

April 7, 1997

LICENSEE: Florida Power Corporation

FACILITY: Crystal River Unit 3

SUBJECT: SUMMARY OF MEETING ON MARCH 18, 1997, REGARDING SOLUTION SET FOR EMERGENCY FEEDWATER AND EMERGENCY DIESEL GENERATOR LOADING PROBLEMS

On March 18, 1997, representatives of the Florida Power Corporation, licensee for Crystal River Nuclear Plant, Unit 3 (CR3) met with members of the staff at NRC Headquarters in Rockville, Maryland to present their potential success path for emergency feedwater (EFW) flow and emergency diesel generator (EDG) loading concerns during a small break loss of coolant accident (SBLOCA) design basis scenario. Enclosure 1 is a list of attendees. Enclosure 2 contains copies of handouts distributed at the meeting.

The licensee discussed the composition of the team that is involved in resolving the design concern. The licensee stated that the limiting scenario affecting the EFW and EDG operation is the SBLOCA, loss of offsite power (LOOP) and three limiting single failures. The licensee indicated that its established success objective is to maintain one high pressure injection (HPI) pump and EFW flow. The licensee presented details about various modifications and analyses that would be necessary to meet its established objective. The licensee also discussed its other long-term solutions including a diesel EFW pump or increased EDG capacity.

The staff questioned whether the licensee had considered the impact of other initiatives and corrective actions on the EFW/EDG resolution strategy. The licensee indicated that its team is generally aware of the other issues and does not expect them to affect the options discussed in the meeting.

The meeting was informational in nature and did not represent the licensee's final solution to the EFW/EDG concerns. The licensee did not request, and the staff did not make a determination on the acceptability of the information presented in the meeting. The licensee expects to finalize its position and make appropriate submittals to the staff soon.

Original signed by

L. Raghavan, Project Manager  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosures: 1. Attendance List  
2. Meeting Handout

cc w/Enclosures: See next page

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OFFICE	PDII-3/PM	PDII-3/LA	PDII-3/D	
NAME	LRaghavan	BClayton	FHebdon	
DATE	04/15/97	04/15/97	04/15/97	

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SUMMARY OF MEETING ON MARCH 18, 1997, REGARDING SOLUTION SET FOR EMERGENCY FEEDWATER  
AND EMERGENCY DIESEL GENERATOR LOADING PROBLEMS

Distribution:

HARD COPY w/Enclosures 1 and 2

Docket File

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Crystal River Reading

OGC

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E-Mail w/Enclosure 1

S. Collins/F. Miraglia (SJC1,FJM)

R. Zimmerman (RPZ)

S. Varga (SAV,RCN)

J. Zwolinski (JAZ)

F. Hebdon (FJH)

L. Raghavan (LXR1)

B. Clayton (BAC2)

R. Shin (RPS)

D. Ross (SAM)

J. Jaudon (JPJ)

H. Cristensen (HOC)

W. Rogers (WGR1)

F. Orr (FRO)

B. LeFave (WTL1)

O. Chopra (OPC)

M. Pratt (MPP)

S. Sanchez (SPS)

D. Thatcher (DFT)

S. Saba (SNS1)

J. Lyons (JEL)

G. Tracy (GMT)

S. Cahill (SJC2)

J. Johnson, RII (JRJ)

**CRYSTAL RIVER 3 MEETING  
MARCH 18, 1997**

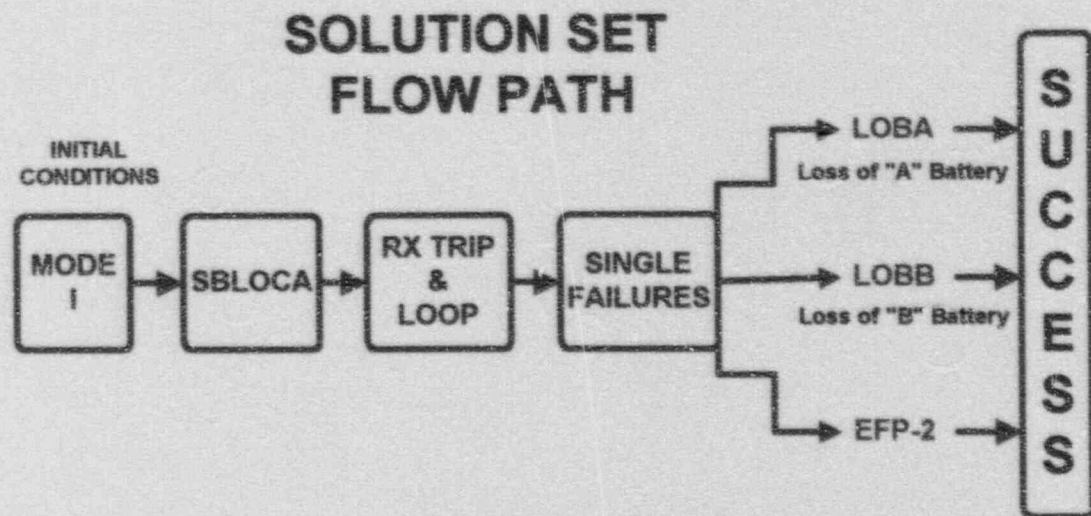
NAME	ORGANIZATION	TELEPHONE
L. RAGHAVAN	NRR	(301) 415-1471
B. Gutherman	FPC	(352) 563-4566
R. SCHIN	NRC - RII	404 / 331-5588
K. LANDIS	NRC - RII	404 331-5509
Johns P. Jauden	NRC - RII	[404] 331-5680
F. J. HEDDON	NRC - DDII-3	(301) 415-2024
H. CHRISTENSEN	NRC - RII	404-331-4700
W. Rogers	NRC - RII	404-331-2605
FRANK ORR	NRC / SRXB	301-415-1815
Bill LeFave	NRR/DSSA/SPLB	301-415-3285
PAUL V. FLEMING	Florida Power Corp.	(352) 563-4796
JOHN J. HOLDEN	Florida Power Corp.	(352) 563-3615
EARNEST J. GALLION	Fla Power Corp.	(352) 795-6486
Om Chopra	NRC/EELB	301 415-3265
Mark Pratt	NRC/EELB	(301) 415-2701
Steven P. Sanchez	NRC - R-II	(301) 415-1287
Dale Thatcher	NRC/NRR/EELB	301 415-3260
Suba Suba	NRC/NRR/EELB	301 415-2781
ALFRED FRIEND	FPC	352-563-4524
John Klingenfus	Framecore Technologies/NC	804-832-3294
Jeff Seals	Framecore Technologies	(804) 832-3620
FX SULLIVAN	FPC	352 795-6486
RON DAVIS	FPC	352 795-6486

CRYSTAL RIVER 3 MEETING  
MARCH 18, 1997

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# Startup Team

## Solution Set Presentation



# FPC / NRC TECHNICAL MEETING AGENDA

March 18, 1997

Meeting Purpose	Brian Gutherman
EFW Startup Team	John Holden
ECCS/EFW Systems	Fran Sullivan
Problem Statement	Fran Sullivan
Cycle 11 Modifications	Fran Sullivan
Solution Set Flow Paths	Mark Van Sicklen Earnie Gallion Paul Fleming Jeff Seals (Framatome)
Licensing Perspective	Brian Gutherman
Operations Management Perspective	Ron Davis
Summary	John Holden

