Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72

October 16, 1998
3F1098-01

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: License Amendment Request #229, Revision 0
Normal Standby Position of Valves DHV-34 and DHV-35

Reference: FPC to NRC letter, 3F1297-37, dated December 29, 1997, "Reply to Notice of Violations, NRC Inspection Report No. 50-302/97-14, NRC to FPC letter, 3N1297-08, dated December 4, 1997"

Dear Sir:

Florida Power Corporation (FPC) hereby submits a request for an amendment to its Facility Operating License No. DPR-72 for Crystal River Unit 3 (CR-3) in accordance with 10 CFR 50.90. The attached License Amendment Request (LAR) #229 proposes changes to the CR-3 Final Safety Analysis Report (FSAR), Improved Technical Specifications (ITS), and ITS Bases to resolve an Unreviewed Safety Question (USQ). This USQ was created in 1985 by changing the normal standby position of valves DHV-34 and DHV-35 from normally open to normally closed.

In 1997, the NRC conducted a Safety System Functional Inspection of the makeup and purification (MU) and decay heat removal (DH) systems. Based on this inspection, the NRC issued Notice of Violation (NOV) 50-302/97-14-13, "Failure to Take Adequate Corrective Actions to Identify and Correct the Design Weaknesses Associated with Adequacy of the Past 10 CFR 50.59 Review for Positioning of DHV-34 and DHV-35 During Normal Operation." FPC has completed evaluation of this NOV, and has determined that this proposed change will resolve the issue.

Based on the guidance provided in NRC Generic Letter 91-18, Revision 1, FPC has determined that maintaining valves DHV-34 and DHV-35 in the normally closed position represents a nonconforming condition, but the low pressure injection (LPI) system remains fully operable. Deficiency Report (DR) 97-7755 was developed to document this decision, and is available for NRC review at the facility.

As discussed in Attachment A (Description of Changes, Reason for Request and Evaluation of Request), FPC has determined that the proposed licensing basis change to leave valves DHV-34 and DHV-35 normally closed does not involve a significant hazard. Attachment B (Proposed FSAR Change Pages - Strikeout/Highlight), provides details of the proposed licensing basis changes in FSAR Section 6.1.2.1.2, FSAR Table 6-4, and FSAR Table 6-5.

The proposed FSAR changes will ensure the licensing basis and design basis requirements for valves DHV-34 and DHV-35 are clearly understood in the future, and will provide sufficient information for evaluating any future changes that may impact the safety functions for these valves.

The proposed ITS change will add new ITS Surveillance Requirements (SRs) for verifying the LPI system components and piping, and the building spray (BS) suction piping, are full of water every 31 days. This verification that the affected portions of these systems are full of water will be accomplished by periodically monitoring LPI and BS system pressure.

Attachments C (Proposed ITS/ITS Bases Change Pages - Strikeout/Highlight) and D (Proposed ITS/ITS Bases Change Pages - Revision Bars) provide details of the proposed revisions to ITS 3.5.2, ITS 3.5.3, ITS 3.6.6, ITS Bases 3.5.2, and ITS Bases 3.6.6.

To support timely closure of DR 97-7755 and NOV 50-302/97-14-13, and to support CR-3 operator requalification training schedules, FPC requests that this license amendment be approved by July 19, 1999.

This letter establishes no new regulatory commitments.

If you have any questions regarding this submittal, please contact Ms. Sherry Bernhoft, Manager, Nuclear Licensing at (352) 563-4566.

Sincerely,

J. J. Holden
Director
Site Nuclear Operations

JJH/gew

xc: Regional Administrator, Region II
NRR Project Manager
Senior Resident Inspector

Attachments

A. Description of Changes, Reason for Request, and Evaluation of Request
B. Proposed FSAR Change Pages - Strikeout/Highlight
C. Proposed ITS/ITS Bases Change Pages - Strikeout/Highlight
D. Proposed ITS/ITS Bases Change Pages - Revision Bars

STATE OF FLORIDA

COUNTY OF CITRUS

John J. Holden states that he is the Director, Site Nuclear Operations for Florida Power Corporation; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

JJHolden

John J. Holden
Director
Site Nuclear Operations

Sworn to and subscribed before me this 16th day of October 1998, by John J. Holden.

