

October 14, 1998

LICENSEE: Florida Power Corporation
FACILITY: Crystal River, Unit 3
SUBJECT: SUMMARY OF MEETING ON SEPTEMBER 21, 1998, CONCERNING CRYSTAL RIVER UNIT 3 EMERGENCY FEEDWATER SYSTEM AND HIGH PRESSURE INJECTION SYSTEM MODIFICATIONS

On September 21, 1998, a meeting was held between staff of the U.S. Nuclear Regulatory Commission (NRC) and representatives of Florida Power Corporation (FPC). The purpose of the meeting was to discuss FPC plans to modify the emergency feedwater system and the high pressure injection system to resolve previously identified design issues related to diesel generator loading and operator burden as a result of required manual actions for a small break loss of coolant accident. The presentation included tentative schedules for the submittal of necessary license amendment requests and the date by which approval of these amendments would be needed. Enclosure 1 is an attendance list for the meeting. Enclosure 2 includes copies of the meeting handouts.

The NRC staff indicated that the information presented by FPC at the meeting, as described in the enclosed handouts, was very useful in understanding the scope, schedule and potential impact on NRC resources of the projects. The NRC representatives indicated that it would be useful to include a discussion of risk reduction and risk insights in the license submittals. They also stated that a description of post-modification testing should be included in the submittals. The NRC staff stressed the need for timely submittal of the license amendment requests to provide adequate time for review and processing. The meeting was adjourned after a brief question-and-answer session.

/s/

Leonard A. Wiens, Senior Project Manager
Project Directorate # 3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosures: 1. Attendance List
2. Handouts

cc w/enclosures: See next page

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DATE	10/14/98	10/14/98	10/14/98	10/ /98

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/s/

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Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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A handwritten signature in black ink, appearing to read "L. Wiens".

Leonard A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-302

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Florida Power Corporation

CRYSTAL RIVER UNIT NO. 3
GENERATING PLANT

cc:

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Citrus County
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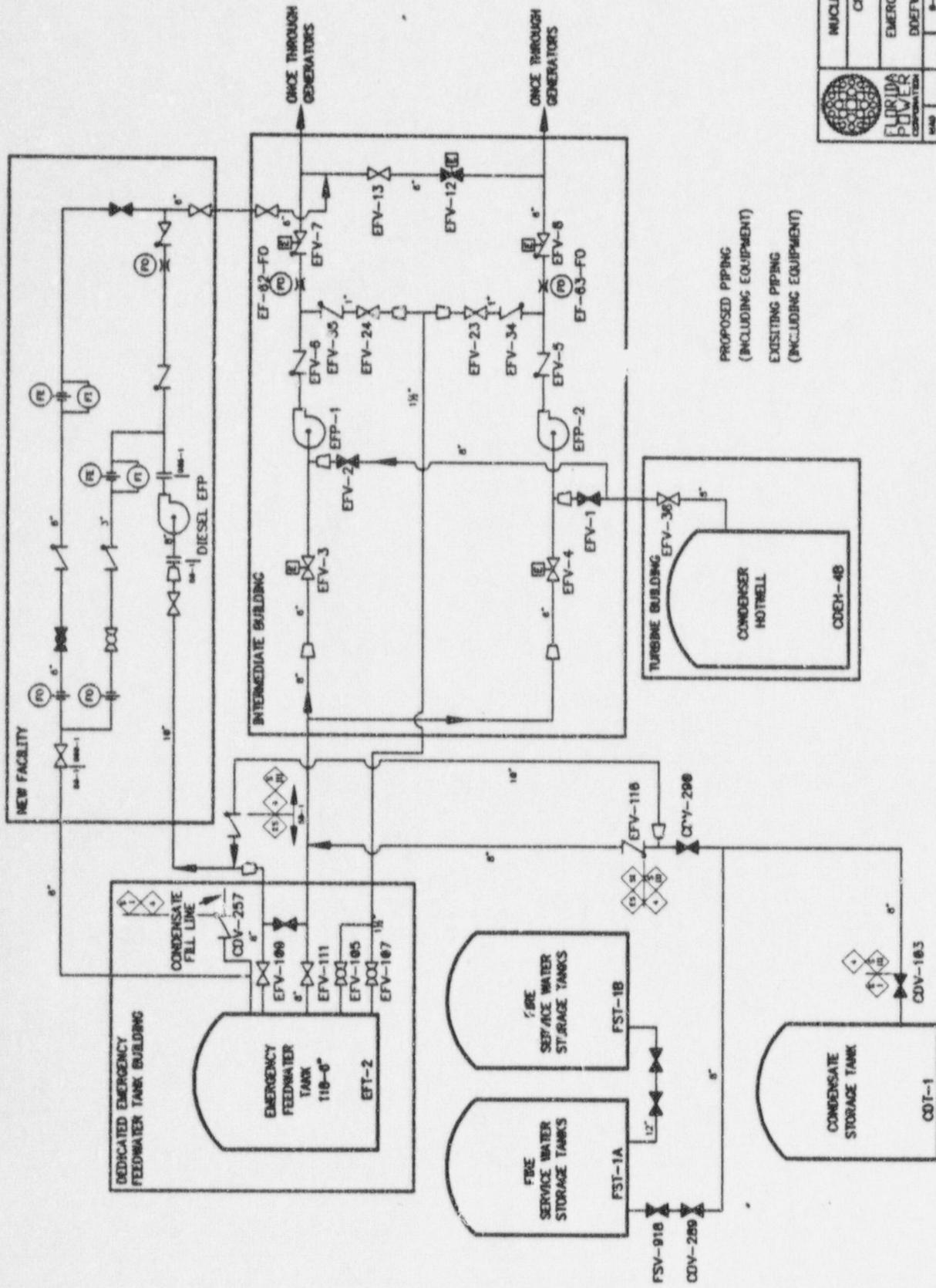
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61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303-3415