# MEETING PURPOSE

- Communicate Technical Information On CR-3 EFW and EDG Loading During Small Break LOCA Mitigation
- Discuss the CR-3 Startup Team Mission
- Discuss the Solution Sets Supporting a Safe Startup
- Provide a Summary of The Regulatory Actions Required



# **CR-3 STARTUP TEAM**

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**Team Charter:** To find a resolution, based on the  
**EDG / EFW Dependency Team results,**  
to allow **CR-3 to Startup Safely.**

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**Management  
Sponsors:**

**Fran Sullivan**

**Ron Davis**

**Team Leader:**

**Mark Van Sicklen**

**Team Members:**

**Bill Marshall**

**Paul Fleming**

**Chris Doyel**

**Garrett Hebb**

**Al Friend**

**Mark Liebmann**

**Earnie Gallion**

**Jeff Seals (FTI)**

# STARTUP TEAM

- **First Team Identified EDG Margin Concerns**
  - » On December 18<sup>th</sup> Recommended 3 Options
- **Second Team Identified Concerns with Startup**
  - » Complexity of TS Changes
  - » Cross-Train Dependencies
  - » Importance of EFW for SBLOCA
  - » Impact of 3 Limiting Single Failures

# **STARTUP TEAM** (cont'd)

- **Startup Team - How Can CR-3 Startup Safely?**
  - » Design EOP Success Paths
  - » No Unreviewed Safety Questions
  - » Accurate Design and Licensing Basis
  - » No Exemptions from the Regulations
  - » Defense In Depth
  - » Integrated Safety Assessment

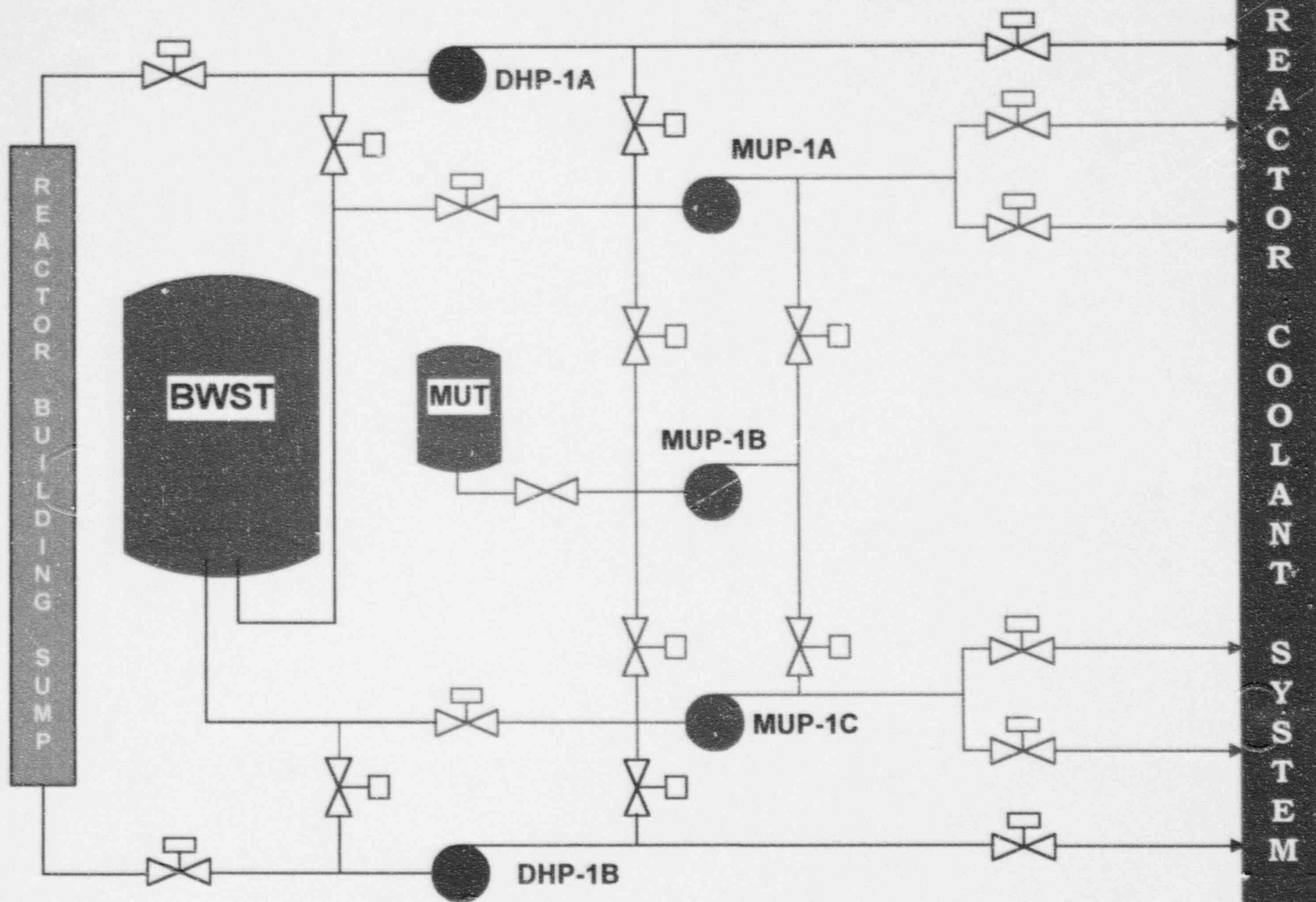
## **STARTUP TEAM** (cont'd)