Charlene Miller

Signature of Notary Public
State of Florida

CHARLENE MILLER
COMMISSION NO. CC652070
EXPIRES 11/4/2000
BONDED THRU ABA - 1-800-NOTARY1

(Print, type, or stamp Commissioned Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT A

LICENSE AMENDMENT REQUEST #229

REVISION 0

Description of Changes,

Reason for Request, and

Evaluation of Request

ATTACHMENT A

LICENSE AMENDMENT REQUEST (LAR) #229, REVISION 0
NORMAL STANDBY POSITION OF VALVES DHV-34 AND DHV-35

BACKGROUND:

By letter dated December 4, 1997, the NRC issued Notice of Violation (NOV) 50-302/97-14-13, "Failure to Take Adequate Corrective Actions to Identify and Correct the Design Weaknesses Associated with Adequacy of the Past 10 CFR 50.59 Review for Positioning of DHV-34 and DHV-35 During Normal Operation." The NOV addressed the fact that an Unreviewed Safety Question (USQ) was created in 1985 by changing the normal standby position of valves DHV-34 and DHV-35 from normally open to normally closed.

Based on this NOV, Florida Power Corporation (FPC) committed to further evaluate the normal standby position of valves DHV-34 and DHV-35, and to propose changes to the Crystal River Unit 3 (CR-3) Final Safety Analysis Report (FSAR) necessary to resolve the USQ.

FPC has determined that maintaining valves DHV-34 and DHV-35 normally closed is acceptable, and that the proposed licensing basis change in this LAR will resolve the issue. Maintaining these valves normally closed is necessary to ensure assumptions used in the 10 CFR 50, Appendix R analyses remain valid. Attachment B (Proposed FSAR Change Pages - Strikeout/Highlight), provides details of the proposed licensing basis changes in FSAR Section 6.1.2.1.2, FSAR Table 6-4, and FSAR Table 6-5.

The concern related to maintaining valves DHV-34 and DHV-35 normally closed is the potential for external leakage from the low pressure injection (LPI) and building spray (BS) systems. This leakage could result in the creation of voids in LPI piping and components and BS suction piping. Voids in the affected piping and components could result in water hammer when water is injected into a dry line. Leaving valves DHV-34 and DHV-35 normally open would reduce this possibility by ensuring sufficient static head from the borated water storage tank (BWST) is available.

To address the issue of possible voiding, the proposed Improved Technical Specification (ITS) change will add new ITS Surveillance Requirements (SRs) for verifying the low pressure injection (LPI) system components and piping and the building spray (BS) suction piping are full of water every 31 days. This verification that the affected portions of these systems are full of water will be accomplished by periodically monitoring LPI and BS system pressure by observing LPI pump suction pressure (the LPI pumps and BS pumps share a common suction header). Attachments C (Proposed ITS/ITS Bases Change Pages - Strikeout/Highlight) and D (Proposed ITS/ITS Bases Change Pages - Revision Bars) provide details of the proposed revisions to CR-3 ITS 3.5.2, ITS 3.5.3, ITS 3.6.6, ITS Bases 3.5.2, and ITS Bases 3.6.6.

LICENSE DOCUMENT INVOLVED: FSAR
ITS

PORTIONS: FSAR Section 6.1.2.1.2
FSAR Table 6-4
FSAR Table 6-6
ITS 3.5.2
ITS 3.5.3
ITS 3.6.6

SUMMARY OF CHANGES:

Attachment B provides details of the licensing basis changes to the CR-3 FSAR for which approval is being requested. Attachments C and D provide details of the ITS changes associated with this licensing basis change for which approval is being requested, and proposed changes to the associated ITS Bases for information, to assist in the review of this license amendment request.

FSAR Section 6.1.2.1.2, Low Pressure Injection

This amendment request proposes to change the licensing basis for valves DHV-34 and DHV-35 by adding the following paragraph in FSAR Section 6.1.2.1.2:

> The valves in the lines connecting the BWST to the LPI pump and BS pump suction headers are maintained normally closed in order to meet the requirements of 10 CFR 50, Appendix R. This configuration ensures that certain fire scenarios will not result in uncontrolled draining of the BWST to the RB Emergency Sump. With these valves maintained normally closed, external system leakage may cause voiding in the system piping to occur. However, voiding cannot occur if the pressure in all portions of the LPI system, and the suction piping of the BS system, remains above atmospheric pressure. Routine pressure monitoring ensures the absence of voiding.

FSAR Table 6-4, Single Failure Analysis - Emergency Core Cooling Systems
FSAR Table 6-6, Single Failure Analysis - Reactor Building Spray System

This amendment request also revises FSAR Table 6-4 and FSAR Table 6-6 to describe the effect of this change on the single failure analysis for the LPI system and BS system. The new single failure created by this change is the failure of either DHV-34 or DHV-35 to automatically open upon receipt of a safety injection signal.

