

1/1  
Aool

# Florida Power

CORPORATION  
Crystal River Unit 3  
Docket No. 50-302

ADD: LA  
NRC/IDRPM  
RES/DET

June 14, 1997  
3F0697-10

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

Subject: Technical Specification Change Request Notice 210

- References:
1. Letter from P.M. Beard, Jr., FPC Senior Vice President, Nuclear Operations to U.S.N.R.C, "Crystal River Forced Outage," October 28, 1996, 3F1096-22.
  2. Confirmatory Action Letter 2-97-001, dated March 4, 1997

Ladies and Gentlemen:

Florida Power Corporation (FPC) hereby submits Technical Specification Change Request Notice (TSCRN) 210 regarding proposed amendments to Operating License No. DPR-72 for Crystal River 3 (CR-3). The TSCRN is necessary to support operation with hardware changes primarily involving the Emergency Feedwater (EFW), High Pressure Injection, Emergency Feedwater Initiation and Control Systems, and the Emergency Diesel Generators (EDGs), as well as associated licensing and design bases changes. The TSCRN has been reviewed and approved by the CR-3 Plant Review Committee and the CR-3 Nuclear General Review Committee.

## Background

In Reference 1, FPC informed the NRC that certain modifications and procedure changes had been implemented during the Spring 1996 Refuel 10 outage which created unreviewed safety questions (USQ) regarding the EDGs. Reference 1 also informed the NRC of FPC's plan to address the eight design issues related to the shutdown prior to restart. The NRC confirmed to

9706180399 970614  
PDR ADOCK 05000302  
P PDR



FPC the required actions to be completed prior to restart of CR-3 when it issued a Confirmatory Action Letter (Reference 2).

As a result of resolving these design issues, FPC identified plant modifications and operator actions required to mitigate the consequences of certain small break loss of coolant accident (SBLOCA) scenarios with concurrent loss of offsite power. FPC has determined that a TSCRN is necessary to reflect the associated modifications and operator actions.

This TSCRN provides measures, certain of which are interim for Cycle 11, that are required to mitigate the consequences of certain small break loss of coolant accidents (SBLOCA) with concurrent loss of offsite power and certain single failures. Prior to the beginning of Cycle 12, FPC will implement the permanent actions to address EDG capacity limitations. Presently, the two primary options under consideration are to (1) modify the existing EDGs, further increasing their capacity or (2) install a diesel-driven emergency feedwater pump. Included with either of these options is the removal of the automatic Emergency Feedwater Initiation and Control System trip of the motor driven EFW pump. Prior to the beginning of Cycle 12, an additional TSCRN will be submitted to reflect the resolution of the EDG limitations and to remove the interim measures proposed by TSCRN 210. The decision depends on the results of manufacturer testing associated with the possibility of further capacity uprates of the CR-3 EDGs.

Based on qualitative evaluations, FPC determined that the limiting EDG capacity-related single failures for SBLOCA scenarios involving a concurrent loss of offsite power are loss of Battery 'A', loss of Battery 'B', and loss of the turbine-driven emergency feedwater pump. Certain SBLOCA break sizes require EFW to maintain primary to secondary cooling via the Once Through Steam Generators (OTSG) until the reactor core decay heat can be solely removed by High Pressure Injection (HPI) and Low Pressure Injection (LPI) flow via the break. FPC determined that EFW is required for a period of time after the SBLOCA, even with two HPI pumps providing injection flow.

After narrowing resolution options, FPC chose the approach which in its judgment, maximizes safety in an economical and regulatory compliant manner. FPC is addressing the above issues through a combination of plant modifications, Technical Specification revisions, and Emergency Operating Procedure (EOP) revisions, which will ultimately lead to appropriate Final Safety Analysis Report (FSAR) changes. This approach maximizes defense in depth and ensures that necessary accident mitigation strategies are available. Therefore, this submittal addresses more than FPC's request to amend its Technical Specifications. It also requests specific NRC review of associated FPC integrated design and operating strategies to resolve USQs identified by NRC and FPC.

#### **SUBMITTAL FORMAT**

This TSCRN is comprised of several attachments that should be considered by the NRC to support Technical Specification changes and licensing action requests in this submittal. A summary of these attachments follows:

### Attachment A - List of Commitments in the Cover Letter

The attachment provides the list of commitments made in this submittal.

### Attachment B - Safety Assessment

The attachment describes the three SBLOCA scenarios and the solution sets. It provides a topically-oriented safety assessment of the proposed accident solution sets based on specific plant modifications and the resulting EOP changes, focusing on accident mitigation challenges. The safety assessment confirms the importance of EFW and presents the means for EDG load management to ensure that the EDGs are not overloaded.

### Attachment C - Technical Specification Change Request Notice 210

The attachment provides revisions to the CR-3 Technical Specifications that are necessary to implement the changes to resolve SBLOCA-related safety issues. Proposed Technical Specification and Bases page changes are also provided in this attachment. To assist the NRC in reviewing this request, FPC has included a set of changed pages with deleted information shown in strikeout font and new or revised information shown in shaded font. The TSCRN is divided into three parts to assist the review. Each Technical Specification and Bases change is cross-referenced to the appropriate part of the TSCRN, which are described below. FPC also provides in this attachment its 10 CFR 50.92(c) evaluation and conclusion that the proposed Technical Specification changes and planned related actions (including revision of the associated EOPs) do not involve a significant hazard.

#### Part 1 - SBLOCA Mitigation

The Technical Specifications and associated Bases are being changed to reflect the latest analysis for the SBLOCA scenarios involving a concurrent loss of offsite power and certain single failures. Due to the expected load and capacity limits on the "A" EDG, the length of time that the motor driven EFW pump (EFP-1) would be available is limited. To ensure adequate EFW system flow, other actions must be initiated. This would include extending the time EFP-1 would be available by managing the load connected to the "A" EDG and/or by taking action to provide EFW flow using EFP-2 and a cross-tie between EFW "A" and "B" flow paths.

#### Part 2 - EDG Upgrade

This aspect of the proposed license amendment involves increases in the service ratings of the EDGs. The required amount of fuel oil in the EDG fuel day tank and fuel storage tank, and lube oil storage is being increased to ensure that adequate volume is available to support the new service ratings. The EDG refueling interval load test parameters are being revised to reflect the increased service ratings and to ensure that the minimum test load is equal to or greater than the expected maximum steady state accident load.

### Part 3 - Load Rejection Test and Steady State Loads

The proposed changes for this part affects the Technical Specification Bases. The basis of the EDG load rejection test is being revised to bound the largest single load. A description of "steady state" is being provided with examples of short duration loads and loads imposed by the starting of motors. Also, addressed is FPC's conclusion that the refueling interval EDG load test is not invalidated by loads imposed by the starting of motors.

### Attachment D - Framatome Document FTI 51-1266138-01

Provides the Framatome Technologies Incorporated (FTI) safety analyses and evaluations of accident mitigation challenges to the SBLOCA solution sets. These evaluations include a limited use of RELAP5. FPC has reviewed this FTI document and concurs with its conclusions. The FTI document is partially based on calculations performed and data provided by FPC. The status of FPC's calculations related to the TSCRN is presented later in the letter under Ongoing Licensing Actions.

### Attachment E - Assessment of Limited Use of RELAP5

As noted previously, FTI analysis (FTI 51-1266138-01) provides a summary of FTI's evaluation of certain SBLOCA scenarios. This evaluation utilized, in part, the RELAP5 evaluation model approved by the NRC. This code was addressed for B&W plants in Topical Report BAW-10192-P, "BWNT Loss-Of-Coolant Accident Evaluation Model For Once-Through Steam Generator Plants." In a February 18, 1997, letter to FTI, the NRC approved the Topical Report analysis for referencing in licensing applications involving LOCAs for OTSG plants<sup>1</sup>. However, the NRC conditioned its approval for using the Topical based on satisfying eleven conditions. Accordingly, this attachment provides assurance that these eleven conditions were satisfied.

### Attachment F - Supporting Information

To address the SBLOCA scenarios and the EDG capacity, Attachment F provides a description of the 1) resolution of NRC identified unreviewed safety questions, 2) modifications, 3) operator actions, 4) FSAR changes, and 5) related LERs. This attachment provides additional information that describes the facility as it will be configured at restart. This information is provided to support the NRC review of the TSCRN.

### Attachment G - List of Acronyms and Abbreviations Used

Provides a listing of the acronyms and abbreviations used in the attachments.

---

<sup>1</sup> Letter from James E. Lyons, Acting Chief, Reactor Systems Branch, U.S. Nuclear Regulatory Commission, to J. H. Taylor, Manager, Licensing Services, Framatome Technologies Inc., February 18, 1997 (TAC No. M89400)



## ONGOING LICENSING ACTIONS

Several activities are ongoing at FPC which involve SBLOCA issues and may result in additional procedure changes or plant modifications. FPC does not believe that these activities will impact the NRC's review of this proposed license amendment. However, should this occur, FPC will promptly inform the NRC of its findings and modify this submittal as appropriate. A summary of ongoing SBLOCA-related activities follows:

### Calculations

Many of the calculations to support TSCRN 210 have been completed. However, certain of these calculations are still pending completion at this time. The anticipated conclusions of these pending calculations have been used to support TSCRN 210. To ensure that the conclusions of the calculations are valid, their inputs and assumptions have been verified and subjected to interdepartmental reviews except for the calculations involving EDG loading, EFW block valve cycling, and Control Complex Cooling.

The EFW block valve and Control Complex Cooling calculations are being developed and have not been completed as of the date of this submittal. By September 15, 1997, FPC will confirm to the NRC that these calculations are complete and their conclusions support TSCRN 210.

A revision of the CR-3 EDG loading calculation is ongoing. A priority has been placed on assessing the loads of the 'A' train EDG, which is the most limiting. By September 15, 1997, FPC will confirm to the NRC that the expected maximum steady state accident loads on the EDGs are bounded by the lower limit of the EDG refueling interval surveillance test. The remainder of the calculation will be completed prior to implementation of the license amendment resulting from TSCRN 210.

### Modifications

Plant modifications supporting TSCRN 210 are in various stages of implementation. As such, the 10 CFR 50.59 evaluations for each of these modifications have not been completed at this time. FPC is currently implementing these modifications and operation of CR-3 with the described modifications is contingent upon NRC approval of TSCRN 210. Therefore, prior to NRC approval of the license amendment resulting from TSCRN 210, FPC will confirm that the modifications do not involve an unreviewed safety question, and that no changes were made in the proposed modifications which would alter the proposed Technical Specifications or Bases.

FPC also will have available Auxiliary Feedwater Pump 7 (FWP-7) which will be powered by a dedicated diesel generator installed during the current outage. This pump is not safety related and is neither included in Technical Specifications nor considered in design basis mitigation analyses. However, the use, maintenance, and testing of FWP-7 will be controlled by plant procedures that will be approved prior to

CR-3 restart to ensure that availability and reliability is appropriately addressed commensurate with its importance.

#### Procedures

EOPs affected by this TSCRN are in various stages of revision. However, to support the NRC's review of the TSCRN 210, FPC has identified in Attachment F (1) those operator actions required to be completed within the first 20 minutes of the SBLOCA scenarios addressed by the solution sets and (2) new operator actions required to be completed after 20 minutes of these SBLOCA scenarios. Some of these actions are considered to be "defense in depth."

FPC has been able to reduce the number of operator actions required in the first 20 minutes of these SBLOCA scenarios relative to the previous requirements. The operator actions presented in Attachment F in conjunction with the proposed Technical Specification changes and plant modifications have been taken in an effort to minimize the operator burden during the response to a SBLOCA.

FPC requests NRC review of these operator actions as an integral part of the amendment review (see Attachment F).

FPC is currently developing the necessary operating procedures and operation of CR-3 with the described operator actions is contingent upon NRC approval of TSCRN 210. Therefore, prior to NRC approval of the license amendment resulting from TSCRN 210, FPC will confirm that the necessary procedure changes do not involve an unreviewed safety question, and that no changes were made to the proposed procedures which would alter the proposed Technical Specifications or Bases.

#### FSAR

FPC is currently revising the FSAR to address changes related to this TSCRN. The information in this table is draft and based on the most recent information available for the modifications scheduled to be completed this outage to support the SBLOCA analysis. FPC will complete and submit FSAR Revision 24 prior to restart to address the SBLOCA solution sets.

Also, an engineering evaluation is being performed on issues concerning decay heat removal in Mode 4. This evaluation does not affect the SBLOCA analyses as presented in this submittal.

FPC respectfully requests that the NRC promptly consider this proposed license amendment. FPC is currently implementing the modifications and developing the operating procedures and operation of CR-3 with the described modifications and procedure changes is contingent upon NRC approval of TSCRN 210. As the NRC is aware, FPC anticipates that CR-3 will be ready for restart prior to the end of 1997. The current restart schedule anticipates approximately nineteen weeks of NRC review of this submittal. This proposed timetable also allows FPC approximately one month to implement necessary procedures and conduct appropriate training

prior to returning CR-3 to a mode requiring use of these modified Technical Specifications. Accordingly, FPC requests NRC approval of this proposed license amendment by November 1, 1997, with a 30-day implementation period.

To facilitate NRC approval, FPC suggests that frequent license amendment review status meetings and communications with the NRC to ensure prompt FPC support to the NRC during its reviews. FPC proposes that the first meeting be held either June 23 or 24, 1997, in the NRC's Rockville, MD offices. During this meeting, FPC anticipates providing the NRC a summary of the accident response methodologies (i.e., Solution Sets) and facility modifications, the approach used in this TSCRN, and the outline of the supporting analyses. In early July 1997, a follow-up meeting addressing the technical aspects and operator actions is suggested. FPC proposes additional meetings at least monthly with the NRC on the license amendment submittal.