Mr. Leonard D. Wert
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303-3415

ATTENDEES
SEPTEMBER 21, 1998 MEETING
CRYSTAL RIVER
HIGH PRESSURE INJECTION
AND
EMERGENCY FEEDWATER

<u>Name</u>	<u>Affiliation</u>
Scot Greenlee	FPC
Craig Miller	FPC
Tim Stack	FPC/Framatome Technologies
Sherry Bernhoft	FPC
Cecil T. Gurganus	FPC
Paul V. Fleming	FPC
Eric Weiss	NRC/SRXB
S. N. Saba	NRC/EELB
Jim Tatum	NRC/SPLB
Bill LeFave	NRC/SPLB
John Knox	NRC/EELB



PROPOSED PIPING
(INCLUDING EQUIPMENT)

EXISTING PIPING
(INCLUDING EQUIPMENT)



NUCLEAR ENGINEERING
CRYSTAL RIVER
UNIT 3

EMERGENCY FEEDWATER
SYSTEM
DOEFW PUMP ADDITION

NO. 48-71	REV.	DATE	BY	CHKD.
1	1	8-21-68	WJL	WJL
2	1			
3	1			
4	1			
5	1			
6	1			
7	1			
8	1			
9	1			
10	1			



Florida Power Corporation

Presentation to the Nuclear Regulatory Commission

Diesel Driven Emergency Feedwater Pump and HPI Upgrade Projects

09/21/98

September 21, 1998



Diesel Driven Emergency Feedwater Pump and HPI Upgrade Projects

■ Agenda

- Introduction - Scot Greenlee
- Diesel Driven Emergency Feedwater Pump
 - » System Operation - Paul Fleming
 - » Project Details - Craig Miller
- HPI Upgrade Project
 - » System Operation - Paul Fleming
 - » Project Details - Craig Miller
- Conclusion - Scot Greenlee
- Questions and Answers - Open Format