ITS 3.5.2, ECCS-Operating
ITS 3.5.3, ECCS-Shutdown

To ensure that LPI piping and components remain full of water with DHV-34 and DHV-35 maintained normally closed, a new ITS SR 3.5.2.8 is added, and ITS SR 3.5.3.1 is revised, to verify that the low pressure injection (LPI) emergency core cooling system (ECCS) piping is

full of water every 31 days. The proposed ITS Bases SR 3.5.2.8 would describe the reasons for this surveillance requirement as follows:

SR 3.5.2.8

With the exception of LPI trains in operation, the LPI piping and components are normally isolated from the BWST by normally closed suction valves. As such, the piping has the potential to develop voids as a result of external system leakage. Maintaining the LPI piping and components between the BWST and the RCS full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of air into the reactor vessel following an automatic actuation signal or during decay heat removal operation. The 31 day Frequency takes into consideration the fact that external LPI system leakage is periodically monitored.

Verification that the LPI piping and components remain full of water is performed by monitoring LPI pump suction pressure to ensure all portions of the LPI system remain above atmospheric pressure.

ITS 3.6.6, Reactor Building Spray and Containment Cooling Systems

To ensure that BS suction piping remains full of water with DHV-34 and DHV-35 maintained normally closed, a new ITS SR 3.6.6.9 is added to verify that the BS suction piping is full of water every 31 days. The proposed ITS Bases SR 3.6.6.9 would describe the reasons for this surveillance requirement as follows:

SR 3.6.6.9

The BS system suction piping and pumps are normally isolated from the BWST by normally closed suction valves. As such, the suction piping has the potential to develop voids as a result of external system leakage. Maintaining the piping between the BWST and the BS pumps full of water ensures that the system will perform properly, injecting its full capacity into the containment upon demand. This will also prevent water hammer and pump cavitation following an automatic actuation signal. The 31 day Frequency takes into consideration the fact that external BS system leakage is periodically monitored.

Verification that the BS suction piping remains full of water is performed by monitoring LPI pump suction pressure (the LPI pumps and BS pumps share a common suction header) to ensure all portions of the BS suction piping remain above atmospheric pressure.

DESCRIPTION OF REQUEST:

This license amendment request is required to revise the CR-3 licensing basis by revising FSAR Section 6.1.2.1.2 to clearly state that the normal standby position of valves DHV-34 and DHV-35 is normally closed. This revision also provides the reason for maintaining these

valves closed as required to comply with the requirements of 10 CFR 50, Appendix R, and addresses the reason why LPI and BS system voiding is not likely to occur or remain undetected with these valves maintained normally closed.

In addition, revisions to FSAR Table 6-4 and FSAR Table 6-6 are required to update the single failure analysis for the LPI system and BS system, respectively. Based on the original single failure analysis for both systems, a failure of either DHV-34 or DHV-35 to automatically open upon receipt of an engineered safeguards actuation system (ESAS) signal will not prevent either system from performing its intended safety functions.

To provide assurance that maintaining valves DHV-34 and DHV-35 closed does not result in voiding occurring in the LPI piping and components and the BS suction piping, new ITS SRs are required to periodically verify the affected piping and components remain full of water.

This license amendment request adds a new ITS SR 3.5.2.8, and revises ITS SR 3.5.3.1, to require verification that the LPI piping and components are full of water every 31 days. This new surveillance requirement is to ensure that periodic monitoring is performed to verify that, by maintaining valves DHV-34 and DHV-35 normally closed, LPI piping and components remain full of water and no voids are allowed to form. Verification that no voids exist in the LPI piping and components prevents possible water hammer, LPI pump cavitation, and pumping of air into the reactor vessel following an ESAS signal or during decay heat removal operation. These proposed changes are consistent with Revision 1 of NUREG-1430, "Standard Technical Specifications, Babcock & Wilcox Plants."

This license amendment request also adds a new ITS SR 3.6.6.9 to require verification that the BS suction piping is full of water every 31 days. This new surveillance requirement is to ensure that periodic monitoring is performed to verify that, by maintaining valves DHV-34 and DHV-35 normally closed, BS suction piping remains full of water and no voids are allowed to form. Verification that no voids exist in the BS suction piping prevents possible water hammer and BS pump cavitation following an ESAS signal. These proposed changes are consistent with the change proposed for the LPI system.

REASON FOR REQUEST:

By letter from the NRC to Florida Power Corporation (FPC) dated December 8, 1975, FPC was requested to discuss the fact that valves DHV-34 and DHV-35 were maintained normally closed. This request was a result of NRC reviewers questioning the emergency core cooling system (ECCS) initial design as presented in the application for an Operating License for Crystal River Unit 3 (CR-3). The NRC stated in their request that the potential for a water hammer when ECCS water was injected into a dry line would be reduced considerably if these valves were normally left open and sufficient static head from the borated water storage tank (BWST) was available.

