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SUBJECT: Submits summary 980618 & 0724 telcons with NRC re amend request,increasing capacity of SFP.Rev 0 to calculation MECH-0088, "Transient Temp of SFP Following Full Core Shroud," encl.

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FPL

Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

September 15, 1998

L-98-221
10 CFR 50.4

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

Re: St. Lucie Unit 2
Docket No. 50-389
Proposed License Amendment: SFP Storage Capacity; Soluble Boron Credit
(TAC No. MA0666); Summary of June 18 and July 24, 1998 Teleconferences

Ref: (1) FPL Letter L-97-325, J. A. Stall to NRC (DCD): Proposed License Amendment, SFP Storage Capacity; Soluble Boron Credit; December 31, 1997.

(2) FPL Letter L-98-132, Rajiv S. Kundalkar to NRC (DCD): Proposed License Amendment: SFP Storage Capacity, Soluble Boron Credit (TAC No. MA0666), Response to Request for Additional Information; May 15, 1998.

Florida Power and Light Company (FPL) requested an amendment to the St. Lucie Unit 2 operating license that would allow an increase in the capacity of the spent fuel pool, in part, by taking credit for a certain soluble boron concentration in the pool coolant (Reference 1). In Reference 2, FPL provided additional information to the NRC staff in connection with that amendment request.

On June 18, 1998, during a telephone conference between FPL (E. J. Weinkam, et al.) and the NRC staff (W. C. Gleaves, et al.), the staff suggested that the proposed Technical Specifications (TS) include by reference that section of the Updated Final Safety Analysis Report (UFSAR) which will describe the conservative allowances for biases and uncertainties used in the spent fuel pool criticality analysis associated with the license amendment request. Specifically, the UFSAR reference should be added to proposed TS 5.6.1.a.1 and 5.6.1.a.2 (Reference 1). In addition, it was noted that FPL had previously concurred with the NRC staff (Reference 2) that the word "restrictive" in the last line of proposed TS 5.6.1.d should be replaced with the word "reactive" as stated in the existing St. Lucie Unit 2 Specification 5.6.1.b. Upon completion of the staff's review of the proposed license amendment, FPL will provide the new TS pages reflecting the necessary revisions for use by the staff in issuance of the approved amendment. The new pages will contain the editorial changes described above.

On July 24, 1998, another telephone conference relative to Reference 1 was conducted between FPL (E. J. Weinkam, et al.) and the NRC staff (W. C. Gleaves, et al.). The conference included discussions concerning the calculated spent fuel pool temperature(s) following a full core off-load, the design capacity of the spent fuel pool cooling system heat exchangers, heat load rejection to the ultimate heat sink, and administrative controls that will ensure a full core off-load does not occur before the required delay time has expired. As requested by the staff, a brief summary of FPL's responses to questions asked during these discussions is provided herein, and a copy of calculations associated with a 1997 analysis of spent fuel pool temperature following full core off-load is provided as an enclosure to this letter.

(1) NRC Staff request re: Spent Fuel Pool (SFP) design temperature relative to full core off-load: Since the transient temperatures shown in Reference 1 differ from values shown in the Updated Final Safety Analysis Report (UFSAR), provide the calculations to show that temperature will be maintained below design temperature, assuming the heat load from full core off-load and single active failure. If the calculated temperature is >150°F, address the American Concrete Institute Standard-379 Criteria. The evaluation should address how long the temperature remains above 150°F and why this is acceptable.

FPL Response: To support the most recent (1997) refueling outage at St. Lucie Unit 2, calculation MECH-0088, *Transient Temperature of Spent Fuel Pool Following Full Core Offload*, was prepared by Sargent & Lundy. The results of this calculation were subsequently used in a 10 CFR 50.59 evaluation prepared by FPL that defined the specific plant initial and concurrent conditions required to perform a full core fuel off-load at Unit 2. To adequately define the constraints on plant operation, calculation MECH-0088 included several cases evaluated with different combinations of input parameters, including component cooling water temperature, spent fuel pool cooling pump flow and heat exchanger heat transfer capability. Case 5 calculations produced a maximum fuel pool temperature of 138°F with one spent fuel pool cooling pump operating, and the constraints required to ensure the Case 5 calculations remain bounding were incorporated into Operating Procedure (OP) 2-1600023, *Refueling Sequencing Guidelines,* which provides the instructions for conducting a full core off-load. As noted in the UFSAR and in the Reference 1 submittal, St. Lucie Unit 2 has two trains of spent fuel pool cooling (two cooling pumps, two heat exchangers, different motor control centers, etc.) so a loss of one spent fuel pool cooling pump is an appropriate single failure.

A copy of the text of calculation MECH-0088 (20 pages) with Appendix F Graphs (8 pages) is provided as an enclosure to this letter. Appendices A-E and G-H of MECH-0088 are available, but are tabularized computer output values from which the graphs were constructed and, with the staff's concurrence, are not included.

(2) NRC Staff request re: UFSAR Section 9.1.3.1 (Fuel Pool Cooling and Purification System Design Bases) vs. information in FPL's submittal: Explain why the heat load of 35.22E6 BTU/hr (which is beyond design capacity of the SFP heat exchanger) is acceptable.