Diesel Driven Emergency Feedwater Pump and HPI Upgrade Projects

■ Introduction

➤ Purpose

- » Scope and Schedule for Projects
- » NRC Resource Impacts

➤ Background

- » Design Outage Issues
- » FPC Commitments

➤ Modification Overview

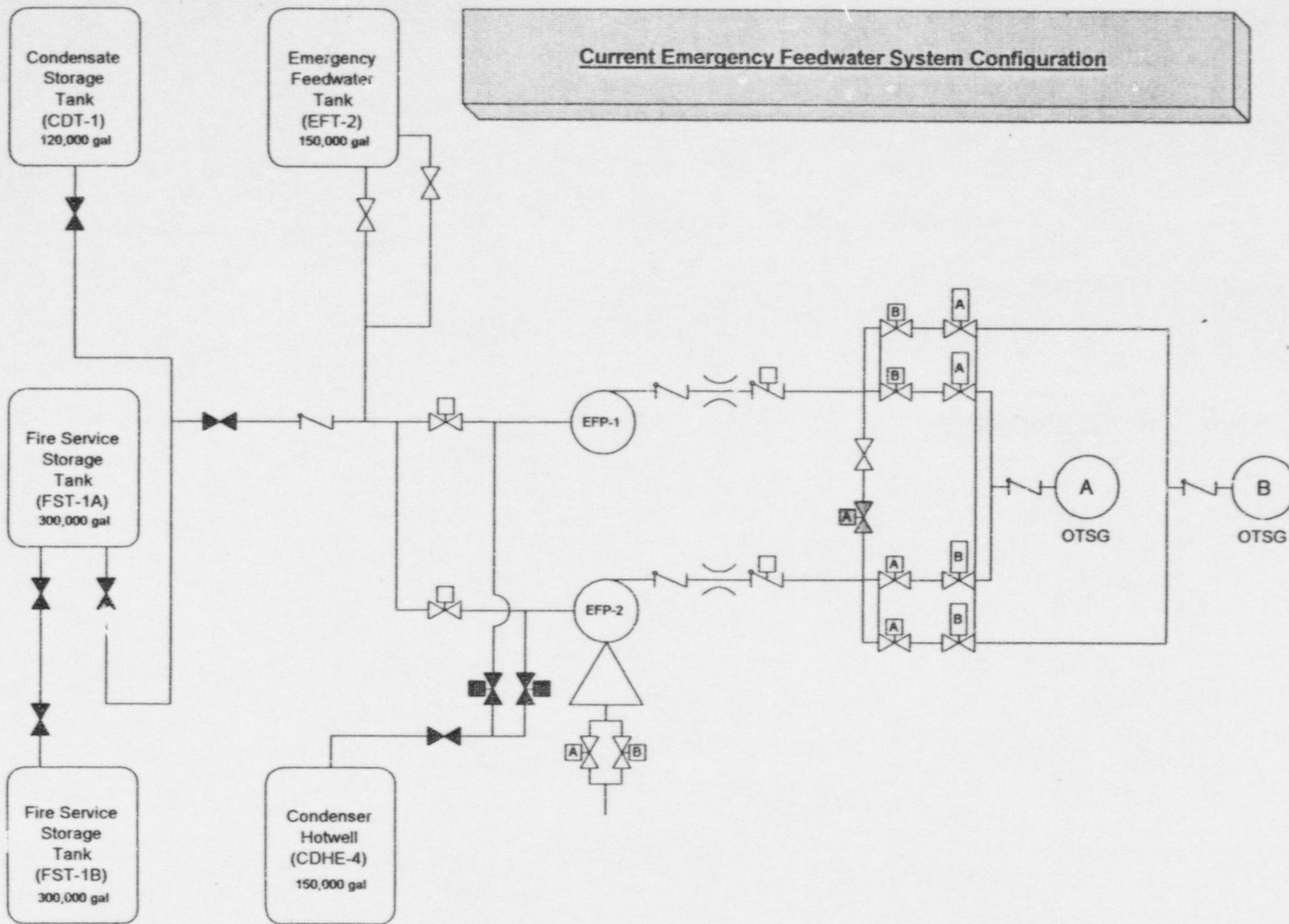
- » EFW System Upgrade
- » HPI System Upgrade



Diesel Driven Emergency Feedwater Pump

- **EFW Configurations and Operation**
 - **License Amendment No. 163**
 - **SBLOCA**
 - » **Spectrum Requiring Use of OTSG Cooling / Emergency Feedwater**
 - **Operator Actions Required to Mitigate Design Basis Accidents**
 - » **EDG Load Management**
 - » **EFW Configuration Management**