By letter from FPC to the NRC dated January 3, 1976, FPC responded to the above question committing to maintain the valves normally open to preclude water hammer. In this letter, FPC committed to vent ECCS lines and pumps following the initial filling of the system from

the BWST to remove any trapped air prior to operation. The letter also stated that periodic testing of the ECCS additionally ensures that no air is contained in the system, thereby precluding any requirement to periodically vent ECCS lines and pumps.

In 1985, a Safe Shutdown Analysis and Appendix R Fire Study was completed to determine compliance with 10 CFR 50, Appendix R. The analysis determined that isolation between the RB emergency sump and the BWST was necessary to preserve required BWST inventory. Loss of BWST inventory would compromise the capability of cooling down the RCS since adequate BWST water inventory might not be available to compensate for RCS water volume shrinkage.

The study performed resulted in the finding that certain postulated fire scenarios could result in spuriously opening valves DHV-42 or DHV-43 (LPI pump suction valves from the RB emergency sump) as a result of hot shorts in the motor control circuits. These same fire scenarios could also result in a loss of power to valves DHV-34 or DHV-35 as a result of damage to the motor control and power circuits. If valves DHV-34 and DHV-35 were in a normally open position at the time of the fire, the BWST would drain into the RB emergency sump. Maintaining valves DHV-34 and DHV-35 closed would require two spurious operations to occur before losing isolation between the RB emergency sump and the BWST. It was not required to postulate two spurious operations from the same fire scenario based on the criteria contained in NRC Generic Letter 85-01, Section 5.3.10. Therefore, maintaining valves DHV-34 and DHV-35 normally closed would ensure assumptions used in the analysis and the study would remain valid.

On August 14, 1985, Operating Procedure OP-404, Decay Heat Removal System, was revised to change the position of DHV-34 and DHV-35 from normally open to normally closed in response to the analysis and study. The Procedure Review Record for this change did not identify the specific reason for the change as being required to comply with 10 CFR 50, Appendix R requirements, and did not address the previous commitment to maintain the valves open to preclude the possibility of water hammer.

During a recently completed Safety System Functional Inspection, documented in NRC Inspection Report No. 97-14, the NRC questioned maintaining valves DHV-34 and DHV-35 normally closed and whether or not the probability of water hammer events had been increased by the actions taken in 1985. Additionally, the NRC questioned whether an adequate review in accordance with 10 CFR 50.59 had been performed in 1985 for this change. This report identified Notice of Violation (NOV) 50-302/97-14-13, "Failure to Take Adequate Corrective Actions to Identify and Correct the Design Weaknesses Associated with Adequacy of the Past 10 CFR 50.59 Review for Positioning of DHV-34 and DHV-35 During Normal Operation."

During and following this inspection, FPC evaluated the concerns expressed by the NRC, and subsequently performed a Safety Assessment/Unreviewed Safety Question Determination (SA/USQD) using the current administrative procedures. From this evaluation, FPC determined that changing the normal position of these valves from normally open to normally closed created an Unreviewed Safety Question (USQ).

However, as part of the ongoing evaluations performed, FPC has determined that the change in normal position of these valves is acceptable based on the justification provided below, and seeks approval of the proposed licensing basis change to the CR-3 FSAR discussed previously. Additionally, FPC requests approval of the ITS changes to verify that LPI piping and components, and BS suction piping, remain full of water with these valves maintained normally closed.

EVALUATION OF REQUEST:

Description of the Emergency Core Cooling System Analysis Basis

Valves DHV-34 and DHV-35 support the safety function of the ECCS as currently described in the FSAR by automatically opening upon receipt of a safety injection signal from the ESAS. The ESAS safety injection signal to these valves is based on low-low reactor coolant system (RCS) pressure of 500 psig, or high reactor building (RB) pressure of 4 psig. Opening of these valves provides a suction path from the BWST to the LPI pumps and to the BS pumps. The BS pumps only start if the ESAS additionally detects a high-high RB pressure of 30 psig.

Assumptions used in the performance of the accident analyses for determining ECCS capability to mitigate design basis accidents include a delay time for obtaining full LPI flow of 35 seconds after receiving the ESAS signal. A maximum assumed full-stroke time of 25 seconds for valves DHV-34 and DHV-35 is required to meet the accident analysis assumptions with or without the availability of offsite power. Both valves DHV-34 and DHV-35 are designed to fully open within this 25 second assumed time, and are tested quarterly to ensure this capability in accordance with the CR-3 ASME Section XI Inservice Testing Program required by ITS 5.6.2.9.