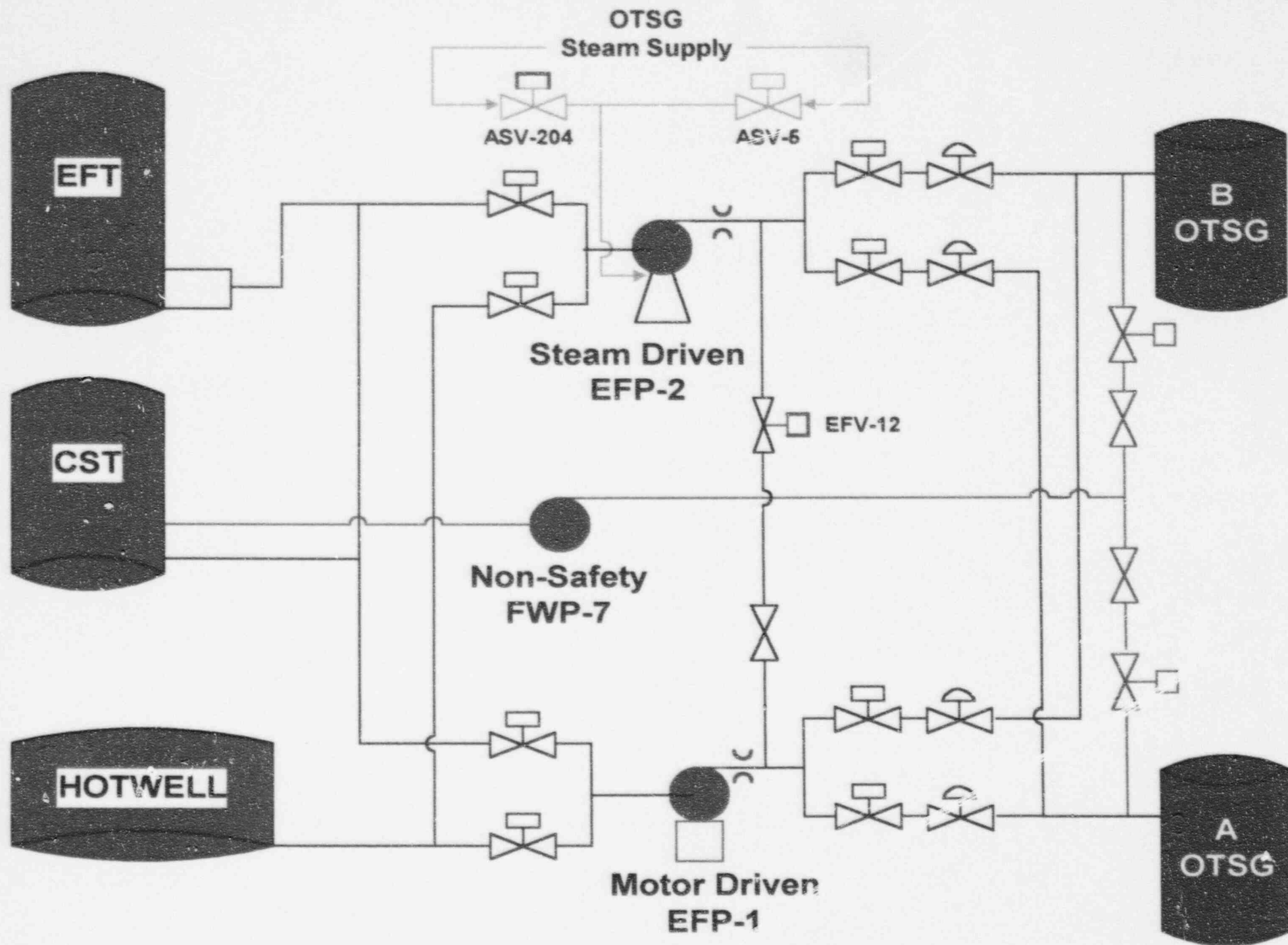
- **What is Different with This Approach?**
  - » Inter-disciplinary Team
    - Engineering/Operations/Licensing
  - » NSSS Supplier On Site Participation
  - » Team Members Challenge Each Other
  - » Management Oversight
- **Cycle 11 / Cycle 12**

# **EFW / ECCS SYSTEMS**

- Makeup and Purification / HPI
- Decay Heat Removal / LPI
- Emergency Feedwater / EFIC
- Auxiliary Feedwater (Pump)
- Emergency Diesel Generators

# HPI - LPI COMPOSITE





# PROBLEM STATEMENT

- 'A' EDG Design Margin
- History
- Issues
  - » EDG Loading
  - » Cross Train Dependencies
  - » Single Failures
  - » Emergency Feedwater NPSH

# **Plant Operational Improvements**

- **EDG CAPACITY**
- **EFW**
- **SYSTEMS**

THE TEAM REVIEWED FSAR CHAPTER 14 ACCIDENTS.

THE LIMITING TRANSIENTS AFFECTING THE  
EMERGENCY DIESEL GENERATOR LOADING AND  
EMERGENCY FEEDWATER WERE IDENTIFIED AS:

**SBLOCA & LOOP**

**AND**

**3 LIMITING SINGLE FAILURES**

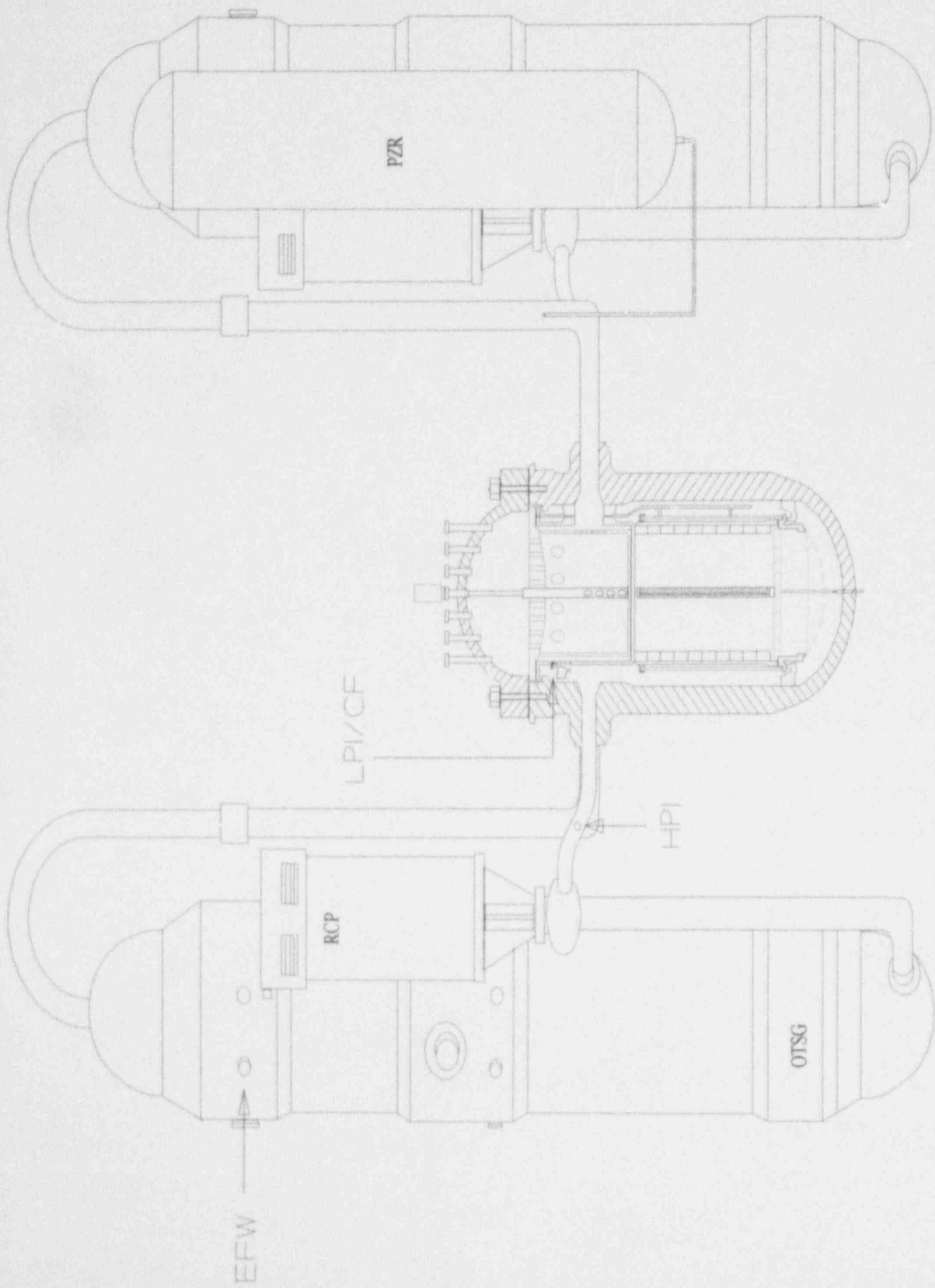
# **LIMITING SINGLE FAILURES**

## **LOBA or LOBB - Loss of a Battery**

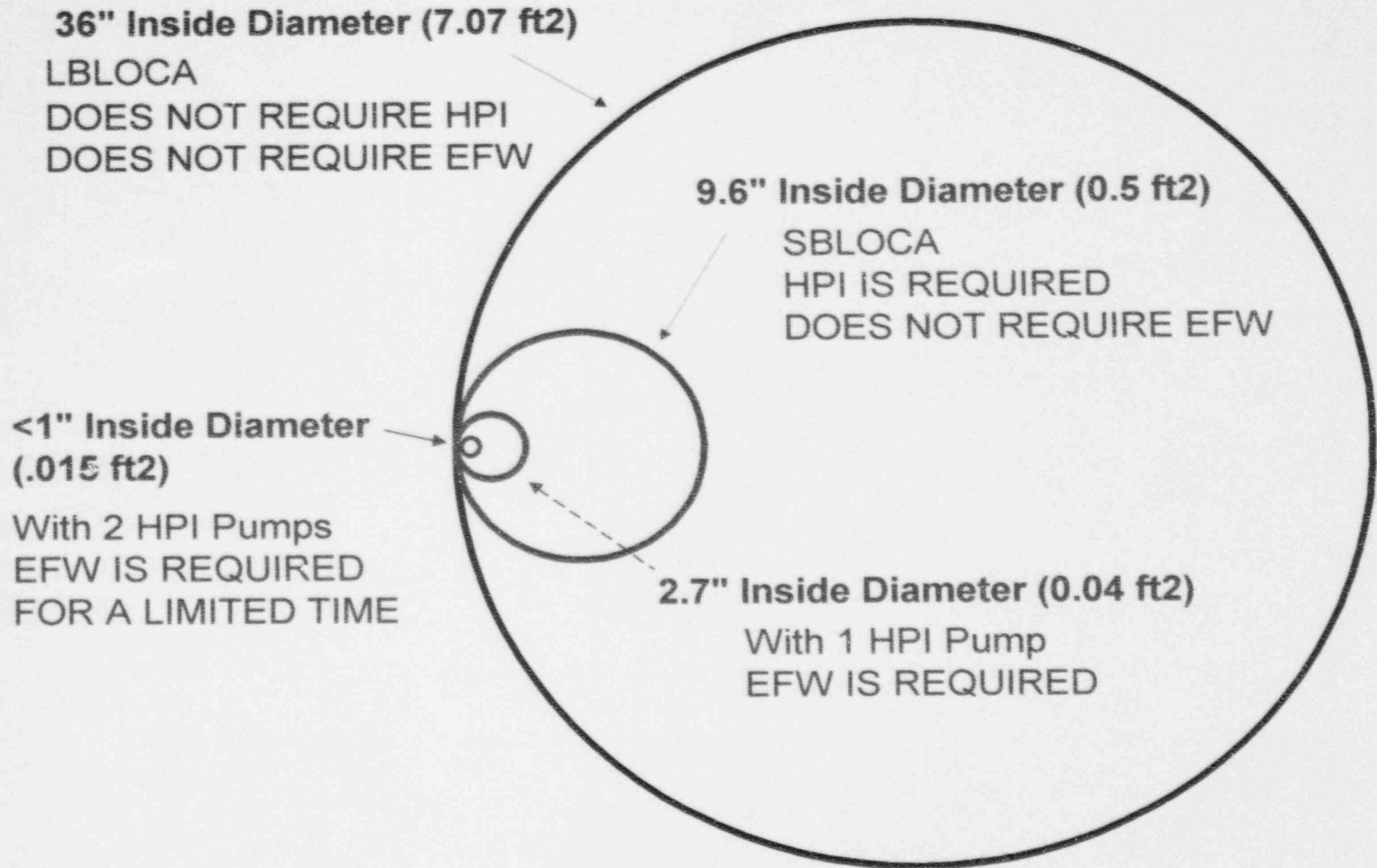
- **Disables ONE Emergency Diesel Generator**
- **Disables ONE Train of Emergency Core Cooling**