Current Emergency Feedwater System Configuration



09/21/98

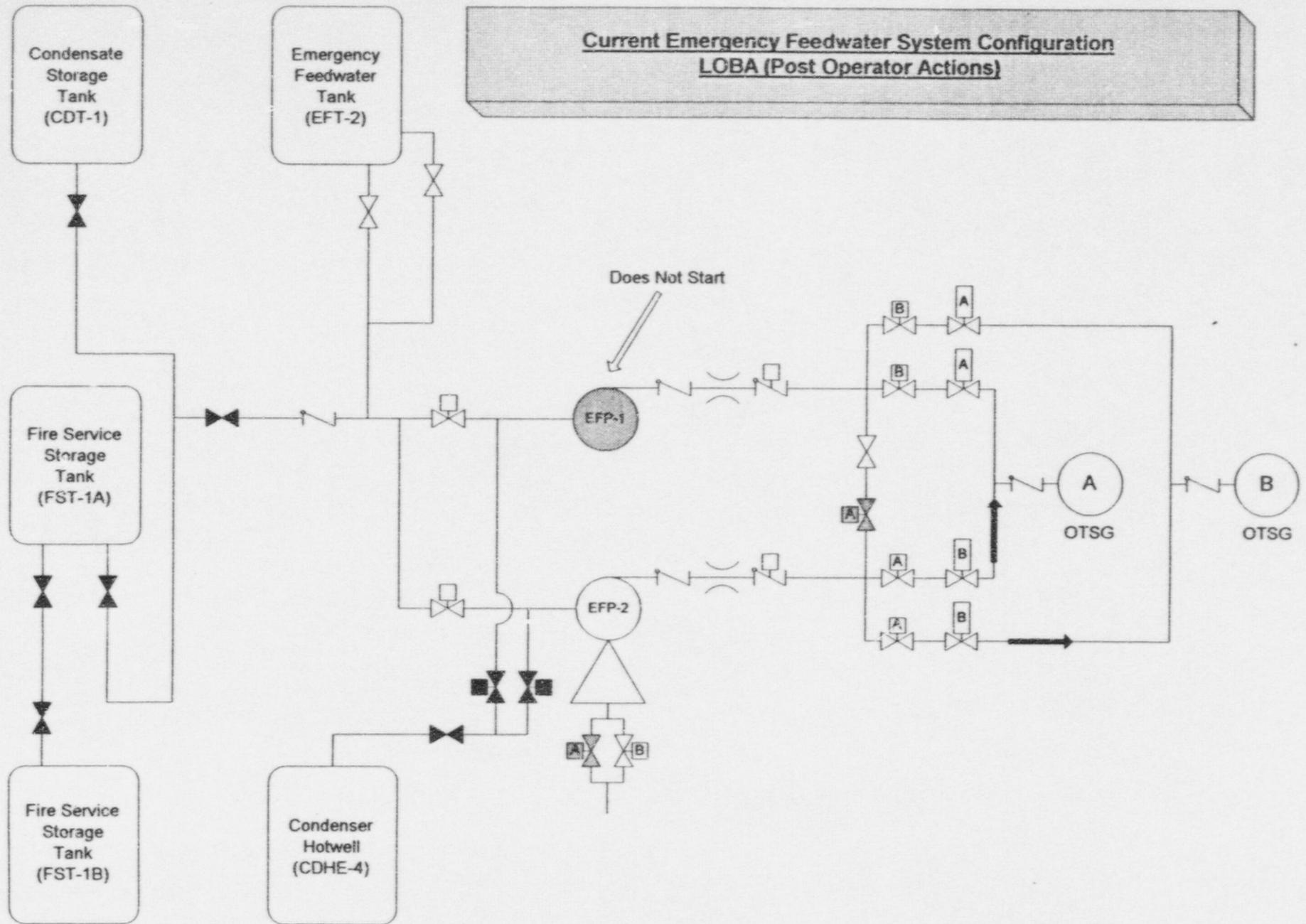