No single, active failure can result in the failure of both of these valves to automatically open upon receipt of an ESAS safety injection signal. Only one train of LPI and one train or BS are required to mitigate the analyzed design basis accidents. Therefore, this proposed change does not result in a reduction in the capability of either system to perform its intended safety functions.

Probabilistic Safety Assessment

A probabilistic safety assessment (PSA) of the challenges to the ECCS capabilities was performed using the current CR-3 PSA model. Based on use of the PSA model, and assuming the failure of either valve DHV-34 or DHV-35 to open, the impact on the core-damage frequency was estimated and determined to slightly increase from 7.38 E-6 to 7.41 E-6 per year. This increase (3 E-8 or 0.4%) is in the range considered acceptable in Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," dated July 1998.

Improved Technical Specification Operability Requirements

The ITS provides no specific operability requirements for valves DHV-34 and DHV-35, but establish system operability requirements for ECCS in ITS 3.5.2 and ITS 3.5.3, and the BS

system in ITS 3.6.6. The applicable ITS SRs require verification that each ECCS and BS automatic valve is in its correct position every 31 days, and that these valves actuate to the correct position on an actual or simulated actuation signal every 24 months. Current surveillance procedures include valves DHV-34 and DHV-35 for complying with the SRs for ITS 3.5.2, ITS 3.5.3, and ITS 3.6.6.

In addition to the above ITS SRs, valves DHV-34 and DHV-35 are full-stroke tested and timed in the open direction quarterly in accordance with the CR-3 ASME Section XI Inservice Testing Program required by ITS 5.6.2.9. Surveillance tests over the last two years have indicated that valve stroke times have consistently met the acceptance criteria. These valves are also included in the Motor Operated Valve preventive maintenance program, which includes periodic preventive maintenance tasks and verification that the valves function properly after activities that could affect valve performance. Based on this additional testing and preventive maintenance, valves DHV-34 and DHV-35 have been found to be highly reliable.

ITS Bases 3.5.4 (BWST) specifically states that valves DHV-34 and DHV-35 are maintained normally closed.

Based on the above, maintaining valves DHV-34 and DHV-35 normally closed has no impact on ITS operability requirements and ITS SRs, and also has no impact on existing ITS Bases.

Possible Voiding of LPI Piping and Components and BS Suction Piping

The original commitment made to the NRC in 1976 to maintain valves DHV-34 and DHV-35 normally open was in response to questions concerning possible voiding of LPI and BS piping as a result of external system leakage. This voiding could create the possibility of water hammer and pump cavitation upon starting the LPI pumps and BS pumps. In addition, voiding in the LPI system could create the possibility of injecting noncondensible gas into the reactor coolant system (RCS).

Voids resulting from evolution of entrained gas from other connecting systems are not likely for the LPI and BS systems for the following reasons:

1. Each train of the LPI system and BS system shares a common suction header from the BWST. The BWST is an atmospheric pressure vessel vented to outside air, and maintained near outside air ambient temperatures. The LPI and BS systems are normally filled using BWST water by opening valves DHV-34 and DHV-35, and are not pressurized above the static head provided by the BWST. Each train of these systems also shares a common suction header from the RB sump, and each train of LPI and BS is isolated from the RB sump by a normally closed motor-operated valve. The containment is normally maintained near atmospheric pressure and at a slightly higher temperature than outside ambient air. Both systems are also normally maintained at auxiliary building ambient temperatures. Therefore, it is highly unlikely that air blanketing the BWST or containment air will be entrained in the LPI and BS systems, and subsequent evolution of air as a gas in the systems would not occur.

2. The BS system discharges into the containment. The containment is normally maintained near atmospheric pressure and at a slightly higher temperature than outside ambient air. Each train of the BS system is isolated from containment by a normally closed check valve and normally closed motor-operated valve. Therefore, it is highly unlikely that air from containment will be entrained in the BS system, and subsequent evolution of containment air as a gas in the system would not occur.

3. The LPI system discharges into the RCS using the same piping as the core flood tanks (CFTs). The RCS is normally pressurized and at high temperatures, and contains entrained gases including hydrogen and nitrogen. The CFTs are normally pressurized using nitrogen, but are maintained near ambient containment temperature. Each train of LPI is isolated from the CFTs by a normally closed check valve and a normally closed motor-operated valve, and from the RCS by both of these valves and an additional normally closed check valve. The normally closed check valves are periodically leak tested as pressure isolation valves (PIVs). Therefore, it is highly unlikely that dissolved gas from the CFTs or the RCS will be entrained in the LPI system, and subsequent evolution of these dissolved gasses in the system would not occur.

Based on the fact that voids from evolution of entrained gas is not likely, if voids were to form they will most likely be the result of external piping and component leaks, and subsequent air leakage into the systems.