- **Disables ONE Train of DC Control Power**

## **EFP-2**

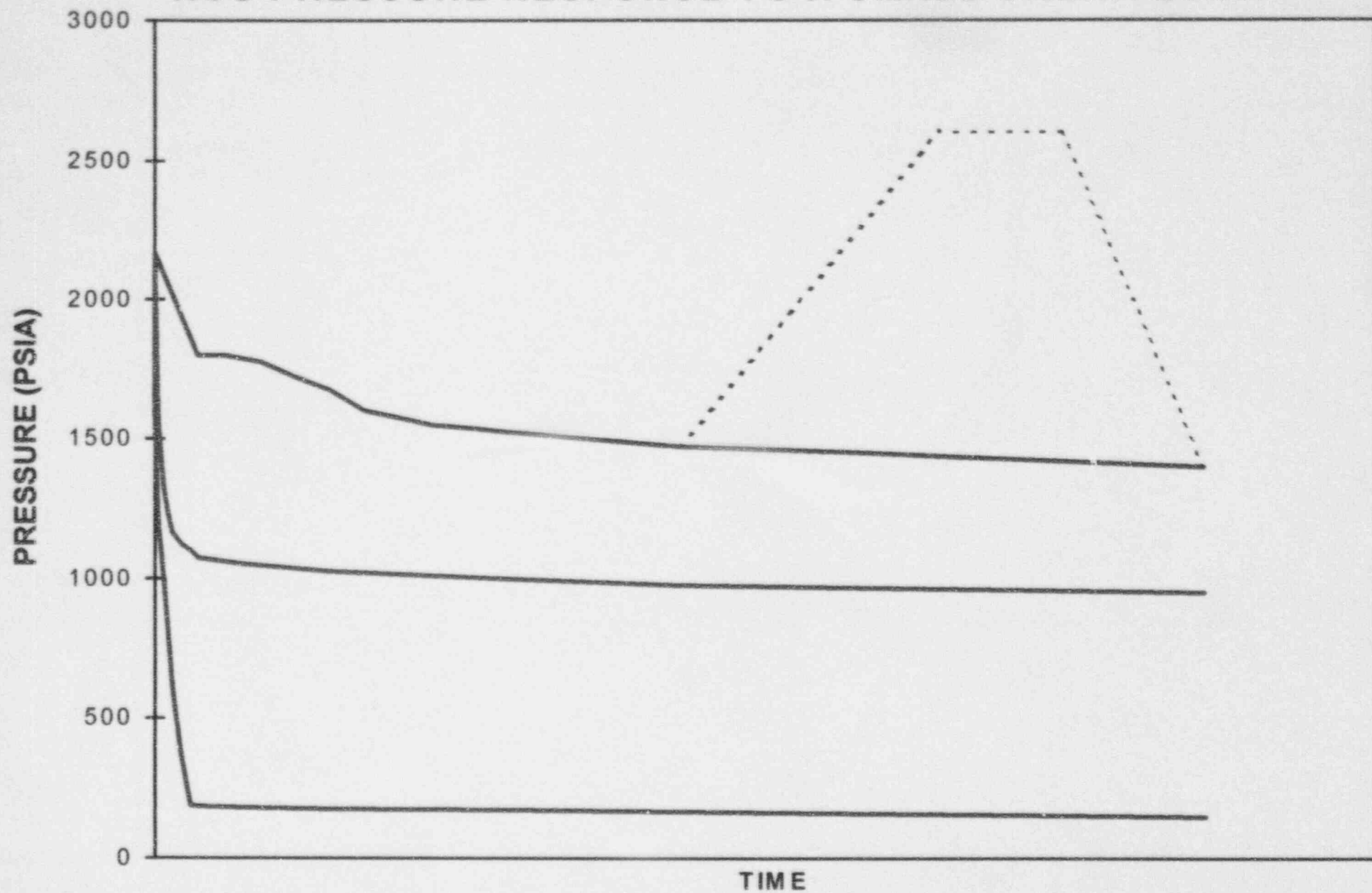
**The Motor Driven Emergency Feedwater Pump (EFP-1) is designed to be load shed (during the accident) to protect the 'A' Emergency Diesel Generator from an overload condition**