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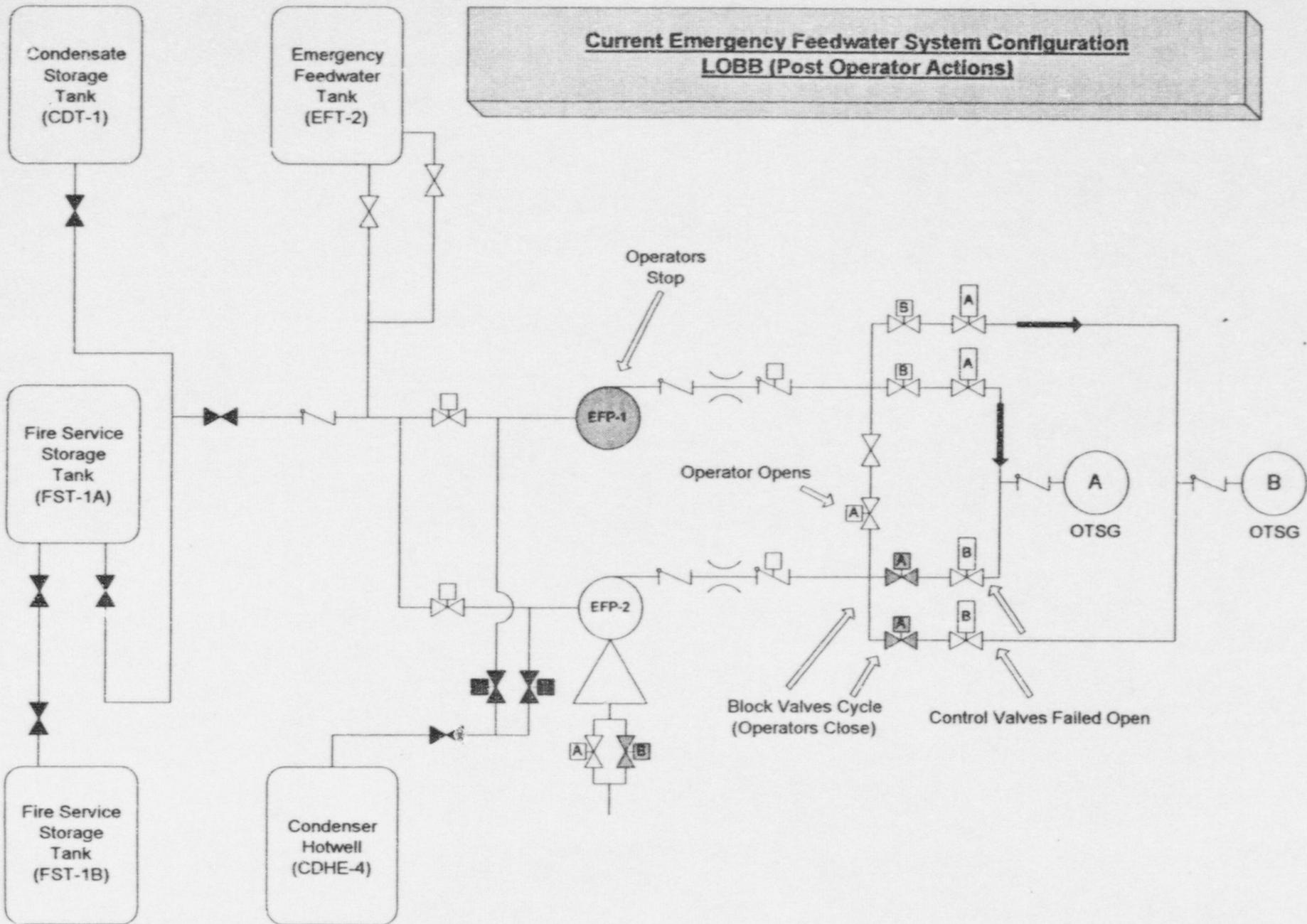
Diesel Driven Emergency Feedwater Pump