Please do not hesitate to call David Kunsemiller, Manager, Nuclear Licensing (352-563-4566) regarding any questions concerning this proposed license amendment.

Sincerely,



John Paul Cowan  
Vice President  
Nuclear Production

Attachments:

- A. List of Commitments in Cover Letter
- B. Safety Assessment
- C. Technical Specification Change Request Notice 210
- D. Framatome Document FTI-51-1266138-01
- E. Assessment of Limited Use of RELAP5
- F. Supporting Information
- G. List of Acronyms and Abbreviations Used

cc: Regional Administrator  
Senior Resident Inspector  
NRR Project Manager

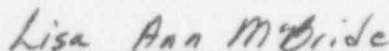
STATE OF FLORIDA  
COUNTY OF CITRUS

John Paul Cowan states that he is the Vice President Nuclear Production 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.

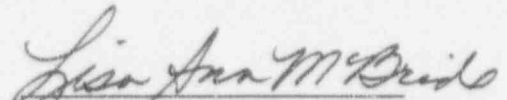


John Paul Cowan  
Vice President  
Nuclear Production

John Paul Cowan is personally known to me. Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 14<sup>th</sup> day of June, 1997.



Notary Public (print)



Notary Public (signature)



LISA ANN MCBRIDE  
Notary Public, State of Florida  
My Comm. Exp. Oct. 25, 1999  
Comm. No. UC 505458



**FLORIDA POWER CORPORATION  
CRYSTAL RIVER UNIT 3  
DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72**

**ATTACHMENT A**

**LIST OF COMMITMENTS IN COVER LETTER**

## ATTACHMENT A

### LIST OF COMMITMENTS IN COVER LETTER

#### 1. Calculations

By September 15, 1997, FPC will confirm to the NRC that the expected maximum steady state accident loads on the EDGs are bounded by the lower limit of the EDG refueling interval surveillance test.

Due: September 15, 1997

The remainder of the calculation will be completed prior to implementation of the license amendment resulting from TSCRN 210.

Due: Prior to implementation of the license amendment resulting from TSCRN 210

By September 15, 1997, FPC will confirm that the calculations involving EFW block valve cycling and Control Complex Cooling are complete and their conclusions support TSCRN 210.

Due: September 15, 1997

#### 2. Modifications

Prior to NRC approval of the license amendment resulting from TSCRN 210, FPC will confirm that the modifications do not involve an unreviewed safety question, and that no changes were made in the proposed modifications which would alter the proposed Technical Specifications or Bases.

Due: September 15, 1997

#### 3. Procedures

Prior to NRC approval of the license amendment resulting from TSCRN 210, FPC will confirm that the necessary procedure changes do not involve an unreviewed safety question, and that no changes were made to the proposed procedures which would alter the proposed Technical Specifications or Bases.

Due: September 15, 1997

#### 4. ESAR

FPC will complete and submit FSAR Revision 24 prior to restart to address these changes associated with the SBLOCA solution sets.

Due: Prior to restart

5. FWP-7

FPC also will have available Auxiliary Feedwater Pump 7 (FWP-7) which will be powered by a dedicated diesel generator installed during the current outage. The use, maintenance, and testing of FWP-7 will be controlled by plant procedures that will be approved prior to CR-3 restart to ensure that availability and reliability is appropriately addressed commensurate with its importance.

Due: Prior to restart

6. Permanent Modifications

Prior to the beginning of Cycle 12, FPC will implement the permanent actions to address EDG capacity limitations. Presently, the two primary options under consideration are to (1) modify the existing EDGs, further increasing their capacity or (2) install a diesel-driven emergency feedwater pump. Included with either of these options is the removal of the automatic Emergency Feedwater Initiation and Control System trip of the motor driven EFW pump.

Due: Prior to the beginning Cycle 12

7. Interim Technical Specification Measures

Prior to the beginning of Cycle 12, an additional TSCRN will be submitted to reflect the resolution of the EDG capacity limitations and to remove the interim measures proposed by TSCRN 210.

Due: 12 months prior to the beginning of Cycle 12

8. Engineering Evaluation of Decay Heat Removal in Mode 4

An engineering evaluation is being performed on issues concerning decay heat removal in Mode 4. This evaluation does not affect the SBLOCA analyses as presented in this submittal.

Due: Prior to restart

**FLORIDA POWER CORPORATION**  
**CRYSTAL RIVER UNIT 3**  
**DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72**

**ATTACHMENT B**

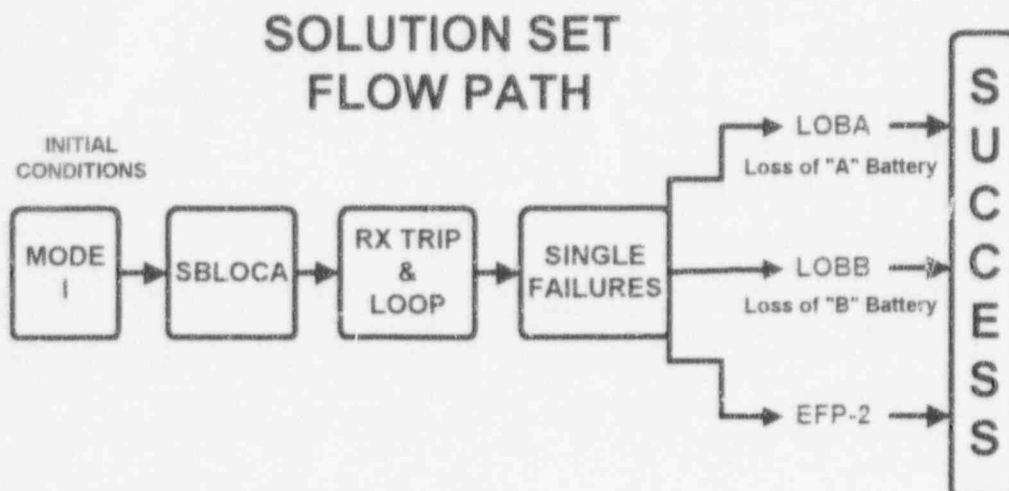
**SAFETY ASSESSMENT**





# Startup Team Solution Set

## Safety Assessment



## INTRODUCTION

This document provides a topically-oriented safety assessment of proposed accident management solution sets<sup>1</sup> based on specific plant modifications<sup>2</sup> and resulting Emergency Operating Procedure (EOP) changes related to the Emergency Diesel Generators (EDG), the Emergency Feedwater (EFW) system, and Emergency Core Cooling Systems (ECCS). This safety assessment is focused on operational challenges to mitigate certain design basis accidents identified in the Final Safety Analysis Report (FSAR). From the review of the FSAR performed by the Startup Team, it was determined that Small Break Loss-of-Coolant Accidents (SBLOCA) with a concurrent Loss-of-Offsite Power (LOOP) and certain single failures pose the greatest challenge to accident management with respect to EDG load limitations and increased reliance on EFW. The single failures are described in the Discussion section with the system and component limitations identified in the following Background section. In addition, the Discussion section describes "Defense-In-Depth" for each accident scenario which employs the use of equipment expected to be available, but not typically credited for mitigation in the accident analyses.

## BACKGROUND

Certain size<sup>3</sup> SBLOCAs require EFW to maintain Once Through Steam Generator (OTSG) cooling until the reactor core decay heat can be removed solely by High Pressure Injection (HPI) cooling. Recently, it was determined that EFW is required for some period of time even with two HPI pumps providing injection flow. The significance of this new information increases the importance of maintaining EFW availability.

Existing EDG-1A load capacity limits prohibit concurrent operation of the motor driven EFW pump (EFP-1) with either Decay Heat Pump (DHP-1A) or the "A" Train Control Complex Chiller, when Reactor Building (RB) Spray Pump (BSP-1A) is operating. A plant modification (88-05-24-01, 6/8/90) installed an EFP-1 auto-trip function based on LOOP and concurrent Low Pressure Injection (LPI) actuation. It was assumed that if the break depressurized the Reactor Coolant System (RCS) to the LPI actuation setpoint, then EFW would no longer be required to mitigate the accident. It was further assumed that the steam driven EFW pump (EFP-2) would be available. The consequences of a SBLOCA with a concurrent LOOP and loss of EFP-2 as the single failure (probability of occurrence is approximately 4E-9/year) were not analyzed with respect to the subsequent loss of EFP-1 due to the auto-trip function, or the need to shut down EFP-1 to support ECCS piggyback<sup>4</sup> operation. The loss of EFP-1, under these circumstances, could potentially challenge successful accident mitigation and therefore needed further evaluation.

---

<sup>1</sup> The proposed solution sets are illustrated in Attachment 1.

<sup>2</sup> The specific plant modifications are identified in Attachment 2.

<sup>3</sup> With 1 HPI pump EFW is required for break sizes  $\leq 0.04\text{ft}^2$ , with 2 HPI pumps EFW is required for break sizes  $\leq 0.015\text{ft}^2$ .

<sup>4</sup> ECCS piggyback operation is defined as LPI suction aligned to the RB sump with the discharge supplying NPSH to its respective train HPI pump.

ASV-204 (steam admittance valve) was installed (modification 80-11-48-01, 3/8/85), in parallel to ASV-5 (the existing steam admittance valve), as a 'B' train component, to improve EFP-2 reliability. ASV-204 was subsequently configured (modification 87-10-09-01, 10/30/87) as an 'A' train component such that it derived power from the 'A' Direct Current (DC) electrical train and would open by a signal generated in the 'A' Emergency Feedwater Initiation and Control (EFIC) system. This new configuration reduces EDG-1A auto-connected load by virtue of EFP-2 starting and sharing EFW flow with EFP-1 during a 'B' Engineered Safeguards (ES) train failure. It was later determined that a failure of the 'B' DC electrical train could result in a loss of EFP-2 due to inadequate NPSH<sub>a</sub>. This condition would develop due to the loss of control and motive power to EFW control valves EFV-55 ('B' OTSG) and EFV-56 ('A' OTSG) resulting in both valves failed fully open. EFP-2 would be supplying both OTSGs with a high and uncontrolled flow rate. OTSG overflow protection would be maintained by EFW block valves EFV-11 ('A' OTSG) and EFV-32 ('B' OTSG), which are 'A' train powered. Therefore, the 'A' EFIC signal to open ASV-204 was removed (modification 96-04-12-01, 5/8/96). This created a condition such that no credit could be taken for reduced load on EDG-1A which challenged the existing EDG load calculations.

The basic strategy for LOCA mitigation, especially when the RCS is inadequately subcooled, is to maximize HPI and maintain EFW to support OTSG cooling. One category of SBLOCA is an HPI line break. Current EOP guidance checks for asymmetric HPI flows and directs isolation of a failed HPI line when certain criteria are met. For CR-3 that criterion is defined as: If only one HPI line indicates >75 gpm more than the lowest HPI line (using the low range HPI flow instruments), then isolate the high line. This action is taken before an RCS cooldown is induced and is assumed to occur within 20 minutes.

## DISCUSSION

As previously stated, EFW is required for certain SBLOCAs for a period of time which is a function of decay heat load, size and location of the RCS leak, and HPI flow (reaching the RCS). Analysis indicates that EFW is required for approximately 35 hours with one HPI pump operating and until piggyback is established with two HPI pumps operating. Therefore, for a SBLOCA, EFW mission time<sup>5</sup> can be defined in terms of how many HPI pumps are operating or how much HPI flow reaches the RCS. If a loss of EFW occurs after the mission time is achieved, then adequate core cooling will be accomplished by HPI/break flow. Even so, RCS pressure may increase to the Safety Relief Valve (SRV) setpoint, however, sufficient HPI flow will exist to mitigate the accident. The challenge is to demonstrate EFW availability for those accidents that require its use.

---

<sup>5</sup> The mission time of a component or system is defined in terms of how long it is needed to fulfill its design safety function.

The accidents of concern are described in terms of a common initiating event and resulting systems responses. However, application of a single failure significantly changes the accident management strategy. The Design Basis Accidents (DBAs) and Licensing Basis Accidents from Chapter 14 of the FSAR that require ECCS/EFW systems response to mitigate the consequences were reviewed. Various single failures were considered in an effort to determine the most limiting combinations from an EFW and EDG loading perspective. Various pump, EDG, and battery failures were postulated. In each case, three failures were limiting:

- 1.) Failure of Battery A or its associated main distribution panel, or
- 2.) Failure of Battery B or its associated main distribution panel, or
- 3.) Failure of the steam driven EFW pump.

The accidents considered were as follows:

- 1.) Large Break Loss of Coolant Accident (LBLOCA)
- 2.) Small Break Loss of Coolant Accident (SBLOCA)
- 3.) Station Blackout (SBO)
- 4.) Main Steam Line Break (SLB)
- 5.) Loss of Feedwater (LOFW)
- 6.) Main Feedwater Line Break (MFWLB)
- 7.) Feedwater Line Break Outside Reactor Building
- 8.) Steam Generator Tube Rupture

Each accident was examined with the 3 identified single failures in order to determine which ones created the greatest challenge for maintaining the required ECCS and EFW operation within the limits of the load that could be added to the diesel generator(s). Of the accidents listed above the SBLOCA creates the largest load on the diesel generators as it potentially involves the operation of all ECCS components and EFW.

#### Initiating Event SBLOCA

Resulting Systems Response An automatic reactor trip occurs on lowering RCS pressure or a manual reactor trip is initiated based on lowering pressurizer level coupled with high makeup flow. It is assumed that a LOOP occurs coincident with the reactor/main turbine trip. An ES actuation occurs when RCS pressure reaches 1500 psig. Operators manually initiate HPI if a loss of subcooling margin occurs before the 1500 psig automatic actuation. Both EDGs automatically start and supply emergency power to their respective busses.