FPL Response: St. Lucie Instruction Manual #2998-4514 Revision 2, *Fuel Pool Heat Exchanger*, includes an "Exchanger Specification Sheet", supplied by the manufacturer that provides values for heat exchanger performance at certain specific system conditions. The performance characteristics presented on this specification sheet should be considered as a description of the warranted performance. The Unit 2 fuel pool heat exchangers are a tube and shell design wherein spent fuel pool water flows through the tubes and component cooling water is supplied to the shell side of the heat exchanger. The specification sheet states that each heat exchanger will transfer 32E6 BTU/hr, given specific tube and shell side flow rates, when the component cooling water supply temperature is 100°F and the fouling factor is at a design value. With these coincident conditions, the heat exchanger tube side inlet flow can be maintained at 150°F. Item 37 on the specification sheet indicates that the design temperature for both the tube and shell sides of the heat exchanger is 250°F.

Operating experience has shown that the component cooling water flow provided to plant heat exchangers is usually less than 100°F. Flow provided to the fuel pool heat exchangers may be throttled to values above or below those identified on the component specification sheet. Additionally, because component cooling water is a closed system containing corrosion-inhibited water, actual heat exchanger fouling factors are significantly less than the values assumed on the heat exchanger specification sheet. Thus, at conditions more representative of the actual operating environment, heat transfer through the heat exchanger could easily be greater than the 32E6 BTU/hr value warranted on the specification sheet. The margin between the heat exchanger design temperature and the warranted value of fuel pool water inlet temperature demonstrates that a higher heat transfer rate could be easily accommodated.

(3) NRC Staff request re: UFSAR Section 9.1.3.1 (Fuel Pool Cooling and Purification System Design Bases) vs. information in FPL's submittal: Explain why the increased heat load rejection to the Component Cooling Water (CCW) system and the environment is acceptable.

FPL Response: The maximum heat load rejected to component cooling water by irradiated fuel stored in the spent fuel pool occurs at the completion of the full core off-load evolution. In Reference 1, this value is 35.22E6 BTU/hr. The reactor is always shutdown at this time of maximum heat load. UFSAR Table 9.2-5 provides representative values of the plant heat loads removed by the CCW system for four different plant conditions. A comparison of the increased heat rejection referenced in the FPL submittal to the accident and emergency heat loads presented in Table 9.2-5 shows that the rejected heat loads from spent fuel are substantially lower than those experienced during accident and emergency shutdown conditions. The post-accident heat loads from Table 9.2-5 correspond to approximately 62 megawatts, or about 2.3% of St. Lucie Unit 2 rated thermal power. Heat loads rejected during refueling, including the increase in spent fuel decay heat, are less than one-half this amount.

Section 9.2.2.1 of the Unit 2 UFSAR lists the design bases for the CCW system. Item c) of this list states that component cooling water is designed to provide a heat sink for safety related components associated with reactor decay heat removal for safe shutdown or DBA conditions, assuming a single failure coincident with a loss of offsite power. It is clear from this discussion and the heat loads from UFSAR Table 9.2-5 that the CCW system is designed to accommodate heat loads that are substantially greater than the limiting decay heat loads from the spent fuel pool.

The heat load rejected to the environment is maximized when St. Lucie Unit 2 is operating at its rated thermal power of 2700 MW. As noted in Reference 1, St. Lucie Unit 2 typically rejects about 6.2E9 Btu/hr to the environment during full power operation. During shutdown, the location of stored irradiated fuel, e.g., in the core or in the spent fuel pool, does not affect the amount of heat rejected to the environment. Assuming a conservatively short refueling outage length of 28 days and applying bounding decay heat generation rates, heat loads from the irradiated fuel assemblies stored in the spent fuel pool will have decreased to less than 0.3% of the full power reactor heat rejection rate by the time the reactor is restarted. This value, and the heat rejection rate during full power operation, are consistent with the values contained in the *Environmental Assessment by the Office of Nuclear Reactor Regulation Related to Expansion of the Spent Fuel Pool, Florida Power and Light Company, et al., St. Lucie Plant , Unit 2, Docket*

No. 50-389; October 9, 1984, that supported a prior increase in the licensed spent fuel storage capacity at St. Lucie Unit 2 (Operating License Amendment No.7).

(4) NRC Staff request re: Administrative Controls: Explain what administrative controls are in place to ensure that a full core off-load does not occur before the 7-day hold period for a full core off-load has expired.

FPL Response: Operating Procedure (OP) 2-1600023, Revision 53, *Refueling Sequencing Guidelines*, Step 8.16, provides the prerequisites for performing a total core off-load. Each prerequisite must be met prior to removing the first fuel assembly from the reactor vessel. Sub-step 8.16.1 requires an individual to ensure the reactor has been subcritical for greater than 168 hours, and to initial the procedural step signifying this is so. To ensure that the stated prerequisites are not changed without proper evaluation (as required by 10 CFR 50.59), review, and approval, step 8.16 is annotated to reference the engineering safety evaluation that serves as the source document from which the prerequisites evolved.

FPL's response to each NRC request provides additional elaboration on topics addressed in Reference 1 and/or Reference 2, and serves as documentation of discussions held during the subject teleconferences. The responses support FPL's conclusions and the no significant hazards determination contained in Reference 1.

Please contact us if there are additional questions about this matter.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/RLD

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant
Mr. W. A. Passetti, Florida Department of Health and Rehabilitative Services

Enclosure