1776 fuel assemblies.

2. In the event of a fire or moderate energy line crack in the Fuel Handling Building that disables both trains of spent fuel pool cooling, the spent fuel pool may eventually boil. Makeup can be provided via the reactor makeup pumps. In addition, makeup water can also be supplied to the spent fuel pool using local hose stations in the FHB. See Section 3.3 of the Fire Hazards Analysis Report (FHAR).

3. If both reactor makeup water pumps are lost as a result of flooding in the Mechanical Auxiliary Building (MAB), a seismic Category I makeup source would be available by connecting temporary hoses to the vent and drain valves located on the low head safety injection pump discharge piping so that refueling water could be delivered to the spent fuel pool.

4. Temperature based on STPEGS fuel load. SRP fuel load value would be lower.

5. All fuel storage locations filled with spent fuel, i.e., 1969 fuel assemblies.