### Postulated Single Failures (see Attachment 1)

- Loss of Battery 'A' (LOBA) -- This failure results in a loss of the 'A' train of ECCS, EDG-1A and EFP-1. EDG-1A starts but does not load due to the loss of DC power. EDG-1B starts and supplies emergency power for the 'B' train auto-connected loads. One HPI pump (MUP-1B or MUP-1C) will be available to provide replacement RCS inventory and some core cooling. One EFW pump, EFP-2, will automatically start to supply the OTSGs with EFW to maintain secondary side cooling. OTSG cooling must be maintained for approximately 35 hours, until decay heat can be removed by HPI/break/ SRV cooling alone. The 'B' Control Complex Chiller will be manually loaded on EDG-1B within 1 hour.

Accident Mitigation Challenges -- The LOCA cooldown procedure (EOP-08) provides guidance to initiate an RCS cooldown using Turbine Bypass Valves (TBV) or Atmospheric Dump Valves (ADV). In this case only one ADV is available to lower OTSG pressure. Framatome Technologies Incorporated (FTI) developed OTSG pressure profiles based on realistic and Appendix K decay heat values.

Resolution: It was determined that the steam drawn by EFP-2 is sufficient to depressurize the OTSGs and that for some SBLOCAs OTSG pressure would decrease below 200 psig with a corresponding reduction in RCS pressure. FTI, Florida Power Corporation (FPC) and Ingersoll-Dresser (IDR) collectively determined that EFP-2 could continue operation with OTSG pressure down to 20 psig. However, to prevent challenging EFP-2 over the mission time for OTSG cooling, operation of EFP-2 will be managed by securing the turbine (closing ASV-5) if OTSG pressure reaches 200 psig. Once OTSG pressure recovers, then EFP-2 can be placed back in service. This guidance will be incorporated into the appropriate procedures.

Defense-In-Depth -- There are several additional methods of assuring OTSG cooling that while not fully qualified are considered, in the aggregate, highly available at different times in the accident. 1) Auxiliary Feedwater Pump (FWP-7) will be powered by a newly installed diesel generator (modification 97-03-01-01) with the capability to start both components from the control room. Isolation valves, located in the intermediate building, can be opened to allow use of FWP-7 within the first couple of hours into the accident. 2) Auxiliary steam from Units 1 and 2 can be lined up to EFP-2 within several hours. This steam source is normally available with the supply line kept warm. It connects to the auxiliary steam distribution header in the turbine building. 3) Recovery of off-site power.

- Loss of Battery 'B' (LOBB) -- This failure results in a loss of the 'B' train of ECCS and EDG-1B which starts but does not load due to the loss of DC power. EDG-1A starts and supplies emergency power for the 'A' train auto-connected loads. One HPI pump (MUP-1A or MUP-1B) will be available to provide replacement RCS inventory and some core cooling. As with a LOBA, EFW is required for approximately 35 hours based on only one HPI pump available. EFP-1 automatically starts to supply the OTSGs with EFW to maintain secondary side cooling. EFP-2 starts as a result of 'A' EFIC actuation opening ASV-204 (modification 96-11-01-01).

Accident Mitigation Challenges -- EFP-1 operation is limited by EDG-1A loading capability. EFP-1 must be secured prior to reaching any one of the following operational limitations:

1) establish Control Complex cooling which requires starting the 'A' train chiller and support systems within 1 hour, 2) start DHP-1A to support ECCS piggyback operation when the Borated Water Storage Tank (BWST) reaches the swapover level, or 3) receive an LPI actuation (approximately 500 psig RCS pressure) based on operator induced cooldown which trips EFP-1.

Resolution: Prior to losing EFP-1 for any of the above reasons, EFW will be cross-connected by energizing and opening EFV-12 (modification 96-10-10-01 installs a motor operator) which will be accomplished within the 'A' 480V ES switchgear room. This routes EFW flow from EFP-2 through the operable 'A' side flow path. EFP-2 would be operating with EFW flow limited by a cavitating venturi (96-10-02-01). Verification of EFP-2 operation is accomplished by observing flow indication in the control room, as measured at the cavitating venturi (97-01-04-01).

As stated in the Background section, EFV-55 and EFV-56 would be open and unable to control EFW flow. If the OTSG overfill setpoint is reached, then the EFW block valves, EFV-11 and EFV-32, will close. As OTSG levels decrease to the overfill reset setpoint, the EFW block valves will open allowing EFW flow to the OTSGs. Frequency of cycling and motor operator capability of the EFW block valves are being evaluated to determine if a limiting condition can be reached.

Resolution: The preliminary results of evaluating EFW block valve cycling indicate there will be no challenge to the valve/operator within 1 hour. Since EFW will be cross-connected to allow securing EFP-1 within 1 hour to start the 'A' train CC chiller, EFW block valves will function as needed. If the EFW block valves are closed, then sufficient EFW will be supplied to the OTSGs from EFP-1.

Cross-connecting EFW prior to securing EFP-1 will provide an EFIC controlled flow path for EFP-2 to supply EFW to both OTSGs through the 'A' side control valves. A validation was performed on the site specific simulator to demonstrate that EFW can be cross-connected before an operational limitation is reached, within 1 hour. The same strategy regarding EFP-2 operation is applicable as described in the LOBA discussion.

**Defense-In-Depth --** As with the LOBA scenario, there are several additional methods of assuring OTSG cooling that while not fully qualified are considered, in the aggregate, highly available at different times in the accident. 1) Auxiliary Feedwater Pump (FWP-7) will be powered by a newly installed diesel generator (modification 97-03-01-01) with the capability to start both components from the control room. Isolation valves, located in the intermediate building, can be opened to allow use of FWP-7 within the first couple of hours into the accident. 2) Auxiliary steam from Units 1 and 2 can be lined up to EFP-2 within several hours. This steam source is normally available with the supply line kept warm. It connects to the auxiliary steam distribution header in the turbine building. 3) Recovery of off-site power.

- Loss of EFP-2 -- This failure results in a loss of the steam driven EFW pump. Both EDGs start and provide emergency power for both trains of auto-connected loads. EFP-1 provides

EFW to the OTSGs while two HPI pumps provide replacement RCS inventory and core cooling. CC cooling is established by operating the 'B' train chiller, loaded on EDG-1B.

Accident Mitigation Challenges -- EFP-1 operation is limited by EDG-1A load capability. EFP-1 must be secured prior to reaching either of the following operational limitations, absent an EDG-1A load management strategy: 1) BWST depletion which requires starting DHP-1A to support ECCS piggyback operation, or 2) receive an LPI actuation (approximately 500 psig RCS pressure) based on operator induced cooldown which trips EFP-1. Prior to losing EFP-1 for either of the above reasons, it must be demonstrated that EFW will no longer be required to mitigate the accident.

Resolution: With two HPI pumps operating EFW is required until the BWST has emptied and the ECCS has been configured for piggyback operation. It was determined that the higher HPI flow achieved in the piggyback alignment effectively reduces EFW requirements to 1.6 hours. However, the BWST won't reach the level at which transfer to the RB sump occurs until 2.7 hours into the accident. Therefore, EFP-1 could be shutdown at the time ECCS piggyback is established and still mitigate the accident.

If OTSG cooling is a contributing factor to RCS cooldown (as opposed to HPI/break alone), then the EOP provides guidance to manage cooldown rate within limits by adjusting TBVs or ADVs as necessary. If RCS pressure decreases as a result of HPI/break alone, then OTSG cooling is not needed. Additional guidance will be provided to control cooldown to maintain RCS pressure above the EFP-1/LPI interlock setpoint until either EDG load management is accomplished (which includes EFP-1/LPI interlock defeat) or another source of EFW can be supplied to the OTSGs.

New HPI line isolation criterion was developed to address 1 and 2 HPI pump operation. If the highest HPI line indicates flow > 50 gpm higher than the next highest-reading HPI line, then isolate the high flow HPI line. This new criterion is applied throughout the accident with HPI in an unthrottled condition and normal makeup isolated.

One of the purposes of developing isolation criterion, specifically for the 2 HPI pump case, was to determine EFW mission time. As stated earlier, if 2 HPI pumps are operating, then EFW is required until piggyback is established. During the course of evaluating EFW requirements it was determined that a single failure to isolate a broken HPI line results in the need to maintain EFW for a much longer period of time. However, with both trains of ECCS and EFW available, OTSG cooling and thus adequate core cooling is assured.

Defense-In-Depth -- Maintaining EFW, via EFP-1, is important to accident management and to that end EDG load management will be employed. Procedural guidance will provide the framework to control EDG load management. 'A' train Service Water Pumps (SWPs) and Raw Water Pumps (RWPs), SWP-1A and RWP-2A, are not needed to manage the accident and can be secured provided their counter parts (SWP-1B and RWP-2B) are operating. A subsequent ES actuation would restart the secured pumps thus undermining the strategy and potentially overloading the EDG. Therefore, Pull-To-Lock (PTL) switches will be installed on the main

control board (modification 97-04-02-01) for SWP-1A, SWP-1B, RWP-2A and RWP-2B to prevent automatic restart on a subsequent ES actuation. For this scenario, only SWP-1A and RWP-2A will be placed in the PTL condition. This will enable starting DHP-1A to support ECCS piggy-back operation while maintaining EFP-1 operating. A switch will be installed (modification 97-04-01-01) in the control room to "defeat" the EFP-1 auto-trip on LPI actuation, with a concurrent LOOP. This will allow DHP-1A to automatically start without having to secure EFP-1. Prior to defeating the EFP-1 auto-trip, EDG load management discussed above must first be accomplished which will be controlled by procedural guidance. FWP-7 will be available as described in the LOBA and LOBB discussions. Once off-site power is recovered the main condenser becomes available supporting the use of TBVs which in turn reclaims the feedwater being used to support OTSG cooling. If an HPI line cannot be isolated, then a decision to split the HPI discharge header can be made by the Technical Support Center based on existing conditions and indications.

## **SUMMARY**

SBLOCA with a concurrent LOOP and specific single failures challenge successful accident mitigation. The installation of certain modifications and procedure changes improve accident management response for the identified accident scenarios regardless of the probability of occurrence. The mission time for EFW is a function of several independent variables such as decay heat load, break size and location, and HPI flow. EFW will be maintained for those SBLOCAs that require OTSG cooling.

For a LOBA or LOBB, 1 HPI pump and EFP-2 are available to provide adequate core cooling. For the LOBA, CC cooling is provided by the 'B' train chiller. For the LOBB, EFW will be cross-connected within 1 hour to provide controlled EFW flow from EFP-2 to both OTSGs which also supports securing EFP-1 to operate the 'A' train chiller for CC cooling. Both scenarios require EFW for approximately 35 hours. Procedures will provide guidance needed to manage EFP-2 throughout the accident. For a single failure of EFP-2, EFP-1 and 2 HPI pumps are available to provide adequate core cooling. Procedural guidance will prevent the loss of EFP-1 before it is no longer needed to support OTSG cooling.

In all three scenarios, if an HPI line break occurs and the isolation criterion is met, then the HPI line containing the break will be isolated. For a single failure to isolate an HPI line break, sufficient HPI flow and EFW provides adequate core cooling.

Accident mitigation improvements can be realized by any of the defense-in-depth capabilities discussed. EDG load management, FWP-7 (backed by a diesel generator), auxiliary steam from Units 1 and 2, and off-site power recovery, individually and collectively adds a significant defense-in-depth measure to accident management.



Operator actions are necessary to cope with the accidents discussed throughout this safety assessment. It should be noted that these actions are only necessary for a limited set of conditions, i.e. SBLOCA scenarios based on single failures. The sum total of their affect will be determined by a combination of table-top and simulator validation to assure each action can be accomplished within the assumed time or condition limit.

The following is a summary of operator actions needed to mitigate those accidents described in the Discussion section: Note--plant procedures have not been revised to incorporate the details of the following discussion. However, the strategies will be reflected in the appropriate procedures which includes verification and validation to assure successful implementation.

Immediate actions of EOP-02 (Vital System Status Verification) are performed in response to a reactor trip. There are five immediate actions that must be performed prior to taking any other action in any other procedure. These actions ensure the reactor is shutdown and the main turbine is tripped.

Operators then scan the control board to determine if any symptoms exist that identify upsets in heat transfer. Inadequate subcooling margin (ISM) is the highest priority heat transfer related symptom. The accidents discussed in this safety assessment result in a loss of adequate subcooling margin. Upon recognition that an ISM condition exists, operators will perform the actions of EOP-03 (Inadequate Subcooling Margin). These actions focus on assuring core cooling by tripping RC pumps, maximizing HPI which includes an initial determination for HPI line isolation, and establishing OTSG levels at the loss of subcooling margin setpoint using EFW. These actions are common to all of the SBLOCAs described in this safety assessment.

For a LOBA, the necessary systems and components are available to mitigate the accident with EDG-1B as the emergency power source. Control Complex (CC) ventilation is restored by starting AHF-18B and AHF-19B (emergency recirculation and supply fans) within EOP-03. During a loss of adequate subcooling margin, EOP-03 branches directly to EOP-08 (LOCA Cooldown) which establishes CC cooling by starting the 'B' train chiller. The only potential challenge rests with EFP-2 long term operation as a function of low steam supply pressure. However, to prevent challenging EFP-2 over the mission time for OTSG cooling, operation of EFP-2 will be managed by securing the turbine (closing ASV-5) if OTSG pressure reaches approximately 200 psig. Once OTSG pressure recovers, then EFP-2 will be placed back in service. In all cases, as a defense-in-depth measure, FWP-7 will be available to supply OTSGs with feedwater to continue plant cooldown to LPI (DHP-1B).