# LOSS OF COOLANT ACCIDENT SIZES



# RCS PRESSURE RESPONSE TO A SMALL BREAK LOCA



— 0.5 ft²

— 0.04 ft²

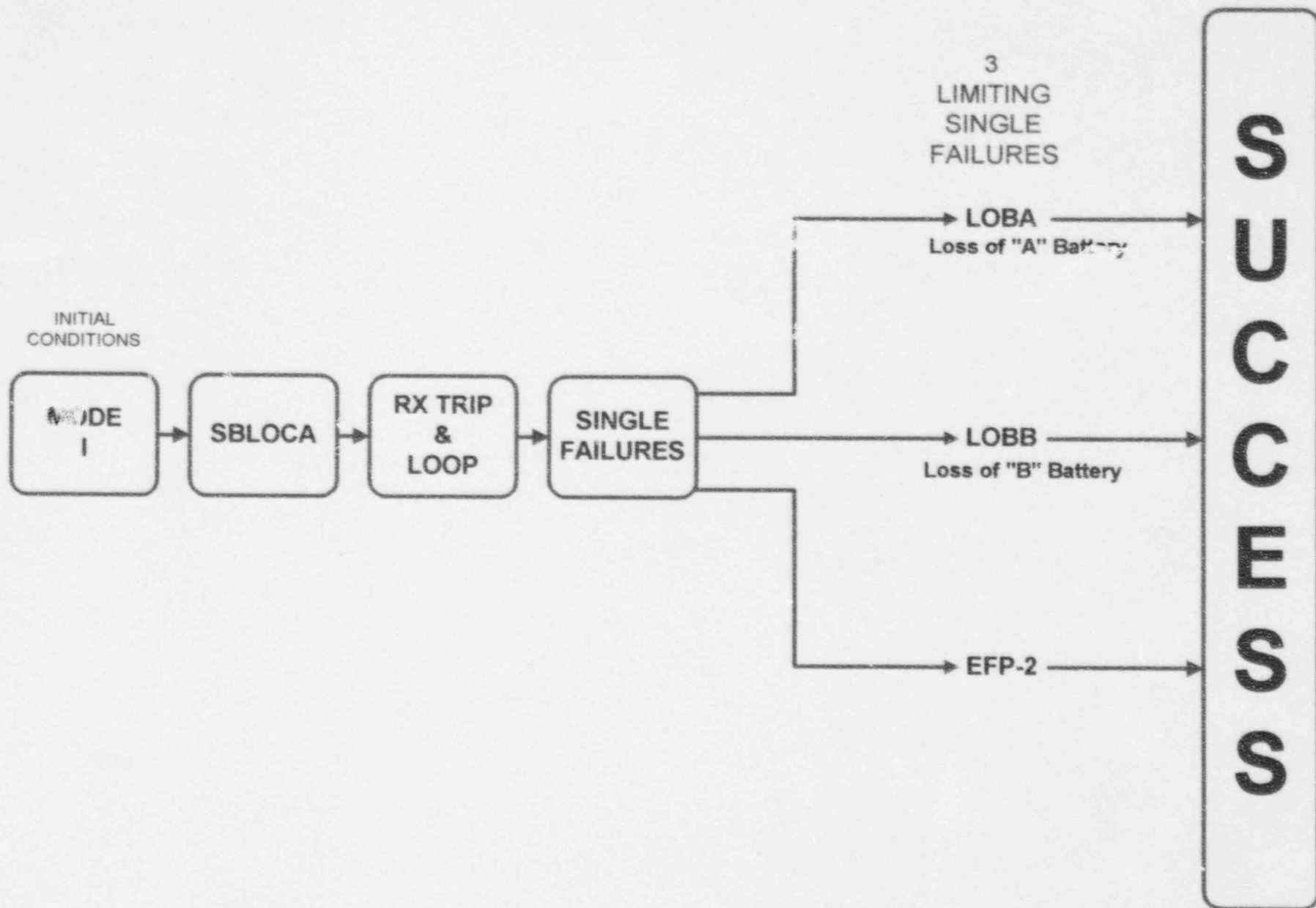
— 0.015 ft²

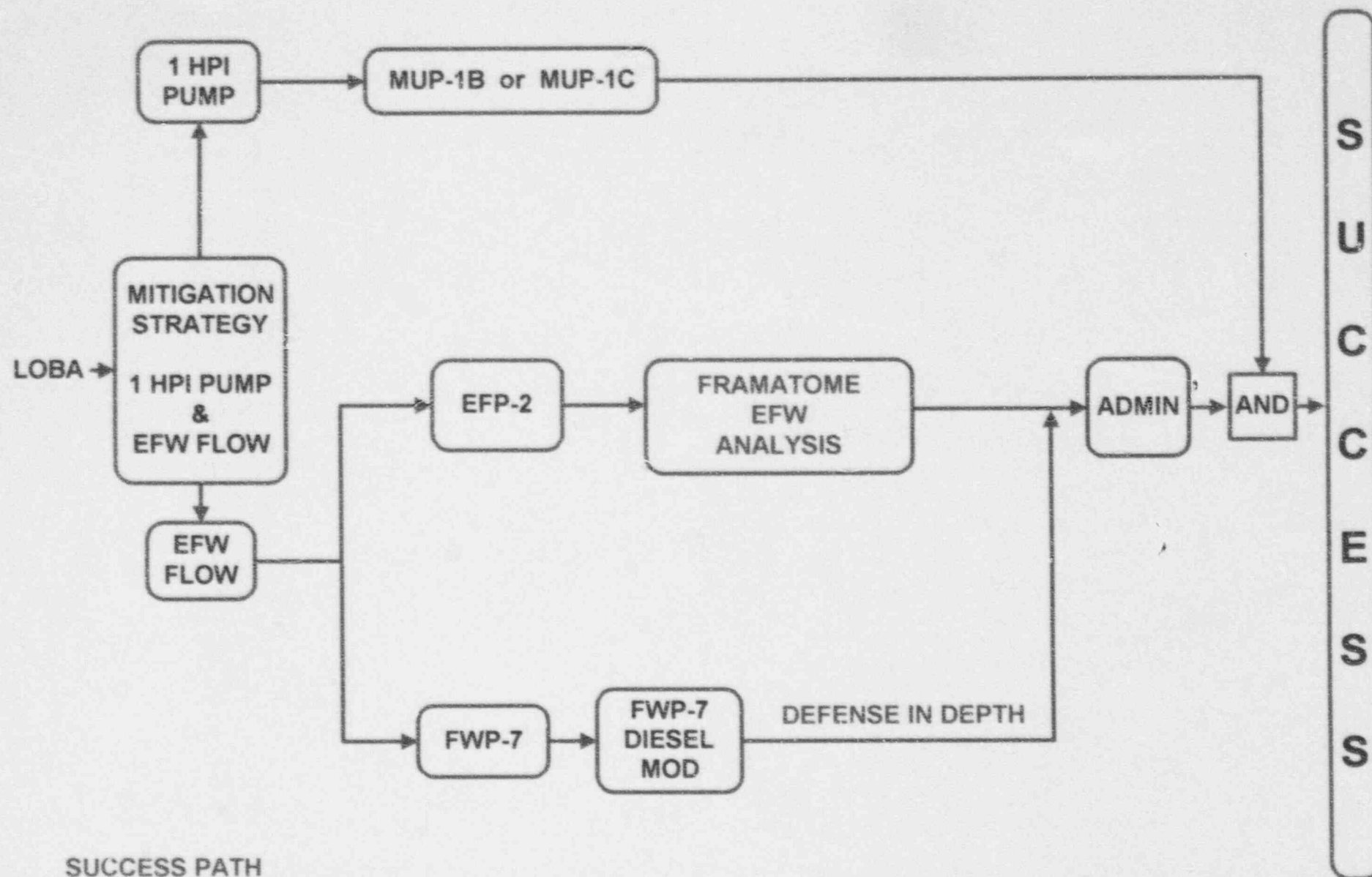
- - 0.015 ft² if EFW is lost

# SOLUTION SET FLOW PATHS

- Address Each Single Failure Scenario Separately
- Identify Design Basis Success Path
- Identify Challenges
- Identify Defense In Depth
- Identify Needs
  - Modifications
  - Procedures
  - Licensing Actions
  - Training