To address this issue of possible voiding due to external leakage, new ITS SRs are proposed to verify the LPI piping and components, and the BS suction piping, remain full of water on a 31-day frequency.

Based on the physical design of the LPI and BS systems, external leakage resulting in possible voiding of the piping and components in both systems can be detected by measuring the pressure on the common suction header, using pressure indication located on the suction side of the LPI pumps.

For the LPI piping and components, indicated pressure above 25 psig (which accounts for $\pm$ 1 psig instrument accuracy) would indicate positive pressure exists everywhere in the LPI system, and would prevent the possibility of any air leaking into the system. For the BS suction piping, indicated pressure above 15 psig (which accounts for $\pm$ 1 psig instrument accuracy) would similarly indicate that no air has leaked into the BS suction piping.

CONCLUSION:

Maintaining valves DHV-34 and DHV-35 normally closed has been evaluated by FPC, and it has been determined that this configuration is acceptable. Maintaining the valves normally closed ensures compliance with the requirements of 10 CFR 50, Appendix R. This change is also acceptable based on evaluation of the original ECCS analysis basis, impact on ITS requirements, and the impact of the proposed change on the CR-3 PSA model. Possible voiding of the LPI piping and components, and the BS suction piping, has been evaluated and determined to be highly unlikely to occur without detection. Also, the proposed periodic monitoring of the LPI

and BS common suction header pressure will provide further assurance that no voids are allowed to form. Therefore, the potential for voiding that could result in water hammer, LPI and BS pump cavitation, or LPI injection of air into the RCS is highly unlikely.

NO SIGNIFICANT HAZARDS CONSIDERATION:

Florida Power Corporation has reviewed the requirements of 10 CFR 50.92 as they apply to the proposed License Amendment and considers the changes not to involve a significant hazards consideration. In support of this conclusion, the following analysis is provided:

1. *Involve a significant increase in the probability or consequences of an accident previously evaluated?*

   Valves DHV-34 and DHV-35 are located in the suction lines between the borated water storage tank (BWST) and the low pressure injection (LPI) and building spray (BS) pumps. These valves are maintained normally closed, and are designed to automatically open upon receipt of a reactor coolant system (RCS) low-low pressure signal of 500 psig or a reactor building (RB) high pressure signal of 4 psig from the engineered safeguards actuation system (ESAS). The designed full stroke time of these valves is within the assumptions of the accident analyses performed for the specific design basis accidents that require the LPI and/or BS systems for accident mitigation. This is the original design basis for these valves. Therefore, the valves are fully capable of performing their intended safety functions while being maintained normally closed.

   The failure of one of these valves to open does not impact the mitigation of previously analyzed accidents that require the operation of the LPI and/or BS systems, and cannot increase the probability of these accidents occurring. No RCS or secondary system pressure boundaries are compromised, no release paths for radioactive materials are created, and no challenge to any safety limit or acceptance limit are created by maintaining these valves normally closed.

   A single, active failure causing one of these valves to fail to open upon demand would render one train of LPI and BS unavailable for accident mitigation. However, the accident analyses have already accounted for the possibility of only one train of LPI and BS being available, and the consequences of previously evaluated accidents would therefore remain unchanged.

   Undetected voiding in the LPI piping and components, and BS suction piping, is highly unlikely to occur. Based on the design and physical layout of the LPI system and BS system, and the monitoring of the systems performed on a periodic basis, any potential for LPI piping and components and BS suction piping voiding will be quickly and easily recognized and corrected. Therefore, since voiding is not likely to occur, the consequence of previously evaluated accidents would not be significantly increased by the proposed change.

2. *Create the possibility of a new or different kind of accident from previously evaluated accidents?*

Failure of either valves DHV-34 or DHV-35 to open upon demand on an ESAS signal will not create the possibility of a new or different kind of accident. The LPI system and BS system are maintained in a standby condition during normal plant operations, and automatically actuate only after an accident has occurred to mitigate the effects of the initiating accident. No RCS or secondary system pressure boundaries are compromised, no release paths for radioactive materials are created, and no challenges to any safety limit or acceptance limit are created by maintaining these valves normally closed. Additionally, the possibility of undetected voiding in the LPI piping and components, and BS suction piping, is not likely to occur by maintaining these valves normally closed. Therefore, maintaining valves DHV-34 and DHV-35 normally closed will not be an initiator of a new or different kind of accident from previously evaluated accidents.