For a LOBB, EDG-1A provides the emergency power to supply required loads. CC ventilation is restored by starting AHF-18A and AHF-19A within EOP-03. EFP-1 will be operating and will be secured before loading the 'A' CC chiller, which will occur within 1 hour. EFW will be cross-connected in EOP-03 which will enable EFP-2 to supply EFW to both OTSGs through EFIC controlled flow valves EFV-58 ('A' OTSG) and EFV-57 ('B' OTSG). Starting the 'A' train CC chiller will be accomplished in EOP-08. Operator actions needed to cross-connect EFW will be accomplished in the CC and is expected to occur within

the time needed to reestablish CC cooling. As in the case for LOBA, EFP-2 operation may be limited in terms of OTSG pressure and will be managed if needed by EOP guidance. As a defense-in-depth measure, FWP-7 will also be available to supply OTSGs with feedwater to continue plant cooldown to LPI (DHP-1A).

For the loss of EFP-2, both EDGs start and provide emergency power to their respective ES busses. CC ventilation is restored by starting AHF-18B and AHF-19B within EOP-03. CC cooling will be established by starting the 'B' train chiller within EOP-08. Prior to reaching an EFP-1 operational limitation<sup>6</sup> operators will stop SWP-1A and RWP-2A (SWP-1B and RWP-2B are operating), place their respective control switches in the PTL position and defeat the EFP-1 auto-trip, all of which is accomplished from within the control room. This EDG-1A load management strategy is relatively simple and will be controlled by the Senior Reactor Operator directing EOP actions. FWP-7 will also be available to supply OTSGs with feedwater.

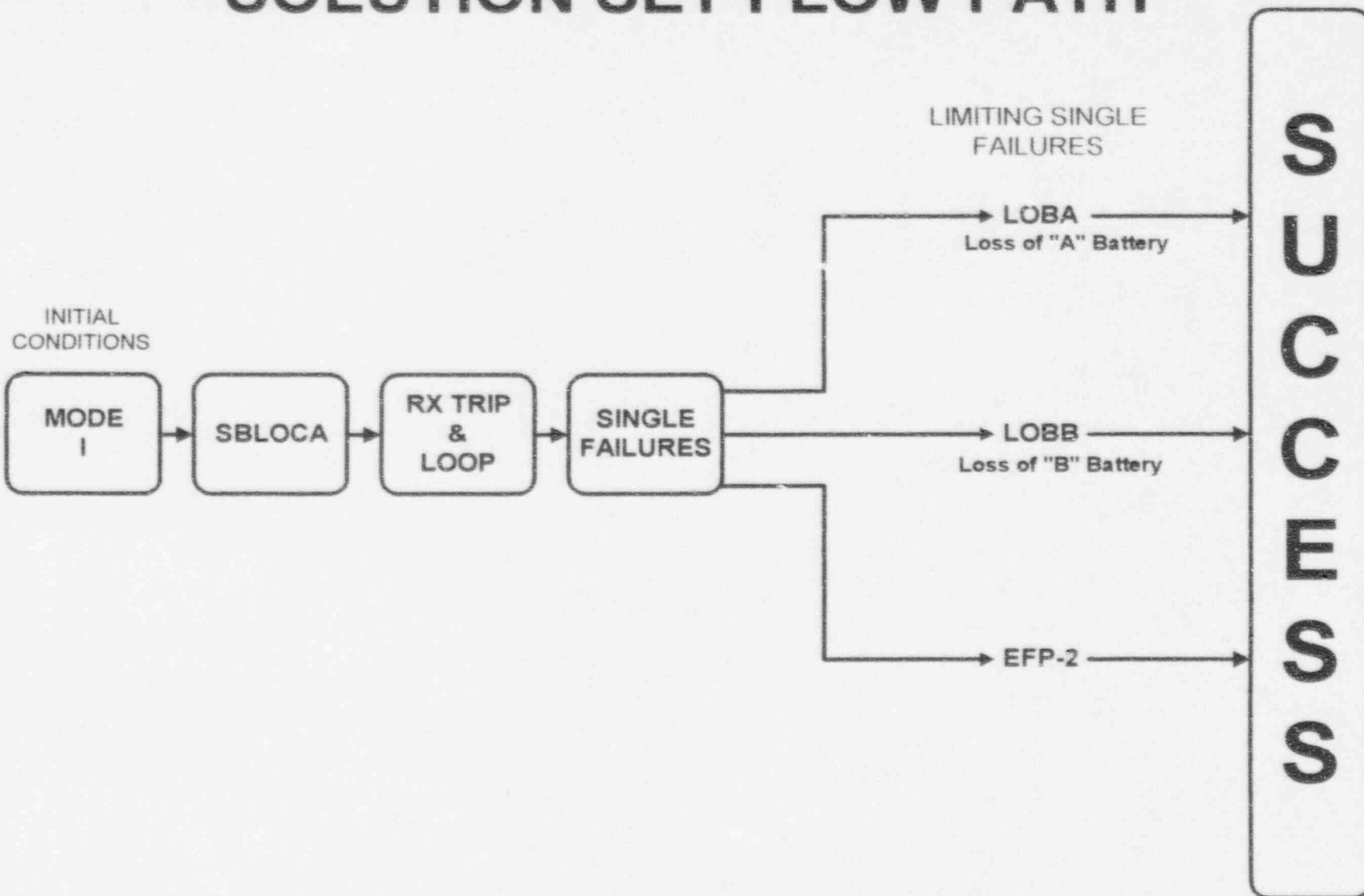
In consideration of the above accident scenarios it was determined that each accident can be managed within the design basis using a combination of plant modifications and operator actions. Several modifications reduce operator burden (EFV-12, EFW Cavitating Venturies, SWP/RWP PTL Switches, and the EFP-1 Trip Defeat Switch) for those actions needed to mitigate the specific accidents outlined and discussed in this safety assessment.

Revision 2 to this Safety Assessment incorporates comments developed by the Nuclear General Review Committee and the Plant Review Committee in addition to those comments generated by an independent team review. This revision also reflects analytical results from FTI document 51-1266138-01.

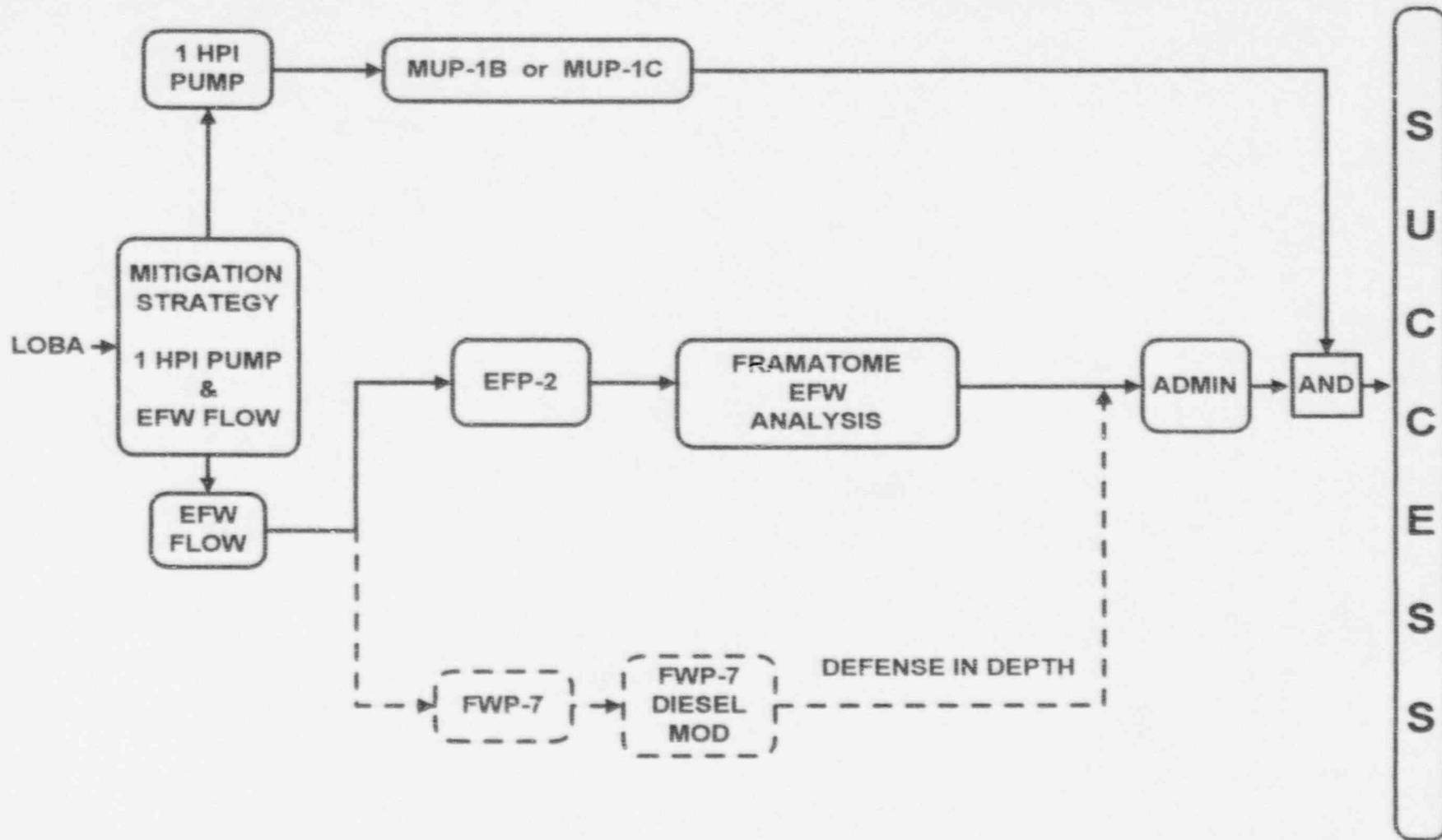
---

<sup>6</sup> DHP-1A will need to be started to establish ECCS piggyback. DHP-1A will automatically start when LPI actuates at ~500 psig RCS pressure.