## SOLUTION SET FLOW PATH



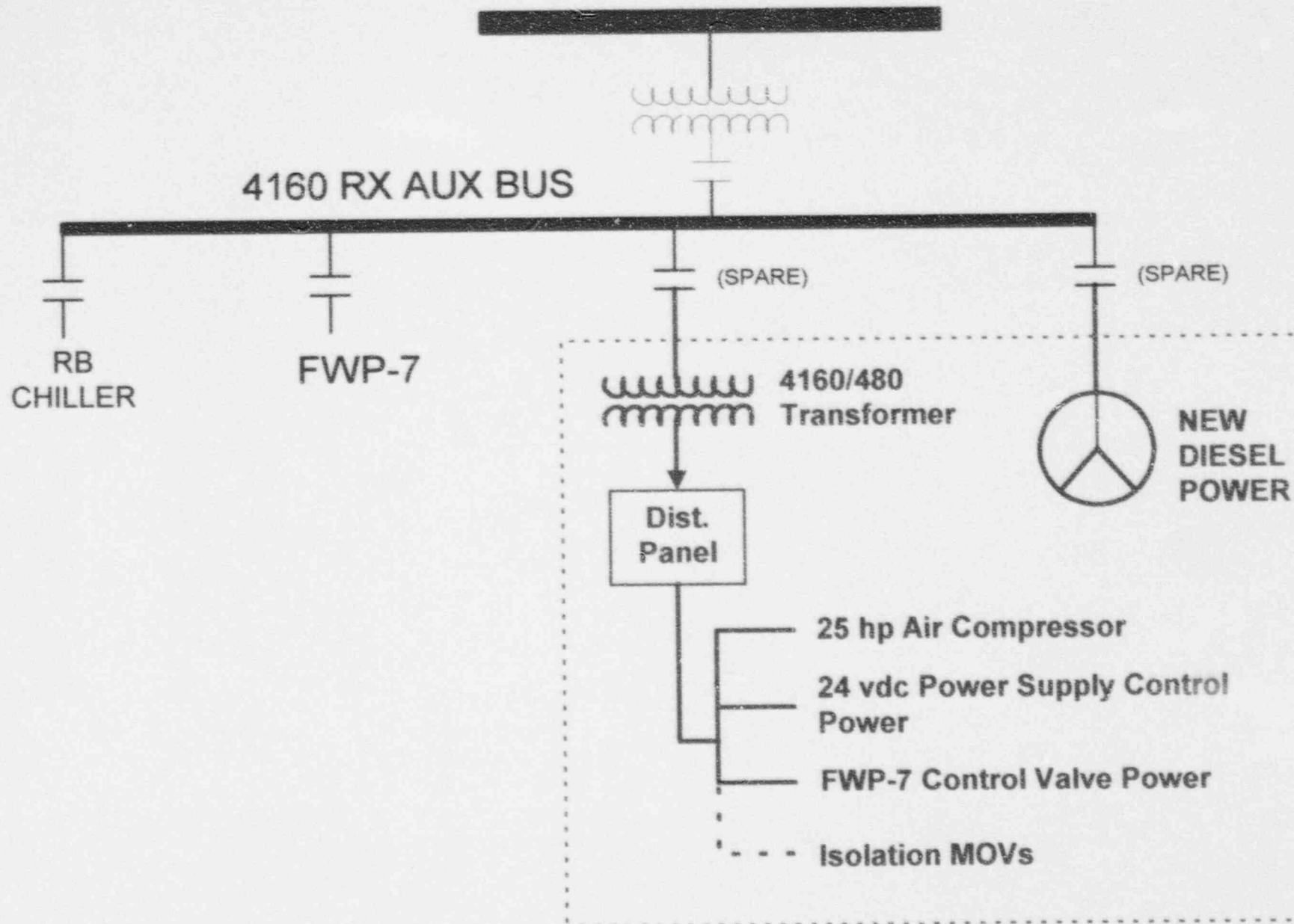


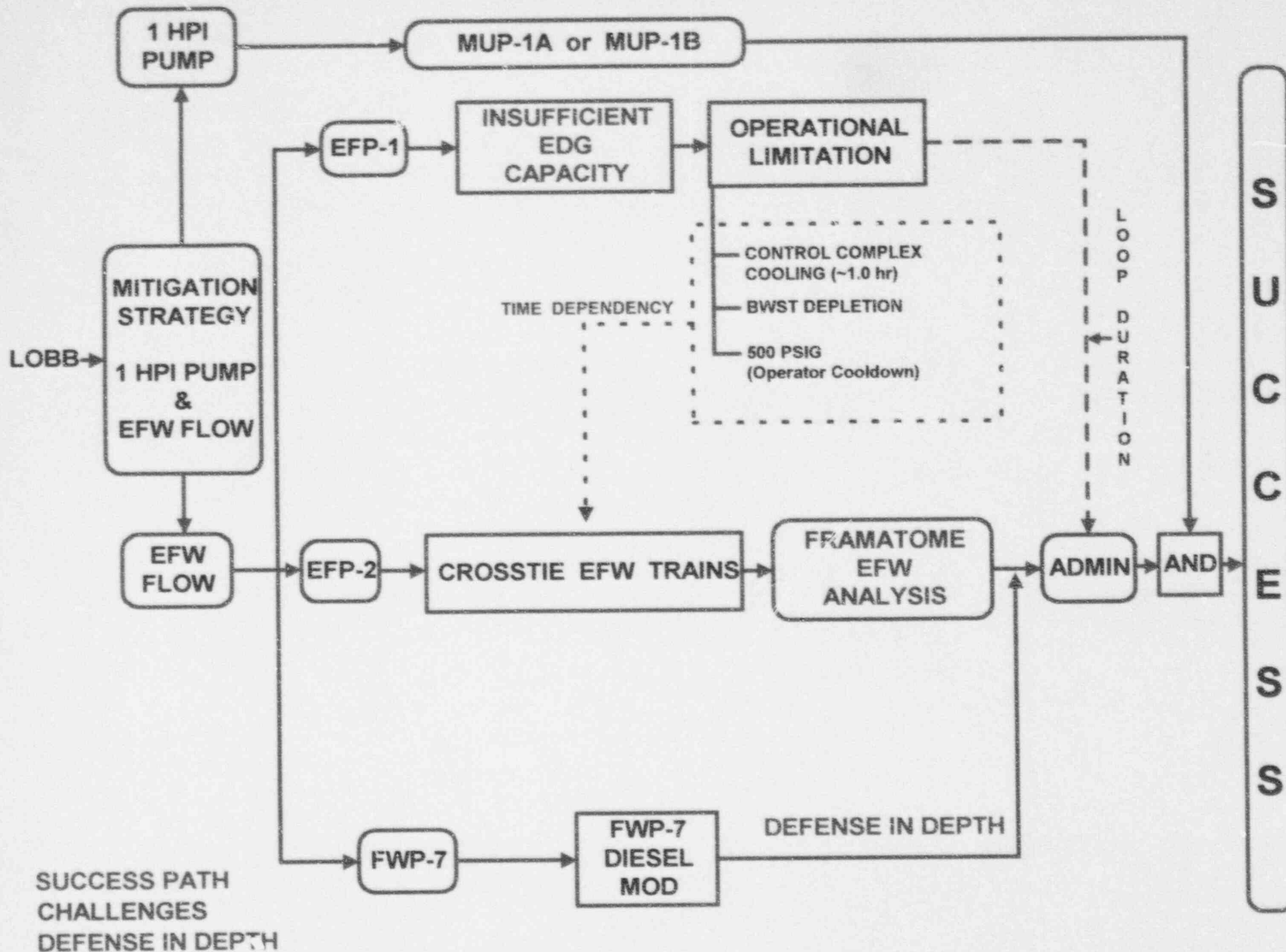
SUCCESS PATH  
CHALLENGES  
DEFENSE IN DEPTH