3. *Involve a significant reduction in a margin of safety?*

Maintaining valves DHV-34 and DHV-35 normally closed will not create a reduction in the margin of safety. Maintaining valves DHV-34 and DHV-35 normally closed will ensure the capability to safely shut down the reactor under certain postulated fire scenarios, but will result in an extremely small increase in the probability of failure of one train of LPI and BS to perform its safety functions. Based on use of the CR-3 Probabilistic Safety Analysis (PSA) model, and assuming the failure of either valve DHV-34 or DHV-35 to open, the impact on the core-damage frequency was estimated and determined to slightly increase from 7.38 E-6 to 7.41 E-6 per year. This increase (3 E-8 or 0.4%) is in the range considered acceptable in Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," dated July 1998.

Maintaining these valves normally closed will not result in undetected voiding in the LPI piping and components, and BS suction piping, as a result of performance of periodic pressure monitoring. If voiding occurs, the Improved Technical Specifications specify the actions required to restore the affected systems to operable status, including correcting the external leakage creating the observed pressure decay. Therefore, the proposed monitoring will ensure the margin of safety is not reduced.

Based on these benefits and risks, there is no discernible change in the risk to the public in mitigating the offsite consequences of any evaluated accident since the failure of one train of LPI and/or BS for any reason is bounded by the assumptions of the accident analyses. Failure of valve DHV-34 or DHV-35 to open upon demand results in extremely low increases in the potential for reactor core damage. Therefore, the existing margin of safety will not be reduced.

ENVIRONMENTAL IMPACT EVALUATION:

While 10 CFR 51 requires an environmental assessment (EA) or environmental impact statement (EIS) for any "major Federal action significantly affecting the quality of the human environment," it does allow the NRC discretion in evaluating the extent to which EAs or EISs are necessary. EAs or EISs are not required for any action included in the list of "categorical exclusions" set forth in 10 CFR 51.22(c). Specifically, 10 CFR 51.22(c)(9), provides that an EA is not required for the issuance of an amendment provided that:

(i) the amendment involves no significant hazards consideration,

(ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and

(iii) there is no significant increase in individual or cumulative occupational radiation exposure.

FPC considers that the provisions of 10 CFR 51.22(c)(9) are applicable to this request for changes to the CR-3 FSAR and ITS. For the reasons described below and elsewhere in this submittal, FPC believes that the three criteria of 10 CFR 51.22(c)(9) are satisfied. Therefore, this License Amendment should be considered under the "categorical exclusions" provisions of 10 CFR 51.22(c)(9).

The basis for this determination includes the following:

1. The proposed changes to the CR-3 FSAR and ITS do not involve significant hazards as discussed above in the No Significant Hazards Consideration.

2. The proposed changes to the CR-3 FSAR and ITS do not result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite. The change does not result in an increase in the consequences of previously evaluated accidents. Therefore, there will be no environmental impact from changes to the normal standby positions for valves DHV-34 and DHV-35.

3. The proposed changes to the CR-3 FSAR and ITS do not result in a significant increase in individual or cumulative occupational exposure. This conclusion is based on the facts that changes to the normal standby positions for valves DHV-34 and DHV-35 do not result in any increased consequences of accidents previously evaluated, and that failure of valves DHV-34 and DHV-35 is not an initiator of a design basis accident or event. Therefore, for the reasons given in this submittal, there will be no change in offsite consequences due to this action and its impact is bounded by the impacts assumed in the existing Final Environmental Statement (FES) for CR-3. Even if the NRC chooses to perform an EA, information provided in the FES, together with this submittal should assist the NRC in making a "finding of no significant impact" in accordance with 10 CFR 51.32.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT B

LICENSE AMENDMENT REQUEST #229

REVISION 0

Proposed FSAR

Change Pages - Strikethrough/Highlight

~~Strikethrough Text~~ Deleted, Highlighted Text Added

emergency operating mode to deliver water from the BWST into the reactor vessel through the reactor coolant lines. The following actions accomplish this change:

a. The idle ES-selected HPI pump starts.

b. The valve in each HPI line opens.

c. The valves in the lines to the BWST open.

d. The normal makeup supply valve closes (by ES A-B diverse containment isolation signal) to facilitate operator identification and isolation of HPI line breaks using the HPI isolation criterion.

e. Decay Heat Closed Cycle Cooling (DC) system water pumps start.

In addition to the automatic action described, the pumps and valves may be remotely actuated by the operator from the Control Room, but ES actuation signals override any operator action. The four HPI injection valves (MUV-23, -24, -25, and -26) may be supplied by either of the two channels of the ES electrical buses through operation of selector switches in the Control Room. The normal makeup supply valve (MUV-27) may be supplied by either of the two channels of ES electrical buses through operation of a selector switch in the main Control Room.

Operation of the HPI system will continue until the system action is manually terminated.