- **SBLOCA - LOOP**
Challenging Single Failures with Current Configuration
 - **Loss of Battery "A" [LOBA]**
 - » "A" Train ES Equipment Inoperable
 - » "B" Train ES Equipment Operable
 - » EFP-2 Starts (via ASV-5)
 - **Loss of Battery "B" [LOBB]**
 - » "A" Train ES Equipment Operable
 - » "B" Train ES Equipment Inoperable
 - » EFP-1 Starts
 - » EFP-2 Starts (via ASV-204)
 - **Loss of EFP-2**
 - » Both Trains ES Equipment Operable
 - » EFP-1 Starts

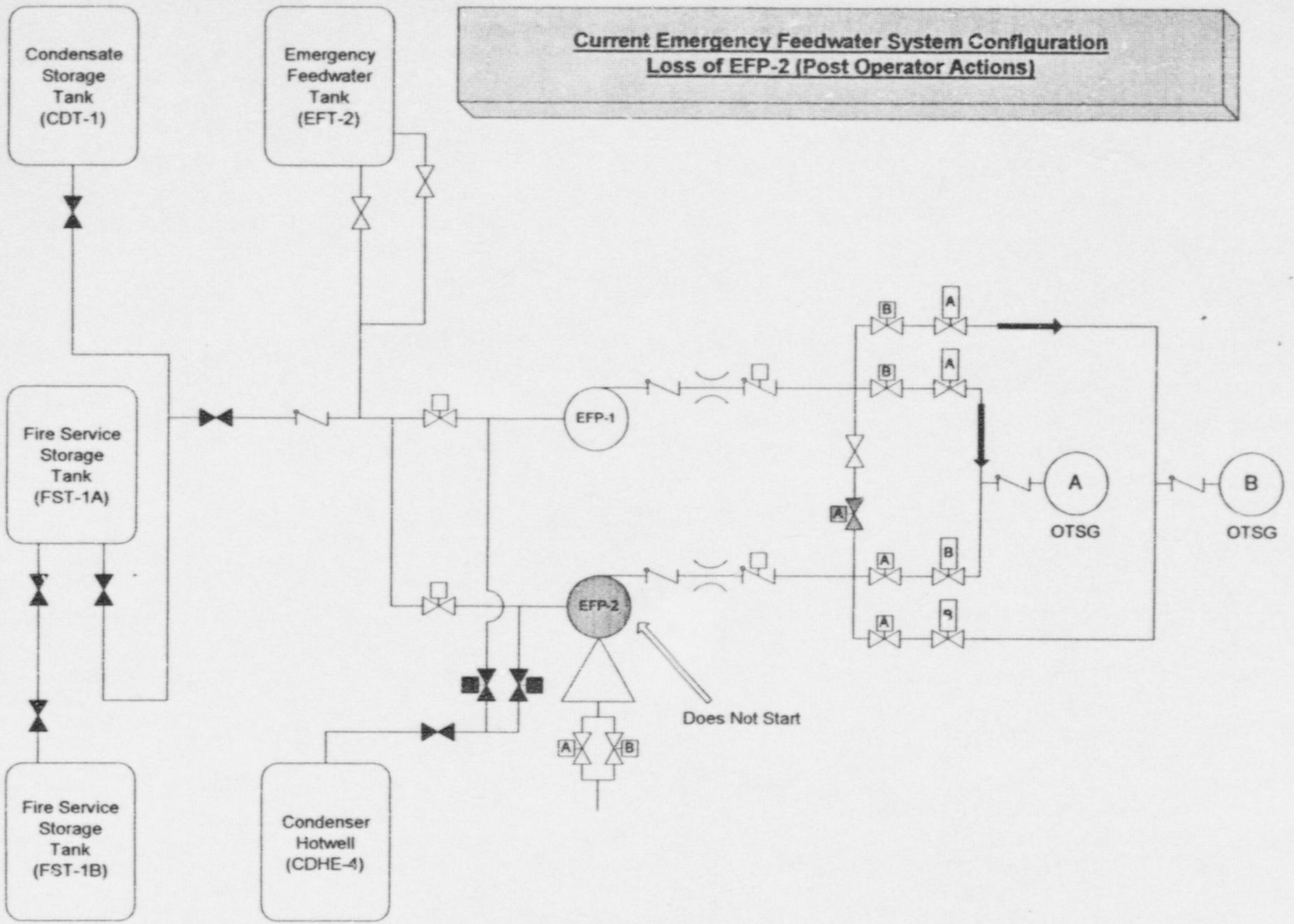
**Current Emergency Feedwater System Configuration
LOBA (Post Operator Actions)**