# SOLUTION SET FLOW PATH

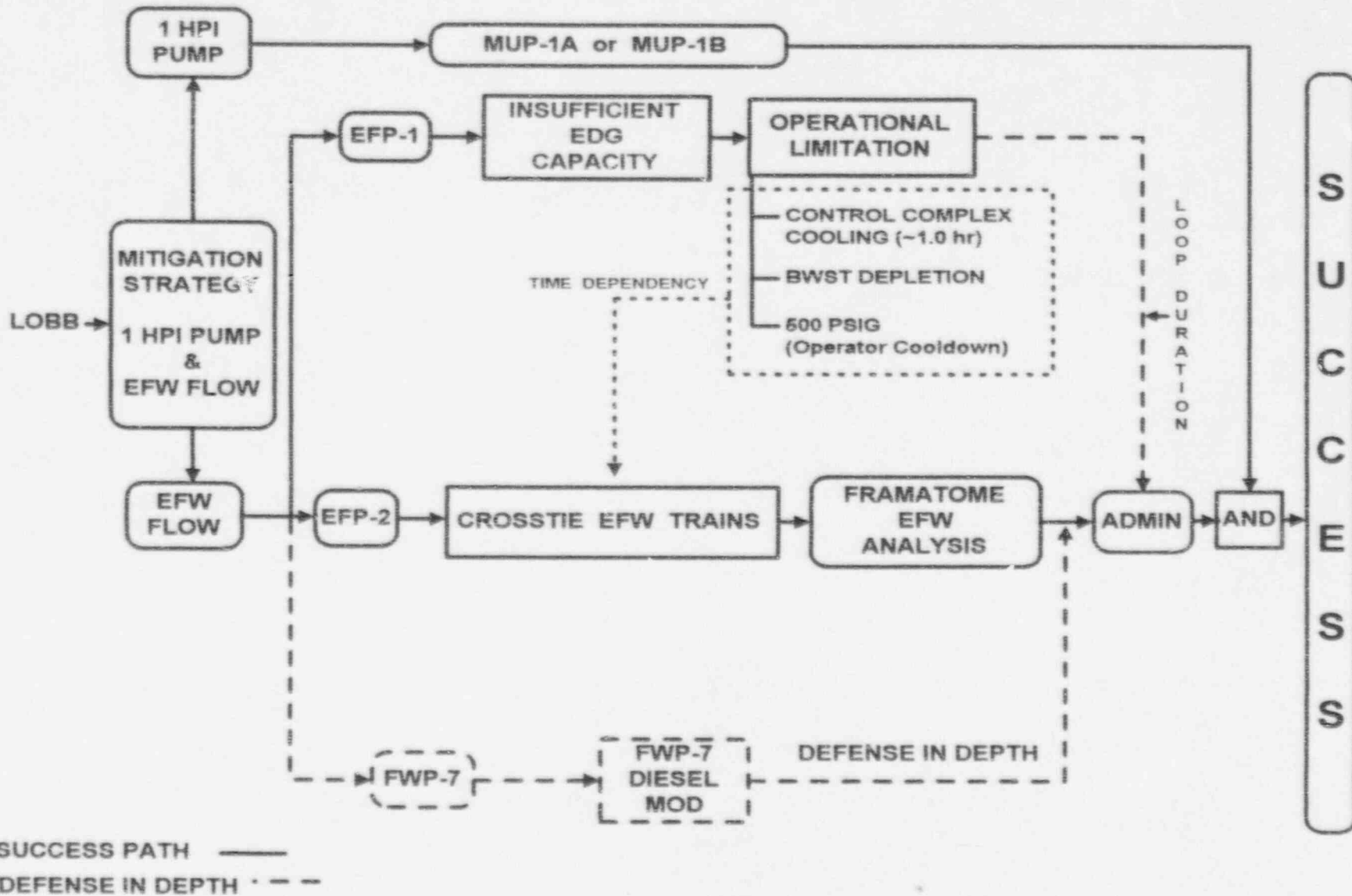


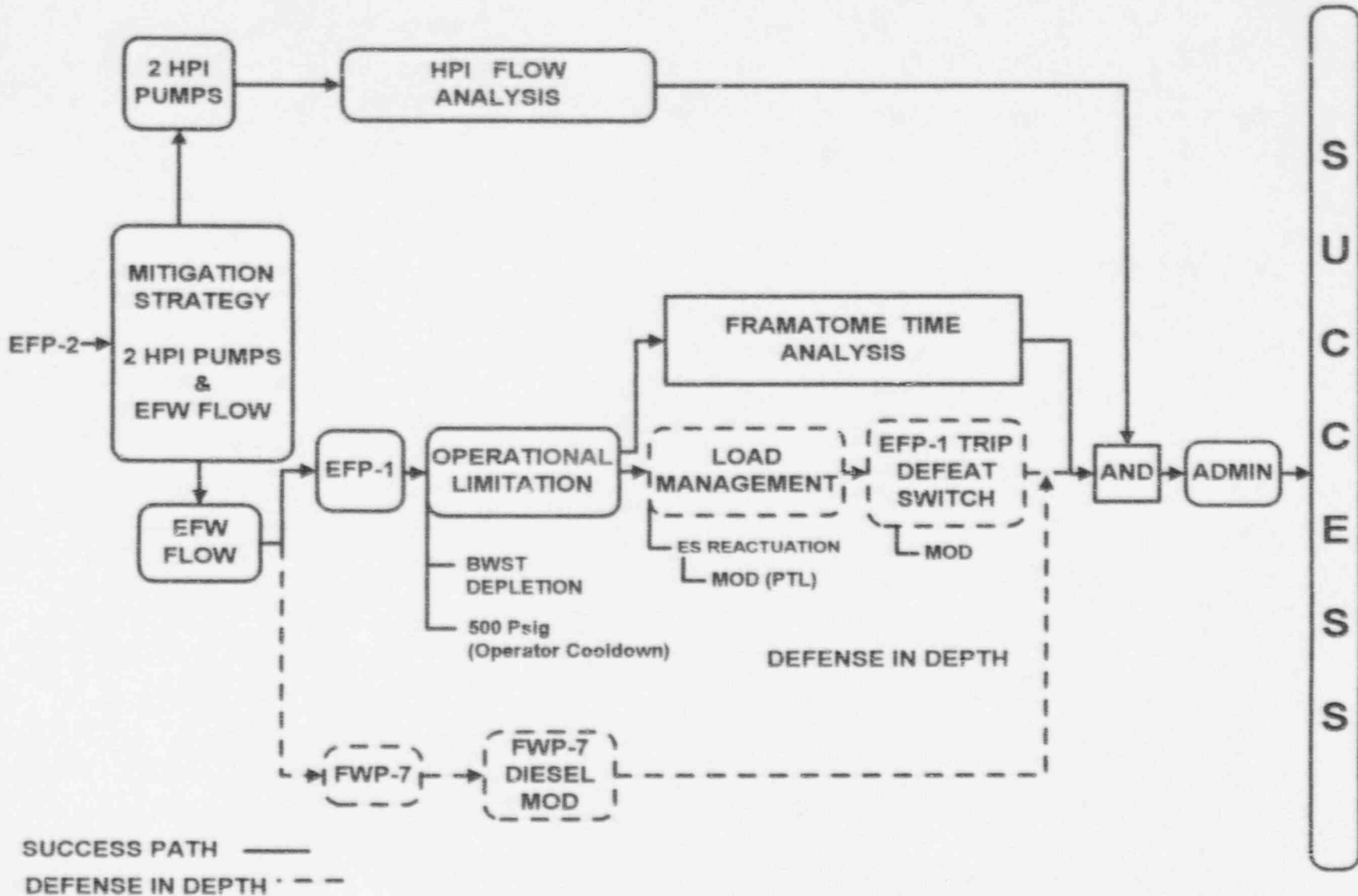
Attachment 1



SUCCESS PATH ———  
DEFENSE IN DEPTH - - -

Attachment 1







## Attachment 2

### Modifications addressed in the Safety Assessment

- EFW Cavitating Venturies (96-10-02-01): Installed to protect EFW pumps from reaching a condition of inadequate NPSHa due to a high flow condition.
- ASV-204 Auto-Open as 'A' Train Component (96-11-01-01): Installed to ensure EFP-2 automatically starts to share recirculation flow with EFP-1. This effectively reduces EDG-1A load due to a lower EFP-1 recirculation flow.
- EFP-2 Cavitating Venturi Flow Indication (97-01-04-01): Installed to provide operators with a remote verification that EFP-2 is operating before attempting to cross-connect EFW.
- Motor Operator for EFV-12 (96-10-10-01): Installed to enable cross-connecting EFW remotely from the CC.
- PTL Switches for SWP-1A/1B and RWP-2A/2B (97-04-02-01): Installed to facilitate EDG load management.
- EFP-1 Trip Defeat Switch (97-04-01-01): Installed to prevent EFP-1 from automatically tripping on an LPI actuation during a SBLOCA with a concurrent LOOP.
- FWP-7 Diesel Generator (97-03-01-01): Installed to provide FWP-7 with a diesel backed power supply. This modification significantly improves the availability of FWP-7 for a wide variety of accidents.

**FLORIDA POWER CORPORATION**  
**CRYSTAL RIVER UNIT 3**  
**DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72**

**ATTACHMENT C**

**TECHNICAL SPECIFICATION**  
**CHANGE REQUEST NOTICE 210**

## ATTACHMENT C

### TECHNICAL SPECIFICATION CHANGE REQUEST NOTICE 210

The Technical Specification changes associated with this request have been divided into three parts as follows:

1. Small Break Loss of Coolant Accident (SBLOCA) Mitigation
2. Emergency Diesel Generator (EDG) Upgrade
3. EDG Load Rejection Test & Steady State Loads

For each specific part, a description of the portions of the Technical Specifications that are affected, the reason for the changes, the justification for the changes, a determination of no significant hazards, and an environment impact evaluation are provided. Marked up pages of the Technical Specifications are attached to show the specific changes that are being requested. Each change on the marked up pages is referenced to one or more of the three parts listed above and indicate whether the change is permanent, for the remainder of Cycle 11 only, or will be reassessed prior to the restart of Cycle 12 based on the resolution of the EDG capacity limitations that is selected. The proposed new Technical Specification pages are also provided.

## PART 1 - SBLOCA MITIGATION

### OVERVIEW:

The Technical Specification changes proposed under this part are those changes necessary to reflect the operational limitations to support the solution sets for the mitigation of limiting SBLOCAs, as evaluated in Attachment B. These changes reflect the limitations on the operation of the motor driven Emergency Feedwater (EFW) system pump (EFP-1) based on load capacity limits on the 'A' Emergency Diesel Generator (EDG). As discussed in the cover letter, corrective actions will be taken during the next refueling outage to remove the limitations associated with the 'A' EDG load capacity. As such, the operational limitations associated with cross train dependencies and EDG load management proposed in these Technical Specification changes will only be required for the next cycle of operation. Other proposed Technical Specification changes in this part reflect modifications and clarifications that are not limited to one cycle of operation.

It should be noted that the EDG load calculations, and certain procedures and modifications listed in Attachment F are not complete at this time. These are discussed in the description and evaluation of the Technical Specification changes present in this part.

**LICENSEE DOCUMENT INVOLVED:** Technical Specifications

### PORTIONS:

#### Revised Technical Specification Sections

- 3.5 Emergency Core Cooling Systems (ECCS)
  - 3.5.2 ECCS - Operating
  
- 3.7 Plant Systems
  - 3.7.5 Emergency Feedwater (EFW) System
  - 3.7.7 Nuclear Services Closed Cycle Cooling Water (SW) System
  - 3.7.8 Decay Heat Closed Cycle Cooling (DC) System
  - 3.7.9 Nuclear Services Seawater System
  - 3.7.10 Decay Heat Seawater System
  
- 3.8 Electrical Power Systems
  - 3.8.1 AC Sources - Operating
  - 3.8.9 Distribution Systems - Operating

#### Added Technical Specification Section

- 3.7 Plant Systems
  - 3.7.18 Control Complex Cooling System

Revised Technical Specification Bases Sections

- B 3.3 Instrumentation
  - B 3.3.5 Engineered Safeguards Actuation System (ESAS) Instrumentation
  - B 3.3.17 Post Accident Monitoring (PAM) Instrumentation
  
- B 3.5 Emergency Core Cooling Systems (ECCS)
  - B 3.5.2 ECCS - Operating
  
- B 3.7 Plant Systems
  - B 3.7.5 Emergency Feedwater (EFW) System
  - B 3.7.7 Nuclear Services Closed Cycle Cooling Water (SW) System
  - B 3.7.8 Decay Heat Closed Cycle Cooling Water System
  - B 3.7.9 Nuclear Services Seawater System
  - B 3.7.10 Decay Heat Seawater System
  - B 3.7.12 Control Room Emergency Ventilation System (CREVS)
  
- B 3.8 Electrical Power Systems
  - B 3.8.1 AC Sources - Operating
  - B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air
  - B 3.8.9 Distribution Systems - Operating

Added Technical Specification Bases Section

- B 3.7 Plant Systems
  - B 3.7.18 Control Complex Cooling Systems

**SUMMARY OF CHANGES**

The Technical Specifications and associated Bases are being changed to reflect the latest analysis for SBLOCAs at CR-3 as described in Attachment B. Analyses have shown that for certain sized breaks, a combination of ECCS flow to the reactor vessel and EFW flow to the once through steam generators (OTSG) is needed to provide for adequate core decay heat removal.

Due to load capacity limits on the 'A' EDG, the length of time that EFP-1 would be available is limited. In order to ensure adequate EFW system flow, other actions would have to be initiated. This would include extending the time EFP-1 would be available by managing the load connected to the 'A' EDG and/or by taking action to provide EFW flow via EFP-2 by opening the cross tie valve. For the postulated single failure of EFP-2, the SBLOCA analysis assumes both HPI pumps and EFP-1 are providing flow for core decay heat removal.

The proposed Technical Specification changes reflect the above operational limitations. For inoperability of required equipment, required actions have been added for prompt verification of appropriate equipment to ensure adequate ECCS and EFW cooling capability remains. The

Technical Specification changes are proposed to be implemented until actions are taken during the next refueling outage to remove the operational limitations associated with the EDGs.

---

## TECHNICAL SPECIFICATION

- 3.3.5 - Engineered Safeguards Actuation System (ESAS) Instrumentation
- 3.3.17 - Post Accident Monitoring (PAM) Instrumentation
- 3.5.2 - ECCS - Operating
- 3.7.5 - Emergency Feedwater (EFW) System
- 3.7.7 - Nuclear Services Closed Cycle Cooling Water (SW) System
- 3.7.8 - Decay Heat Closed Cycle Cooling (DC) System
- 3.7.9 - Nuclear Services Seawater System
- 3.7.10 - Decay Heat Seawater System
- 3.7.12 - Control Room Emergency Ventilation System (CREVS)
- 3.7.18 - Control Complex Cooling System
- 3.8.1 - AC Sources - Operating
- 3.8.3 - Diesel Fuel Oil, Lube Oil, and Starting Air
- 3.8.9 - Distribution Systems - Operating

### Description of Request

Technical Specification 3.7.5 for the EFW system has been revised to require within one hour, verification of the operability of SW pump 1B (SWP-1B); train B of the Nuclear Services Seawater system; train B of the Control Complex Cooling system; and both trains of the ECCS, DC system, Decay Heat Seawater system, EDGs, AC Electrical Power Distribution subsystem, and AC Vital Bus subsystem when EFP-2 is inoperable. These changes for system cross train dependencies and EDG load management are required through the remainder of Cycle 11 only.

Prior to the beginning of Cycle 12, an additional TSCRN will be submitted to reflect the resolution of the EDG capacity limitations and to remove the interim measures proposed by TSCRN 210. Presently, the two primary options under consideration are to (1) install a new diesel-driven EFW pump and, thereby, reduce the loadings on the existing EDGs, or (2) to increase the capacity of the existing EDGs.

A corresponding requirement has been added to the Technical Specifications for ECCS (3.5.2), SW (3.7.7), DC (3.7.8), Nuclear Services Seawater (3.7.9), Decay Heat Seawater (3.7.10), Control Complex Cooling (3.7.18 - new), the Emergency Diesel Generators (EDG) (3.8.1), and Distribution System (3.8.9). With one train of ECCS, SW pump 1B (SWP-1B), one train of the DC system, train B of the Nuclear Services Seawater system, one train of the Decay Heat Seawater system, CHHE-1B and CHP-1B of the Control Complex Cooling system, one EDG, one AC Electrical Power Distribution subsystem, or one AC Vital Bus



subsystem inoperable, required actions have been added to verify within one hour that EFW-2 and associated flow path are operable. These changes for cross train dependencies and EDG load management are required until the next cycle of operation.

The Technical Specification for the EFW system (3.7.5) has been revised to require the operability of EFP-2 in Mode 3 with OTSG pressure less than 200 psig.

Technical Specification 3.7.18 has been added to provide the requirements for operability and testing of the Control Complex Cooling system. Also, the Bases for Technical Specification 3.7.12 has been changed to reference this new specification.

Appropriate changes to the Technical Specification Bases have been proposed to support the above Technical Specification changes. Additionally, other Technical Specification Bases changes have been proposed. Discussions for the trip defeat of EFP-1 on a reactor coolant system (RCS) Pressure - Low Low initiation coincident with a loss of offsite power have been added. Discussions are added to address the modification of switches for SWP-1A and Nuclear Services Seawater Pump 2A (RWP-2A) to allow these pumps to be secured and locked out to prevent reinitiation. The trip defeat, along with the trip feature, will be removed during the next refueling outage. The modified switches for SWP-1A and RWP-2A will not be replaced during the next refueling outage but the operator action to use these switches to secure the loads on the A EDG will not be necessary after plant changes to address the load capacity limits on the EDGs. A statement has been added for Bases 3.8.3 that in certain SBLOCA scenarios, both EDGs are relied upon for accident mitigation.