Three transmitters and four indicators for each leg are provided for HPI flow measurement and indication.

6.1.2.1.2 Low Pressure Injection

The Low Pressure Injection (LPI) system is designed to maintain core cooling for large break sizes and operates independently of, and in addition to, the HPI system. The normal operating mode and component data for the system are described in Chapter 9.

Automatic actuation of LPI is initiated by low RC system pressure or high RB pressure. Initiation of the emergency operation provides the following actions:

a. The valves in the lines connecting the BWST to the LPI pump suction headers open.

b. The injection valve in each LPI line opens.

c. Decay heat removal pumps start.

d. Decay Heat Services Sea Water pumps start.

The valves in the lines connecting the BWST to the LPI pump and BS pump suction headers are maintained normally closed in order to meet the requirements of 10 CFR 50, Appendix R. This configuration ensures that certain fire scenarios will not result in uncontrolled draining of the BWST to the RB Emergency Sump. With these valves maintained normally closed, external system leakage may cause voiding in the system piping to occur. However, voiding cannot occur if the pressure in all portions of the LPI system, and the suction piping of the BS system, remains above atmospheric pressure. Routine pressure monitoring ensures the absence of voiding.

LPI is accomplished through two separate flow paths, each including one pump and one heat exchanger and terminating directly in the reactor vessel through core flood nozzles located on opposite sides of the vessel. The LPI System is provided with a crossover line to permit one LPI train flow to be split. Plant procedures establish appropriate administrative controls for utilization of the LPI cross connect configuration. These controls are supported by FTI calculation 51-5001075-01 (FPC file M98-0003) (Ref. 20), which establishes the appropriate quantitative limits for use of the LPI crossover line. This defines how the B&W Topical Report BAW-10103A, "ECCS Analysis of B&W's 177-FA Lowered-Loop NSS" (Ref. 21) is implemented at CR-3. Redundant transmitters and indicators are provided for LPI flow measurement and indication. The LPI crossover injection mode of operation is accomplished by opening the crossover line, provided with a two-way flow element between the separate and independent LPI trains, and remotely adjusting the flow through the crossover line via two (one in each LPI train) electric motor operated valves (see Figure 9-6).

In addition, the decay heat removal pumps are provided with automatic flow control circuitry and throttle valves which restrict maximum decay heat flow to a nominal operator selectable setpoint of 3,000 gpm to preclude pump runout

TABLE 6-4 Single Failure Analysis - Emergency Core Cooling Systems

	Component	Malfunction	Comments
A. High Pressure Injection (HPI) System			
1.	Suction valve for makeup pump from borated water storage tank (BWST)	Fails to open	The parallel valve will supply the required flow to one pump string.
2.	Emergency injection valve	Fails to open	The alternate line will provide the flow required for protection.
3.	HPI pump (operating)	Fails (stops)	Adequate injection is provided by the redundant pump.
4.	HPI pump	Fails to start	Adequate injection is provided by the redundant pump.
5.	Seal return isolation valve	Fails to close on ES signal	The other isolation valve will close eliminating this fluid path.
6.	Letdown cooler isolation valve	Fails to close on ES signal	The other isolation valve will close the flow path.
B. Low Pressure Injection System			
(Injection From BWST)			
1.	LPI pump	Fails to start	Adequate injection is provided by the redundant pump.
2.	Emergency injection valve	Fails to open	Other line admits necessary flow. Shutoff pump in the associated line until the valve can be opened.
3.	Valve in ~~the~~ suction line ~~the~~ from BWST	Fails ~~(closes)~~ to open	Other line admits necessary flow. Shutoff pump in the associated line until the valve can be opened.
(Recirculation From Reactor Building Emergency Sump)			
1.	Valve in suction line from emergency sump	Fails to open	Other line admits necessary flow.
2.	Valve in suction line from BWST	Fails to close after initiating recirculation	Check valve prevents flow into BWST.
3.	Low pressure injection pump	Loss of pump	Reactor core protection will be maintained by alternate pump and low pressure injection string.

TABLE 6-6 Single Failure Analysis – Reactor Building Spray System

Component	Malfunction	Comments
1. Reactor Building Spray (BS) system pump	Fails to start	Since the two strings of the BS system are equally sized, one string will provide heat removal capability at a reduced rate. In combination with the Reactor Building emergency cooling system, heat removal capability in excess of the requirements will be provided (Chapter 14 sensitivity analysis). Iodine removal is adequate with one string operating.
2. Building isolation valve	Fails to open	(Same as above)
3. Check valve in suction to discharge line	Fails to open	(Same as above)
4. Valve in suction line from BWST	Fails to open	(Same as above)