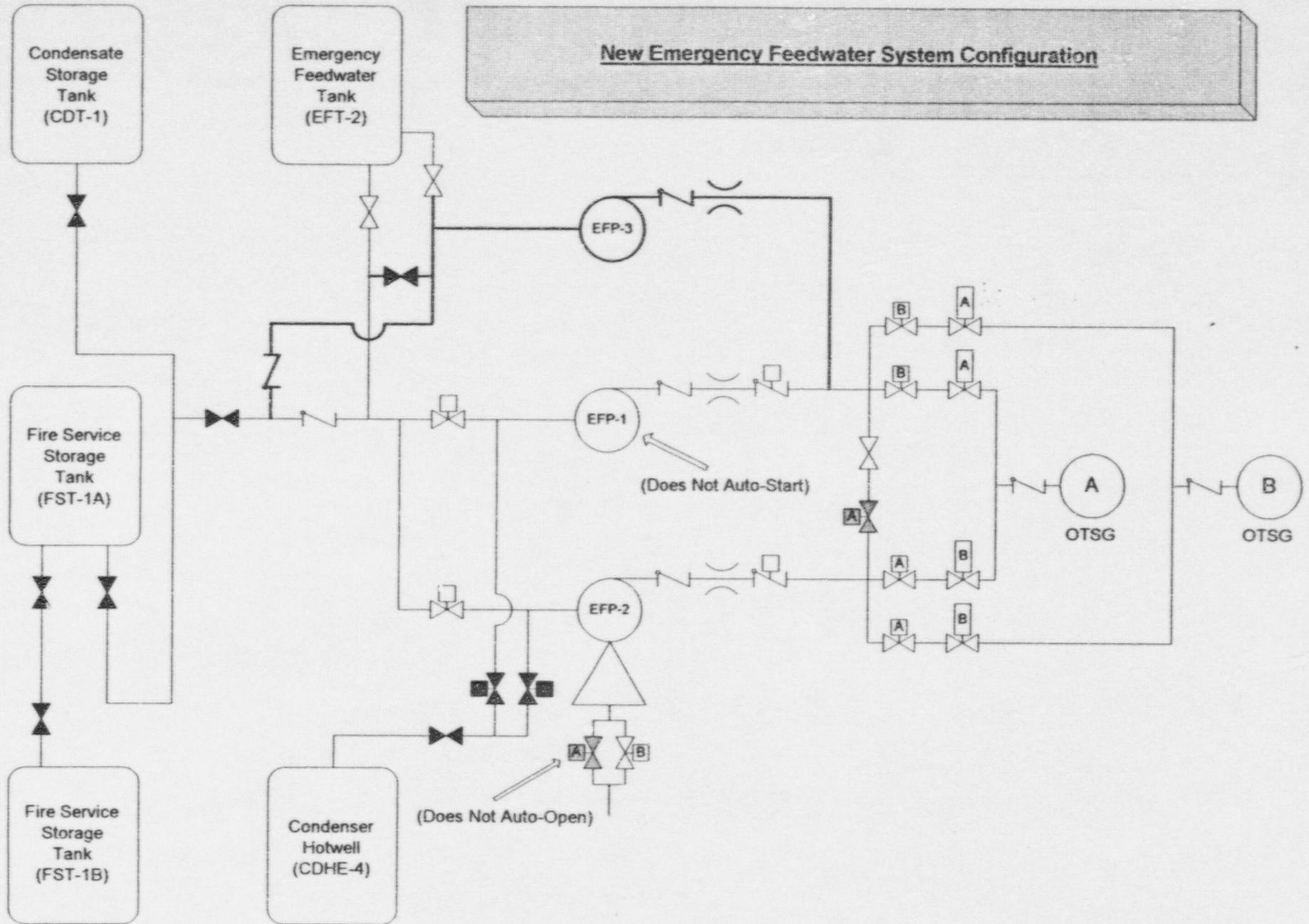
**Current Emergency Feedwater System Configuration
LOBB (Post Operator Actions)**