Additional changes to the Technical Specification Bases have been proposed to add discussions on the installation of cavitating venturis on the discharges of the EFW pumps and to revise discussions for ASV-204.

### **Reason for Request**

The proposed changes for Part 1 implement those requirements to correspond with mitigation of SBLOCAs as described in Attachment B. For certain sized SBLOCAs, the EFW system is required to provide cooling to the OTSGs until the time that core decay heat can be removed solely by the high pressure injection (HPI) system. Based on certain SBLOCA scenarios incorporating single failure criteria, a combination of ECCS flow, EFW flow, and management of 'A' EDG loadings are required to ensure adequate core cooling is provided for the duration of the event. The proposed Technical Specification changes provide for prompt action to ensure the availability of the required systems.

To address the SBLOCA scenarios and the EDG capacity, Attachment F provides a description of the 1) operator actions, 2) modifications, 3) FSAR changes, 4) resolution of NRC identified unreviewed safety questions, and 5) related LERs.

### **Evaluation of Request**

The changes proposed to the Technical Specification under this part provides requirements that reflect interim measures for Cycle 11 required to mitigate the consequences of certain SBLOCAs with a concurrent LOOP and certain single failures. A reevaluation of the SBLOCA analyses has been performed based on the identification of these single failures.

The results of the previous SBLOCA analyses for CR-3 was provided to the NRC by letter dated May 22, 1996<sup>1</sup> in accordance with 10 CFR 50.46. These analyses were performed by FTI in the referenced calculation (FTI 51-1245866-01) in order to evaluate a new instrumentation configuration in terms of the HPI system capabilities.

It should be noted that this scenario does not affect the currently analyzed integrity of the OTSG tubes. The OTSG Tube Surveillance Program in accordance with Technical Specification 5.6.7.10 ensures that the integrity of the OTSG tubes is maintained for postulated accidents. This is consistent with the guidance in Regulatory Guide 1.121, "Basis for Plugging Degraded PWR Steam Generator Tubes."

FTI 51-1245866-01 evaluated the HPI flow results against the limiting ECCS flow requirements. The limiting requirements are governed by five considerations based upon FTI Calculation 51-01229115-02, "Crystal River-3 HPI Flow Requirements for an Upgraded Power Level of 2568 MWt:"

1. Cold leg pump discharge (CLPD) break
2. Core flood line break
3. Large effective area HPI line break
4. Small effective area HPI line break
5. Feed and bleed cooling using the pressurizer code safety valves

This evaluation determined that the HPI system did not satisfy the ECCS flow requirements for selected CLPD breaks and small effective area HPI line pinch breaks. The other events were acceptable with the HPI flow results.

The SBLOCA analysis in FTI 51-1245866-01 recalculated the maximum PCT for the two unacceptable events and determined that the most limiting case was the 0.125 ft<sup>2</sup> CLPD break. In this break, the results indicated core uncovering (4 feet of the upper core uncovered at 730 seconds into the event) with a PCT of 1859 °F. The most limiting HPI line pinch break resulted in a minimum vessel inventory that remained continuously above the top of the core. Therefore, it experienced no cladding temperature excursion. These results satisfied the requirements of 10 CFR 50.46.

---

<sup>1</sup> FPC to NRC, dated May 22, 1996, "New Small Break Loss-of-Coolant Accident (SBLOCA) Analyses," 3F0596-22

Since the completion of that SBLOCA analysis, a review of EDG capacities and EFW dependencies determined that insufficient margins could exist for the mitigation of a SBLOCA subject to coincident LOOP and specific assumed single failures. The single failures of concern were identified as (1) the loss of battery "A" (LOBA), (2) the loss of battery "B" (LOBB), and (3) the failure of EFP-2. Solution sets depicting success paths for mitigation of a SBLOCA with these identified single failures were developed and challenges were identified and evaluated.

Attachment B describes the SBLOCA scenarios and the solution sets. It provides a topically-oriented safety assessment of the proposed accident solution sets based on specific plant modifications and the resulting EOP changes, focusing on accident mitigation challenges. Attachment D provides FTI 51-1266138-01 which presents the FTI safety analyses and evaluations addressing the identified challenges.

For SBLOCAs, removal of core decay heat is accomplished by a combination of ECCS injection flow and EFW system flow to the steam generators. EFW system flow to the steam generators is required for certain sized SBLOCAs until the time that core decay heat can be removed solely by the HPI system. Depending on the postulated single failure assumed in conjunction with a LOOP, adequate core cooling will be maintained by the following combinations of HPI and EFW cooling.

<b>Attachment B Solution Sets for Postulated Single Failures</b>		
<b>Postulated Single Failure</b>	<b>HPI</b>	<b>EFW</b>
Loss of A Battery	1 HPI Pump	EFP-2
Loss of B Battery	1 HPI Pump	EFP-1 followed by EFP-2 via cross tie
Loss of EFP-2	2 HPI Pumps	EFP-1 (EDG load management capability)

Recent reviews have determined that the A EDG load capacity limits restricts the length of time that EFP-1 can be operated. The existing load capacity limits on the A EDG prohibits concurrent operation of EFP-1 with certain other safety related equipment required to operate during the accident. Additionally, EFP-1 automatically trips on a RCS Pressure - Low Low initiation coincident with a LOOP based on the assumption that EFW would not be required for the mitigation of the accident at the LPI actuation setpoint.

Based on the single failures, required ECCS and EFW flow requirements, and EDG load capacity limits, solution sets were developed to ensure that a strategy was available to ensure successful mitigation of postulated SBLOCAs with a concurrent LOOP.

For the postulated single failure of the loss of the B Battery, EFP-1 would be secured at some time in the accident in order to allow other loads to be connected to the A EDG. These would include manually starting the A LPI pump (piggy back mode) on borated water storage tank (BWST) depletion, reaching the automatic trip setpoint of EFP-1 on a RCS Pressure - Low Low initiation coincident with a LOOP, or manually starting the Control Complex Cooling system. EFW flow would still be required at that time; therefore, actions would be taken to open the cross tie valve (EFV-12) and supply flow to the OTSGs with EFP-2, in order to secure EFP-1 and reduce loads on A EDG.

During the current outage, a modification on EFV-12 is being implemented to install a motor-operated valve in place of the current manual operated valve. Controls to operate the motor-operated valve will be installed in a switchgear room due to other operational conditions (e.g., Appendix R). Replacement of the manual valve with the remote operated valve will minimize the operator burden should this scenario occur and will allow operation of the cross tie valve within the time constraints assumed in the SBLOCA analysis.

As discussed in Attachment D, for certain SBLOCA scenarios RCS repressurization to the pressurizer safety valves (PSV) actuation setpoint could occur. Without EFW flow and certain small break sizes, core cooling would be maintained by utilizing HPI flow and core decay heat removal via the break and PSV actuation. The break sizes of interest are those which are too small to remove the core decay heat solely with HPI flow through the break. For example, EFW flow could be lost based on securing EFP-1 due to starting LPI on BWST depletion. Actuation of the PSVs would continue until either EFW flow could be re-established or core decay heat decreases to match heat removal via HPI flow through the break.

The break configuration resulting in the least amount of HPI flow at the PSV setpoint is for the HPI line pinch break. New HPI line break isolation criteria have been developed based on HPI line flows to ensure that the ruptured HPI line is isolated to provide adequate HPI flow for this scenario. Additionally, the HPI flow is required to be periodically re-evaluated based on the isolation criteria due to changes in HPI line flows with RCS pressure.

To increase the availability of EFW during these scenarios, EDG load management will be available to the operators as a defense in depth mechanism. Load management allows relying on the redundant B train components, securing redundant system loads on the A EDG, and thus providing the required load capacity for EFP-1. This ability has been added to the required actions for the affected Technical Specifications. Affected systems are SW and Nuclear Service Seawater.

For SW system pump SWP-1A and Nuclear Services Seawater system pump RWP-2A, modifications will be implemented during the current outage to allow these pumps to be manually secured to prevent automatic reinitiation. Similar modifications will be performed on the redundant pumps for human factors and to provide a method for securing the pumps during other abnormal events. Although the modification is in development, pull-to-lock switches with alarms are the intended method to secure the pumps. Prior to securing the



pumps for managing the EDG load in this scenario, the redundant pumps would be verified to be operating and providing the required safety function

As discussed in Attachment D, an evaluation of the RCS cooldown was performed to determine if the RCS could be cooled below the 500 psig EFW trip setpoint before EFW would no longer be needed. This evaluation conservatively assumed that the non-safety atmospheric dump valves (ADV) were available in order to maximize the cooldown rate. The ADVs were limited to approximately 80% of wide open capacity consistent with the main steam Enhanced Design Basis Document. With the loss of EFP-2 and a LOOP, operator actions would be initiated at 20 minutes into the accident scenario to perform a forced cooldown of the RCS. The evaluation concludes that the RCS would not reach the 500 psig automatic trip of EFP-1 before core decay heat could be removed solely by HPI.

Additionally, a trip defeat switch will be installed during the current outage to allow the operator to bypass the automatic trip of EFP-1 on a RCS Pressure - Low Low initiation coincident with a LOOP. Although the modification is in development, this switch is intended to be located in a locked relay panel in the control room and will be equipped with an alarm when it is placed in the defeat position. The automatic trip functions to protect the EDG by preventing both the Low Pressure Injection (LPI) pump and EFP-1 from being loaded on the A EDG at the same time. When steps taken to manage the load on the A EDG have been taken such that load capability would support the operation of both pumps, the trip defeat will extend the available time of EFP-1 when needed.

Attachment B provides the results of the evaluation of the analyzed SBLOCA scenarios. This evaluation shows that for SBLOCAs with a concurrent LOOP and certain single failures, the ECCS and EFW systems can adequately mitigate the consequences of the accident. Due to the loading limitations on the EDGs, actions have to be initiated to ensure that EFP-1 would be available until core decay heat can be solely removed by HPI. These limitations are reflected in the Technical Specification changes proposed by this TSCRN. These changes for system cross train dependencies are required through the remainder of Cycle 11 only.

Prior to the beginning of Cycle 12, an additional TSCRN will be submitted to reflect the resolution of the EDG capacity limitations and to remove the interim measures proposed by TSCRN 210. Presently, the two primary options under consideration are to (1) install a new diesel-driven EFW pump and, thereby, reduce the loadings on the existing EDGs, or (2) to increase the capacity of the existing EDGs.

The proposed Technical Specification changes provide operability requirement limitations based on the additional dependencies resultant from the A EDG capacity limitations. Accordingly, action requirements are added for inoperable equipment as listed in the following table. For the inoperability of equipment in Column A, the operability of equipment in Column B must be verified within one hour. Conversely, for the inoperability of equipment in Column B, the operability of equipment in Column A must be verified within one hour. The

one hour completion time ensures that prompt action will be taken to confirm the capability for core decay heat removal and EDG load management.

<b>System Cross Train Dependencies</b>	
<b>Column A</b>	<b>Column B</b>
Train "B": <ul style="list-style-type: none"> <li>• EDG</li> <li>• AC Electrical Power Subsystem</li> <li>• AC Vital Bus Subsystem</li> </ul>	<ul style="list-style-type: none"> <li>• EFP-2 (ASV-204)</li> <li>• Cross tie ability (EFV-12, EFV-13)</li> </ul>
EFP-2	<ul style="list-style-type: none"> <li>• Both Trains of                SFI                EDGs                Decay Heat Seawater                DC                AC Electrical Power Distr Subsys                AC Vital Bus Subsystem</li> <li>• SWP-1B</li> <li>• Train "B" of Nuclear Services                Seawater</li> <li>• CHHE-1B and CHP-1B of Control                Complex Cooling</li> </ul>

Proposed Technical Specification changes were not made for the system cross train dependencies for the inoperability of both EDGs, one DC electrical power subsystem, or one DC Electrical Power Distribution subsystem. In these instances, the existing Technical Specification Required Actions to restore the inoperable equipment have a completion time of 2 hours. A one hour completion time to verify that EFP-2, EFV-13, EFV-12, or ASV-204 is operable was not added in these cases in order to focus the efforts on restoring the inoperable equipment to an operable status. The 2 hour limit to restore the inoperable equipment is not significantly different than 1 hour limit being added to the other affected Technical Specifications. Further, the Technical Specifications require that CR-3 be placed in Mode 3 and ultimately in Mode 5 if the these 2 hour Completion Times are not met.

The required action for inoperability of EFP-2 based on the inoperability of the steam admission valves (ASV-5 and ASV-204) is further modified. ASV-204 is addressed separately from EFP-2 with a 1 hour Completion Time to verify cross-train dependencies. ASV-5 is also addressed separately from EFP-2 but without the need to verify cross train dependencies. The difference between ASV-204 and ASV-5 reflects the greater reliance on ASV-204 in the mitigation of a



SBLOCA as provided in the solution sets. ASV-204 is used for the load sharing capability of the EFW system for a SBLOCA concurrent with a LOOP and loss of the B EDG. A modification is being performed this outage to restore the automatic opening feature of ASV-204 which restores the reliability of EFP-2.

The proposed Technical Specification changes require that certain equipment is verified as OPERABLE during the required completion time. Verify as OPERABLE does not mean that the associated surveillance requirements must be reperformed during the completion time. Rather, it means that the associated equipment is assumed to be OPERABLE if the associated surveillance requirements are up to date (i.e., have been met within the required frequency) and that the equipment is not otherwise known to be inoperable. This is consistent with the Bases for Surveillance Requirement 3.0.1 and NRC Generic Letter 91-18.