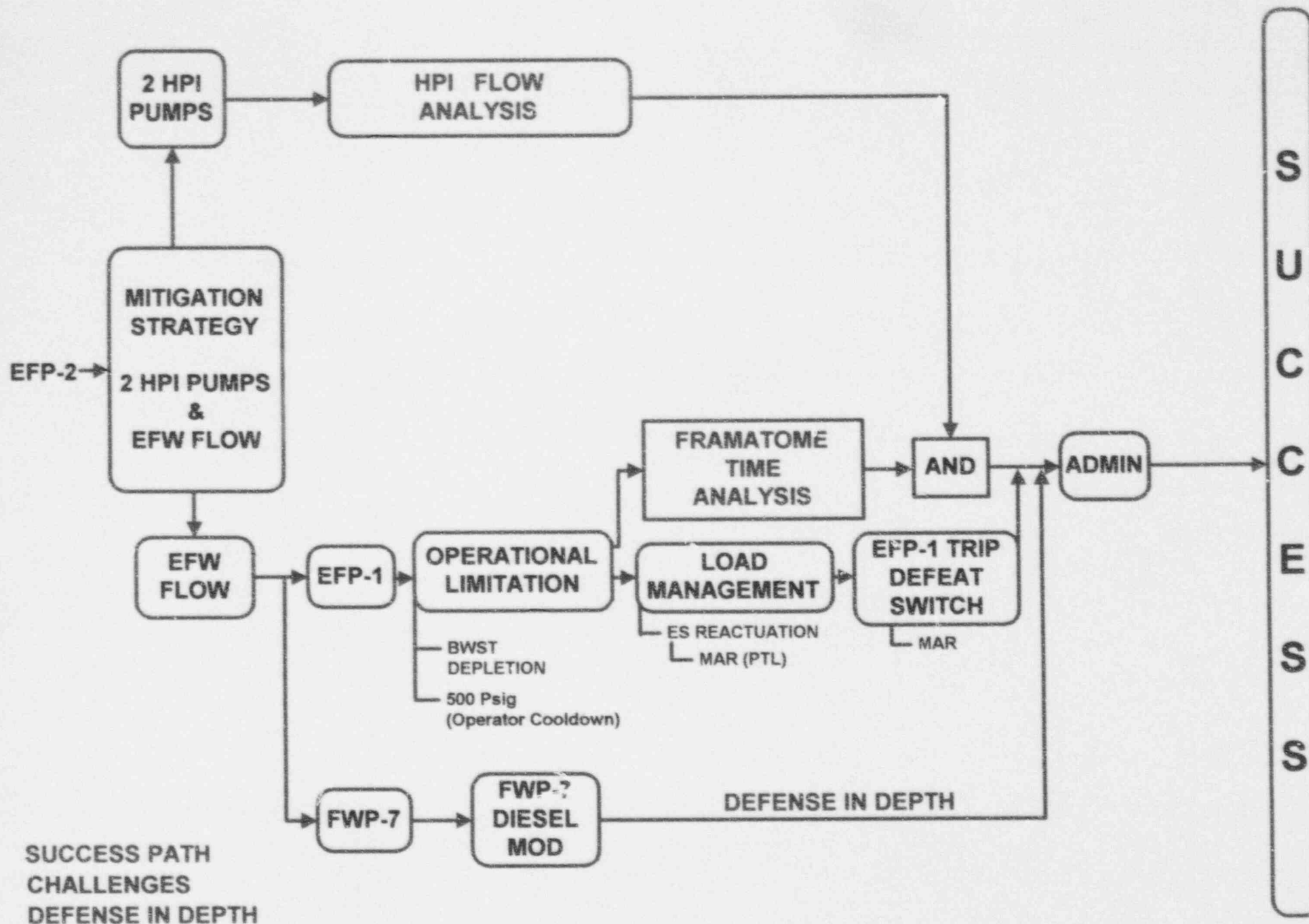
# **FWP-7**

- **INCREASE DEFENSE-IN-DEPTH**
- **MAXIMIZE FWP-7 INDEPENDENCE**
- **MINIMIZE OPERATOR BURDEN**

'A' 6900 VOLT BUS







## LIMITING SINGLE FAILURES

**LOBA**  
Loss of "A" Battery

**LOBB**  
Loss of "B" Battery

**EFP-2**

**ADMIN**

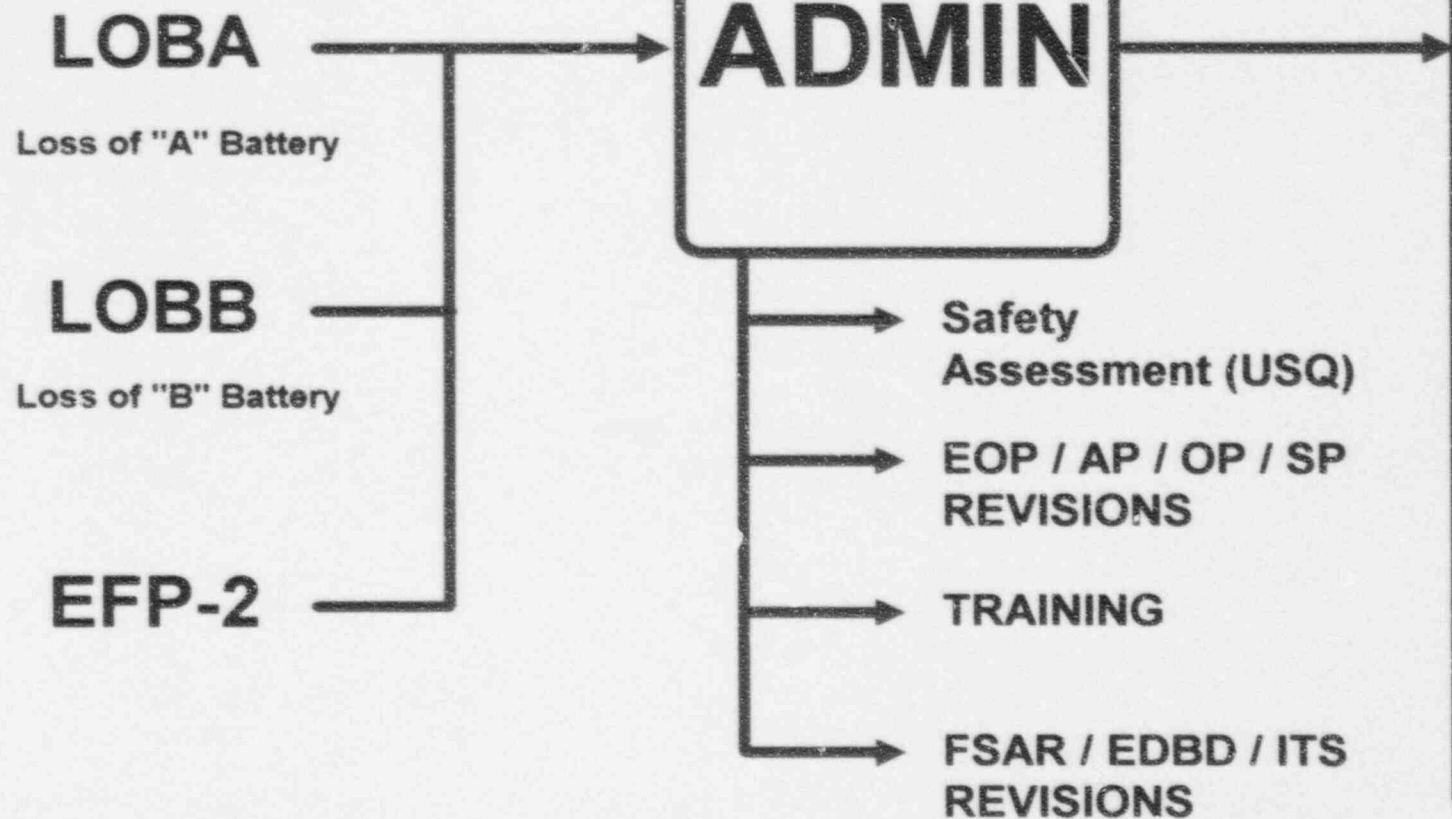
Safety  
Assessment (USQ)

EOP / AP / OP / SP  
REVISIONS

TRAINING

FSAR / EDBD / ITS  
REVISIONS

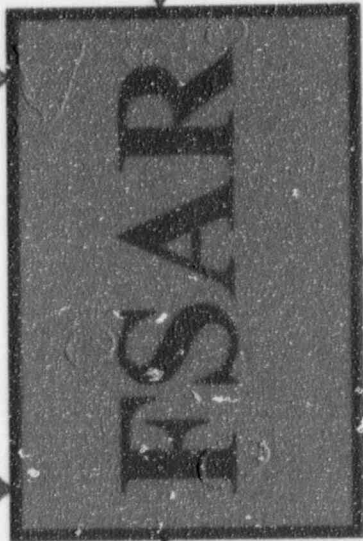
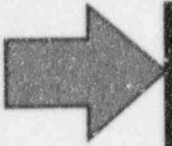
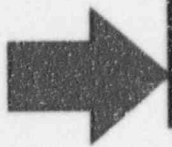
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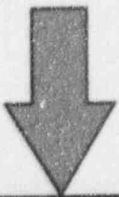
**STARTUP**

**TEAM**

**EOPs**



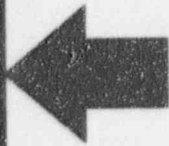
**FTI & FPC  
REVIEW**



**PLANT**

**MODIFICATIONS**

**SYSTEM**



**READINESS REVIEWS**

# LICENSING PERSPECTIVE

- 2 Team Members with Licensing Experience
- Needs Integrated with Other Plant Efforts
  - » TS Changes
  - » USQs
  - » FSAR/TS Bases
- This Is a Safe Approach
- TS Changes Must Address Applicable Dependencies
- Must Comply with Regulations
- NRC Communication a Key



# **OPERATIONS MANAGEMENT PERSPECTIVE**

- Operator Burden
- Defense In Depth
- EOP Impact
- Integrated Team

## CYCLE 11 RESTART

**New Isolation Criteria**

**Crosstie EFP-2 / ASV-204**

**150 KW EDG Upgrade**

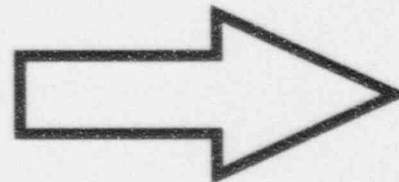
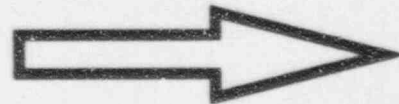
**Load Management**

**Analyze EFP-2**

**EFW Cavitating Ventures**

**FWP-7 Diesel Powered**

**EFIC Improvements**



## CYCLE 12

**HPI Cavitating Ventures**

**Diesel EFW Pump**

**or**

**Increase EDG Capacity**

# HPI - LPI COMPOSITE