A statement is being added to the Bases for Diesel Fuel Oil and Lube Oil (3.8.3) to reflect the requirement that both EDGs are relied upon for accident mitigation in certain SBLOCA scenarios. This requirement does not change the current Technical Specification basis for a 3.5 day supply of fuel oil and lube oil for each EDG. This onsite fuel oil capacity ensures adequate time is available to replenish the onsite supply from outside sources prior to the diesel running out of fuel.

A new Technical Specification is proposed to be added for the Control Complex Cooling system. The Control Complex Chillers are safety related loads that would be manually loaded onto the EDGs as needed after a SBLOCA with a concurrent LOOP. The addition of this Technical Specification allows for including the action requirements for the operational limitations as described above to extend the availability of EFP-1. The proposed Technical Specification is consistent with the Standard Technical Specifications (STS) for B&W plants except for 1) the CR-3 Control Complex Chiller system design layout does not use trains as described in the STS but uses redundant components that can be aligned for the cooling function and 2) an additional surveillance has been added to address the testing of the chiller pumps in accordance with ASME Section XI.

Additionally, Specification 3.7.5 is revised to require the operability of the turbine driven emergency feedwater pump in Mode 3 with OTSG pressure less than 200 psig. Recent analysis by the pump manufacturer has shown that at OTSG pressure of less than 200 psig, EFP-2 is capable of producing the accident analysis flow rate. In these conditions, the flow rate produced by the pump would be adequate to perform heat removal function.

During the current outage, cavitating venturis are being added to the EFW pump discharge lines. This modification enhances the operation of the EFW system when it is required to operate for accident mitigation. Installation of the cavitating venturis will resolve previously identified concerns regarding net positive suction head (NPSH), provide cavitation protection for the EFW pumps, and provide protection to the OTSG tubes by preventing excessively high flow induced problems. Appropriate changes to the Technical Specification Bases have been proposed to reflect this modification.

In order to correct the problem reported in CR-3 LER 96-024 regarding the removal of the automatic opening feature of ASV-204 (one of two steam admission valves associated with EFP-2), a modification is being performed this outage to restore this feature. Accordingly, changes to the Technical Specification Bases have been proposed to reflect the restoration of this feature.

---

#### **NO SIGNIFICANT HAZARDS EVALUATION:**

FPC has evaluated the provisions in 10 CFR 50.92(c) regarding the proposed Technical Specification changes, modifications, and operator actions and concludes that a significant hazard is not involved. Efforts have been made to maintain the changes consistent with the applicable generic guidance and the Improved Standard Technical Specifications, recognizing FPC's decision to explicitly address certain cross-train dependencies rather than to rely on the Safety Function Determination Program, and to use certain manual operator actions. In support of these conclusions, the following evaluation is provided:

1. The proposed Technical Specification changes, modifications, and operator actions involving SBLOCA mitigation will not result in a significant increase in the probability of an accident previously evaluated. In addition, the portions of the change involving cross-train dependencies and load management are being requested for the remainder of Cycle 11 only, which limits the impact on any previously established probabilities. The initiators of any design basis accident is not affected by the proposed Technical Specification changes, modifications, and operator actions involving SBLOCA mitigation. Consequently, there is no significant impact on any previously evaluated accident probabilities

The proposed Technical Specification changes, modifications and operator actions involving SBLOCA mitigation do not result in a significant increase in the consequences of SBLOCA mitigation-related accidents previously evaluated. In this regard, the proposed Technical Specification changes, modifications and operator actions will not adversely affect the integrated ability of the EDGs and the EFW, SW, RW, Control Complex Cooling, ECCS, DC, Decay Heat Seawater, and Electrical Distribution Systems to perform their intended safety functions. Therefore, the combined ability of these components and systems and actions to mitigate the consequences of a SBLOCA will continue to be maintained. In fact, the collective impact of these Technical Specification changes, modifications and operator actions represents a restoration of the ability to mitigate the consequences of a SBLOCA, which are consistent with the consequences assumed in licensing and design basis for CR-3. For example, the installation of EFW cavitating venturis and the improved operational range of the turbine driven feedwater pump increase the ability of the EFW system to mitigate the consequences of a SBLOCA. In addition, the Technical Specification changes, modifications and operator actions do not significantly affect the onsite or offsite doses which remain a small fraction of 10 CFR Part 100 limits.

2. The proposed Technical Specification changes, modifications and operator actions do not create the possibility of a new or different kind of accident from any accident previously evaluated. The Technical Specification changes, modifications, and operator actions do not involve a different initiator for any design basis accident and do not create new design basis scenarios. SBLOCA mitigation, utilizing a combination of automatic and manual actions, is already part of the CR-3 licensing basis. Manual operator actions necessary for the mitigation of SBLOCAs are currently addressed or are being addressed in EOPs. Also, these Technical Specification changes, modifications and operator actions restore the ability to mitigate the impact of a SBLOCA, which is consistent with the CR-3 licensing and design basis. Based on the above, a new or different kind of accident does not result from this submittal.
3. The proposed Technical Specification changes, modifications and operator actions do not involve a significant reduction in the margin of safety for SBLOCA mitigation. The Technical Specification changes, modifications and operator actions for the EDGs and the EFW, SW, RW, Control Complex Cooling Systems represent a restoration of the overall margin of safety to a degree that it will be consistent with the existing plant design and licensing bases for SBLOCA mitigation.

---

#### **ENVIRONMENTAL IMPACT EVALUATION:**

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not; (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released off site, or (3) result in an significant increase in individual or cumulative occupational radiation exposure. FPC has reviewed this license amendment and believes it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of the proposed Technical Specification changes, modifications and operator actions. The basis for this determination is as follows:

1. The proposed Technical Specification changes, modifications and operator actions do not involve a significant hazard as described previously in the No Significant Hazards Consideration evaluation.
2. The proposed Technical Specification changes, modifications and operator actions do not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite. The re-evaluation of the SBLOCA analysis confirms that no significant changes in types or amount of effluents for CR-3 are postulated.

3. The proposed Technical Specification changes, modifications and operator actions do not result in a significant increase in individual or cumulative occupational radiation exposure. As previously described in the No Significant Hazards Consideration evaluation, these changes provide a net improvement in the ability to mitigate the consequences of a SBLOCA and, therefore, do not significantly affect the onsite or offsite doses which remain a small fraction of 10 CFR 100 limits.

## **PART 2 - EDG UPGRADE**

### **OVERVIEW:**

These are the Technical Specification changes resulting from the upgrade of the EDG 200-hour and 2000-hour service ratings.

**LICENSEE DOCUMENT INVOLVED:** Technical Specifications

### **PORTIONS:**

#### 3.8.1 - AC Sources - Operating

- SR 3.8.1.4 - Minimum EDG day tank fuel volume
  - SR 3.8.1.11 - EDG refueling interval load test
- The Bases of this specification are also changed.

#### 3.8.3 - Diesel Fuel Oil, Lube Oil, and Starting Air

- Action A - Minimum fuel storage tank volumes
  - Action B - Minimum lube oil volume
  - SR 3.8.3.1 - Minimum fuel storage tank volumes
  - SR 3.8.3.2 - Minimum lube oil volume
- The Bases of this specification are also changed.

### **SUMMARY OF CHANGES**

The required minimum inventories of the EDG Fuel Oil Storage Tanks, Lube Oil Storage, and Day Tanks are being increased. Also, the maximum and minimum EDG load capacity limits for the refueling interval test increased and the Background, LCO, Actions, and Surveillance Requirements Bases are being revised accordingly. The Action requirement for EDG stored lube oil is revised to clarify that the lube oil storage is common for both EDGs. Additionally, the Surveillance Requirements Basis for the Lube Oil is clarified to ensure sufficient oil for one EDG, rather than each EDG. The Surveillance Requirements Basis for the refueling EDG load test is revised for a test that bounds the maximum expected accident loads.

---

### **TECHNICAL SPECIFICATIONS**

- 3.8.1 - AC Sources - Operating
- 3.8.3 - Diesel Fuel Oil, Lube Oil, and Starting Air



### **Description of Request**

#### **SR 3.8.1.4 - Minimum EDG Day Tank Fuel Volume**

The minimum contained volume for each EDG day tank is being increased from 245 gallons to 280 gallons. The associated basis is being changed to indicate that the fuel volume requirements are adequate for a load profile that bounds the postulated worst case post-accident EDG loads, rather than full load plus 10%. The basis is also being clarified to indicate the day tank fuel oil level is expressed as usable volume.

#### **SR 3.8.1.11 - Refueling Interval Load Test**

The minimum load for the refueling interval EDG load test is being changed from 3100 kW to 3300 kW. Also, the maximum load for the refueling interval EDG load test is changed from 3250 kW to 3400 kW. Background and Surveillance Requirement Bases are being revised to reflect the increased minimum and maximum loads. The Surveillance Requirement Basis regarding the EDG test band is also being revised to be more consistent with the Standard Technical Specifications, to clarify that the surveillance test bounds the maximum expected accident loads, and to describe the loads that make up the accident loads.

#### **TS 3.8.3, Action A - Minimum Fuel Storage Tank Volumes**

##### **SR 3.8.3.1 - Minimum Fuel Storage Tank Volumes**

The lower volume of stored fuel for each EDG is being changed from 15,933 to 19,643 gallons, and the upper volume is changed from 18,589 to 22,917. In addition, the minimum combined stored fuel for both EDG tanks is being changed from 37,177 to 45,834 gallons. The Surveillance Requirement is being revised to require a minimum of 22,917 gallons for a single tank and 45,834 gallons for combined fuel oil storage. The Background, LCO, Action A.1, and Surveillance sections of the basis for Technical Specification 3.8.3 are being changed to indicate the minimum EDG stored fuel volume are based on operation at the upper limit of the 200 hour rating, rather than at the continuous load rating. The Bases of Action A.1 and Surveillance Requirement are also being clarified to indicate the storage requirement is based on usable volume.

#### **TS 3.8.3, Action B - Minimum Lube Oil Volume**

##### **SR 3.8.3.2 - Minimum Lube Oil Volume**

The lower volume of lube oil inventory for each EDG is being changed from 200 to 240 gallons, and the upper volume is changed from 233 to 280 gallons. The Surveillance Requirement and its basis are being revised to require a minimum of 280 gallons. The Background, LCO, Action B.1, and Surveillance Requirement sections of the Basis for Technical Specification 3.8.3 are being changed to indicate the minimum EDG stored lube oil inventory requirements are based on operation at the upper limit of the 200 hour rating, rather than full load operation. Additionally, the Surveillance Requirement Basis for the Lube Oil is being clarified to ensure sufficient oil for



one EDG, rather than each EDG. The Action requirement has been clarified to indicate that both EDGs must be declared inoperable when the lube oil storage volume is below the minimum level since this volume is common to both EDGs.

### **Reason for Request**

FPC is performing modifications to the EDGs at CR-3 which increase the 2000 hour and 200 hour ratings. Additional modifications are underway to reduce the loads on the EDGs. The largest reduction of loads on Train "A" of the EDGs is attributed to restoring the automatic opening of the steam admission valve to the turbine driven emergency feedwater pump on an "A" EFIC actuation. This will restore the load sharing capability of the EFW System. The modifications were performed in response to the results of an increase in the worst-case accident load profile. FPC has also modified the EDG instrumentation to provide a more accurate indication of EDG load.

The minimum contained volume for the EDG day tanks, fuel storage tanks, and lube oil inventory is being increased to reflect a recent recalculation of the fuel and lube oil consumption of the EDGs. These calculations are based on an increase in the worst-case accident load profile, and revised engine fuel consumption rates for different loadings provided by the manufacturer. The calculations also reflect a more conservative value of specific gravity for the diesel fuel, more accurate level and volume instrument uncertainties, and the usable volume of the tanks.

The current basis for the EDG refueling interval load test states that the minimum test load is based on the automatically connected loads occurring at one minute. For certain accident conditions, the automatically connected loads would be higher later in the scenario than at one minute due to the timing of the actuation of engineered safeguards (ES) systems.

To address the SBLOCA scenarios and the EDG capacity, Attachment F provides a description of the 1) operator actions, 2) modifications, 3) FSAR changes, 4) resolution of NRC identified unreviewed safety questions, and 5) related LERs.

### **Evaluation of Request**

The current basis for SR 3.8.1.4 requires verification that the level of each day tank ensures adequate fuel oil for a minimum of 1 hour of EDG operation at full load plus 10%. The design guidance, ANSI N195-1976, clarifies that the tank capacity shall assume the fuel consumption with the diesel running at 100 percent continuous load plus a minimum additional margin of 10 percent. The continuous rating of the EDGs is 2850 kW.

The revised minimum usable fuel volume for each day tank is based on 1 minute of operation at the 30 minute rating (3500 kW) and 59 minutes of operation at the upper limit of 200 hour rating (3400 kW). This provides a minimum requirement that bounds the current 1 hour operation at full load plus 10 percent as well as the postulated worst case accident EDG load

profile. The current capacity of each day tank is sufficient to hold the increased usable volumes proposed by this change. The adequacy of the fuel transfer pumps between the storage tanks and day tanks to supply the increased fuel demand resulting from the EDG upgrade has been verified.

The current basis for Actions A and B of TS 3.8.3, and SR 3.8.3.1 and SR 3.8.3.2 requires sufficient fuel and lube oil for EDG operation at the continuous load rating. However, the postulated worst case post-accident loading is not bounded by operation at the continuous rating (2850 kW) of one EDG. Therefore, the minimum fuel and lube oil storage requirements are being changed to require operation of one EDG at the upper limit of the revised 200 hour rating (3400 kW). This will ensure a conservative inventory that will bound the postulated post-accident loads. The current usable capacity of each fuel tank is sufficient to hold the increased volumes proposed by this change.

A new Action A is being added to verify within 1 hour that a combined stored volume of fuel oil is greater than 7 days (45,834) if either of the EDG storage tanks is less than a 3.5 day volume. This action in conjunction with the existing Action A (renumbered to B). will clarify the existing requirements for fuel oil storage. Fuel oil storage requirements will be acceptable as a 7 day capacity exists and at least a 3 day capacity is contained in each individual tank. This is consistent with the existing Bases.

Additionally, the Bases for SR 3.8.3.2 is being revised to ensure sufficient lube oil for 7 day operation of one EDG, rather than for each EDG. This change will establish consistency with the previously approved lube oil inventories in Action B of TS 3.8.3, which is based on one EDG operation and the 7 day fuel oil requirements.

The service ratings of the EDGs are increased to reflect the recent EDG modifications. This increase in 200 hour service rating bounds the postulated accident EDG load profile. Increasing the EDG loading for the refueling interval load surveillance will provide a test that demonstrates that the EDGs are capable of accepting a load within the 200 hour service rating and provide assurance that the EDGs are capable of operating at the increased loads made possible by the modifications. Although the EDG load calculation has not been completed at this time, the minimum test load of 3300 kW will bound the maximum expected accident EDG loads. The accident loads includes the automatically connected accident loads, manually applied accident loads, and momentary loads. The Bases for the refueling interval EDG load test is being revised accordingly.

The current refueling interval load test is based on a lower and upper test limits with a range of 150 kW. The revised limits (3300 kW to 3400 kW) have a range of 100 kW and take into consideration the increased EDG capability and improved loading instrumentation. The Bases of the refueling interval load test regarding the test load band was revised to be consistent with the Standard Technical Specifications.

The revision of the Bases for the EDG load test reflects a better understanding of EDG loading for small break LOCAs. Within one minute following a large break LOCA with a simultaneous LOOP, steady state conditions have been achieved for the ES loads for this accident, including the block loading, motor operated valves moving to their engineered safeguards positions, and actuation of HPI, LPI, reactor building isolation and cooling, and reactor building spray.

For small break LOCAs however, the loading on the EDG at one minute will not be representative of steady state load. For CR-3, the actuation setpoints for the protective functions described above would not be reached as soon and some systems would still be in a transient condition at and beyond one minute. Also, the SBLOCA EDG loads are not bounded by the large break LOCA EDG loads. Therefore, selection of EDG load postulated to occur at any time during the accident scenario, rather than one minute, is necessary in order to demonstrate that the EDG would be at steady state conditions with bounding ES applied loads. The requirement to perform the test and the associated acceptance criteria remain the same.

---

#### **NO SIGNIFICANT HAZARDS EVALUATION:**

FPC has reviewed the requirements of 10 CFR 50.92(c) as they relate to the proposed Technical Specification changes, modifications and operator actions associated with the proposed EDG upgrade, and concludes that a significant hazard is not involved. Efforts have been made to maintain the Technical Specification changes consistent with the applicable generic guidance and the Improved Standard Technical Specifications. In support of these conclusions, the following evaluation is provided:

1. The proposed Technical Specification changes, modifications and operator actions do not involve a significant increase in the probability of an accident previously evaluated because neither the EDGs nor the EDG's fuel oil and lube oil systems serve as the initiator for any design basis accident and, therefore, do not significantly impact any previously evaluated accident probabilities.

The proposed Technical Specification changes, modifications and operator actions do not involve a significant increase in the consequences of an accident previously evaluated because the ability of the EDGs and the EDG fuel oil and lube oil to perform their intended safety function has not been adversely affected. The EDGs and the EDG fuel oil and lube oil systems remain fully capable of performing their safety function for all design basis accidents. The increase in loading permitted under these changes will reflect the manufacturer's certified capabilities of the EDGs. Also, the increase in the required fuel remains within the capabilities of the fuel tanks. The same potential design basis failures that existed prior to the EDG upgrades will continue to exist subsequent to the modifications. It follows that the consequences of such failures will remain a small fraction of 10 CFR Part 100 limits.

2. The proposed Technical Specification changes, modifications and operator actions do not create the possibility of a new or different kind of accident from any accident previously evaluated. Also, the proposed Technical Specification changes, modifications and operator actions do not involve any new accident initiators, or a new or different kind of accident from any previously evaluated. In addition, the configuration and basic function of the EDGs and EDG's fuel and lube oil systems are unaffected by the changes. In fact, the EDG upgrades ensure that the previously evaluated accidents are consistent with system and component capabilities and the current design and licensing bases.
3. The proposed Technical Specification changes, modifications and operator actions do not involve a significant reduction in the margin of safety. The EDGs and EDG's fuel and lube oil systems will continue to be able to perform their safety function for all design basis accidents. There is an increase in the net margin of safety for fuel and lube oil storage since required volumes have been recalculated and increased, additional margin has been added to the calculated results, and the required volumes are based on usable tank volumes instead of tank capacity. These volumes continue to bound the postulated worst-case accident scenario. The increase in fuel storage required by the changes remains within the capacity of the storage tanks. The Technical Specification changes, modifications and operator actions further ensure that margins provided in current design and licensing bases are satisfied.

---

#### **ENVIRONMENTAL IMPACT EVALUATION:**

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not; (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released off site, or (3) result in a significant increase in individual or cumulative occupational radiation exposure. FPC has reviewed the Technical Specification changes, modifications and operator actions and believes they meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of the proposed Technical Specification amendment. The basis for this determination is as follows:

1. The proposed Technical Specification changes, modifications and operator actions do not involve a significant hazards consideration as described previously in the No Significant Hazards Consideration evaluation.
2. The proposed Technical Specification changes, modifications and operator actions do not result in a significant change in the types or a significant increase in the amounts of any

effluents that may be released offsite. The Technical Specification changes, modifications and operator actions provide requirements for the upgrade of the service ratings for the EDGs. The resultant increase in any effluents from the EDGs due to the upgrade is not considered to be significant.

3. The proposed Technical Specification changes, modifications and operator actions do not result in a significant increase in individual or cumulative occupational radiation exposure. As previously described in the No Significant Hazards Consideration discussion, these changes ensure that the EDGs continue to perform their safety function for all design basis accidents. In addition, as previously addressed in the No Significant Hazards Consideration evaluation, the 10 CFR Part 100 consequences have not significantly changed; therefore, there is no significant increase in radiation exposure.



## **PART 3 - LOAD REJECTION TEST & STEADY STATE LOADS**

### **OVERVIEW:**

These Technical Specification Bases changes assure that the testing of the EDGs adequately demonstrates the capability of the EDGs to reject the largest single load without exceeding predetermined limits, and to indicate that the EDG tests are not invalidated by loads imposed by the starting of motors.

**LICENSEE DOCUMENT INVOLVED:** Technical Specifications

### **PORTIONS:**

#### 3.8.1 - AC Sources - Operating

SR 3.8.1.8 - EDG load rejection test; Bases change only

SR 3.8.1.11 - Refueling EDG load test; Bases change only

The Background Bases of B.3.8.1 are also changed.

### SUMMARY OF CHANGES

The basis for the EDG load rejection test is revised to bound the recently calculated largest single load. The Bases of the Background for the Technical Specification provides a description of steady state. The Bases for the refueling EDG load test is revised to indicate that the EDG tests are not invalidated by loads imposed by the starting of motors such as during block loading.

---

### **TECHNICAL SPECIFICATION**

#### 3.8.1 - AC Sources - Operating

#### Description of Request

#### **TS B 3.8.1 - BASES BACKGROUND**

Steady state loading is described as not including those loads imposed by the starting of motors such as during block loading, and short duration loads such as motor operated valves, battery charger surges, and short duration pump surge flows.

#### **SR 3.8.1.8 - EDG LOAD REJECTION TEST (BASES CHANGE ONLY.)**

The description and magnitude of the largest single load, the HPI pump at 616 kW, currently in the basis for the EDG load rejection test is changed to a bounding value of less than 750 kW.



### **SR 3.8.1.11 - REFUELING EDG LOAD TEST (BASES CHANGE ONLY)**

The Bases are being revised to indicate EDG test is not invalidated because of loads imposed by the starting of motors such as during block loading.

#### **Reason for Request**

Modifications and procedure changes were performed which caused the largest single load on the A EDG to increase in excess of that stated in the Bases of Surveillance Requirement 3.8.1.8. The largest single load calculated from the most recent test data is approximately 713 kW for the A EDG and 688 kW for the B EDG.

The revisions regarding steady state loads are necessary to accurately describe the predicted conditions. During the performance of the refueling EDG load test, some loads are experienced, which include those imposed by the starting of motors and short duration loads. The acceptance criteria of the refueling load test is not intended to address such loads. Only the refueling EDG load test is associated with such loads since the monthly EDG load test is performed synchronized to the grid and does not experienced the motor loading transients.

A short description of the modifications to address the SBLOCA scenarios and the EDG capacity, including those associated with Part 3, are presented in Attachment F, Table 2.

To address the SBLOCA scenarios and the EDG capacity, Attachment F provides a description of the 1) operator actions, 2) modifications, 3) FSAR changes, 4) resolution of NRC identified unreviewed safety questions, and 5) related LERs.

#### **Evaluation of Request**

Past modifications and maintenance have increased the loads on both EDGs. The FPC calculation program ensures that changes in the largest single load due to maintenance and modifications are reflected in the load rejection test procedure. The proposed change reflects a load that bounds the largest single load. A bounding load ensures that the EDG load rejection test demonstrates the EDG overspeed protection capability to preclude potential EDG damage due to excessive overspeed. The requirement to perform the test remains the same.

To ensure the Technical Specifications accurately describe the predicted conditions, the Bases of the Background for Technical Specification 3.8.1 was revised to provide a description of steady state loads.

The loads imposed by the starting of motors have no adverse impact on the EDG or other safety loads based on an evaluation of the EDGs conducted with the support of the EDG manufacturer, Coltec Industries. The manufacturer limits for loads imposed by the starting of motors of 3910 kW reflect the age and wear of the EDGs. Although the EDG load calculation is currently being revised, the calculated loads imposed by the starting of motors are expected to be less than 3750 kW, which is less than the manufacturer limit of 3910 kW. These loads

are very short in duration. The evaluation of the postulated loads occurring during block loading following a simultaneous LOCA and LOOP has concluded that the EDGs have the capability to produce the required power for accelerating loads such as induction motors, without degrading the EDGs. Frequency response during the transients were found to be within the limits of Regulatory Guide 1.9.

The calculated momentary loads are included as part of the calculation of the worst-case accident load profile. The 200 hour service rating and manufacturer limits will bound the expected accident profile.

---

#### **NO SIGNIFICANT HAZARDS EVALUATION:**

FPC has reviewed the requirements of 10 CFR 50.92(c) as they relate to the proposed Technical Specification changes, modifications and operator actions, and concludes that a significant hazard is not involved. Efforts have been made to maintain the Technical Specifications changes consistent with the applicable generic guidance and the Improved Standard Technical Specifications, recognizing CR-3 unique design and the use of certain manual operator actions. In support of this conclusion, the following evaluation is provided:

1. The proposed Technical Specification changes, modifications and operator actions do not involve a significant increase in the probability of an accident previously evaluated because the EDG load tests and load rejection test do not serve as the initiator for any design basis accident and, therefore, do not significantly impact any previously evaluated probabilities.

The proposed Technical Specification changes, modifications and operator actions do not involve a significant increase in the consequences of an accident previously evaluated because the changes do not affect the ability of the EDGs to perform their intended safety function. Rather, the Technical Specification changes, modifications and operator actions provide further assurance that the EDGs are capable of performing their safety function. Failure of an EDG has the same consequences as it would if the changes were not made. It follows that the 10 CFR Part 100 consequences of such failures has not changed.

2. The proposed Technical Specification changes, modifications and operator actions do not create the possibility of a new or different kind of accident from any accident previously evaluated because the changes do not affect the ability of the EDGs to perform their intended safety function. The configuration and basic function of the EDGs, including accurately describing the manufacturer certified EDGs service ratings and steady state loads, do not create a possibility for a new or different kind of accident. Although the load rejection test is for an increased EDG largest single load, the kind of accident addressed by both the load rejection test and the refueling load test remain the same.

3. The proposed Technical Specification changes, modifications and operator actions do not involve a significant reduction in the margin of safety. The calculated loads imposed by the starting of motors are short duration, have a low probability of occurrence, and are expected to be within the manufacturer limits. In fact, the margin confirmed by EDG refueling load testing and load rejection testing will demonstrate a restoration of design and licensing margin and confirm that the EDGs remain fully capable of performing their safety function for all design basis accidents.

---

#### **ENVIRONMENTAL IMPACT EVALUATION:**

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not; (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released off site, or (3) result in a significant increase in individual or cumulative occupational radiation exposure. FPC has reviewed the Technical Specification changes, modifications and operator actions and believes they meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of the proposed Technical Specification changes, modifications and operator actions. The basis for this determination is as follows:

1. The proposed Technical Specification changes, modifications and operator actions do not involve a significant hazards consideration as described previously in the No Significant Hazards Consideration evaluation.
2. The proposed Technical Specification changes, modifications and operator actions do not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite. The proposed Technical Specification changes, modifications and operator actions provide assurance that the EDGs are capable of performing their safety function and do not affect CR-3 effluents.
3. The proposed Technical Specification changes, modifications and operator actions do not result in a significant increase in individual or cumulative occupational radiation exposure. As previously described in the No Significant Hazards Consideration evaluation, these changes provide for testing of the EDGs and confirm the EDGs remain fully capable of performing their safety function for all design basis accidents. The 10 CFR Part 100 consequences remain the same; therefore, there is no significant increase in radiation exposure.