**Current Emergency Feedwater System Configuration
Loss of EFP-2 (Post Operator Actions)**



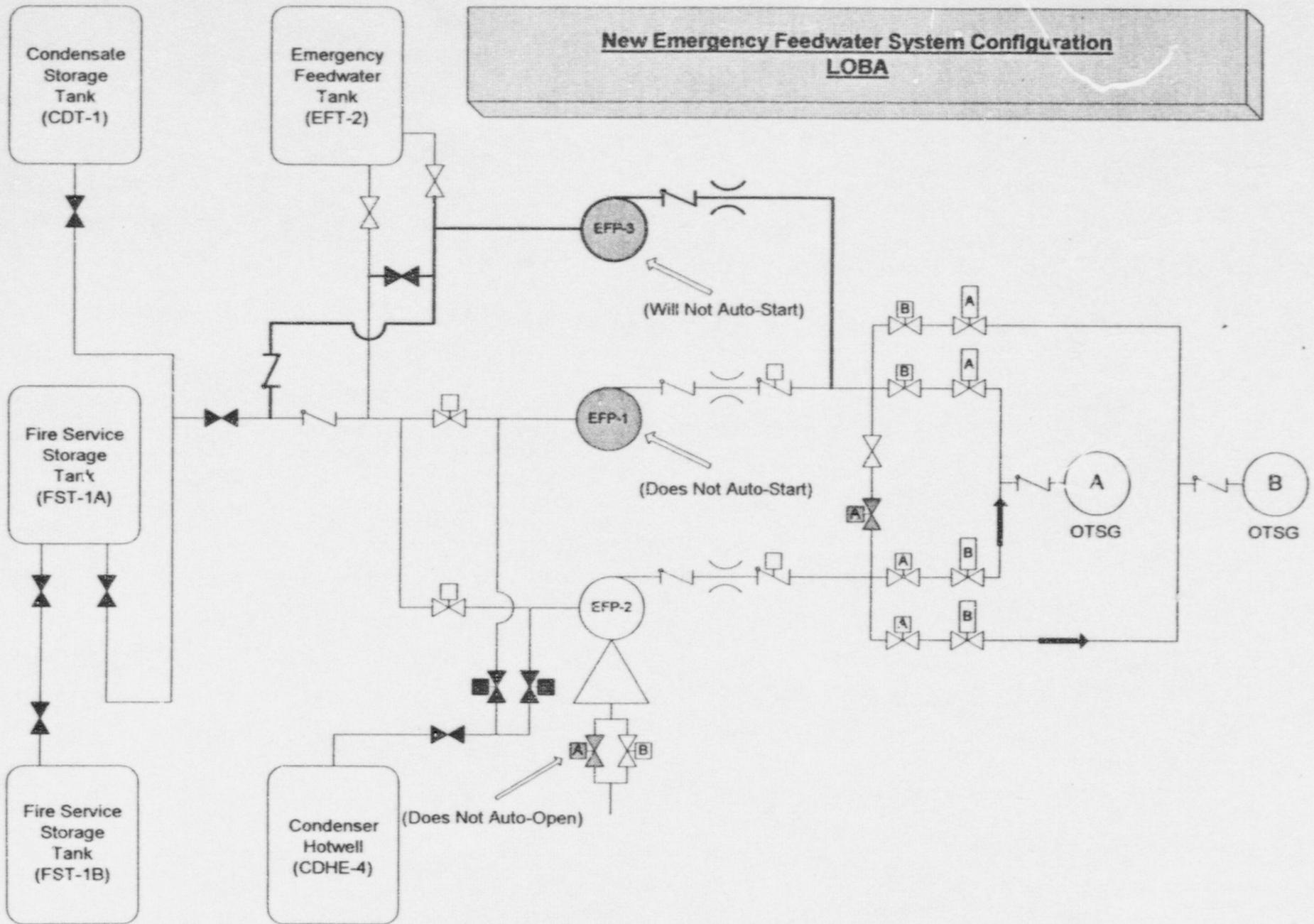
New Emergency Feedwater System Configuration



09/21/98

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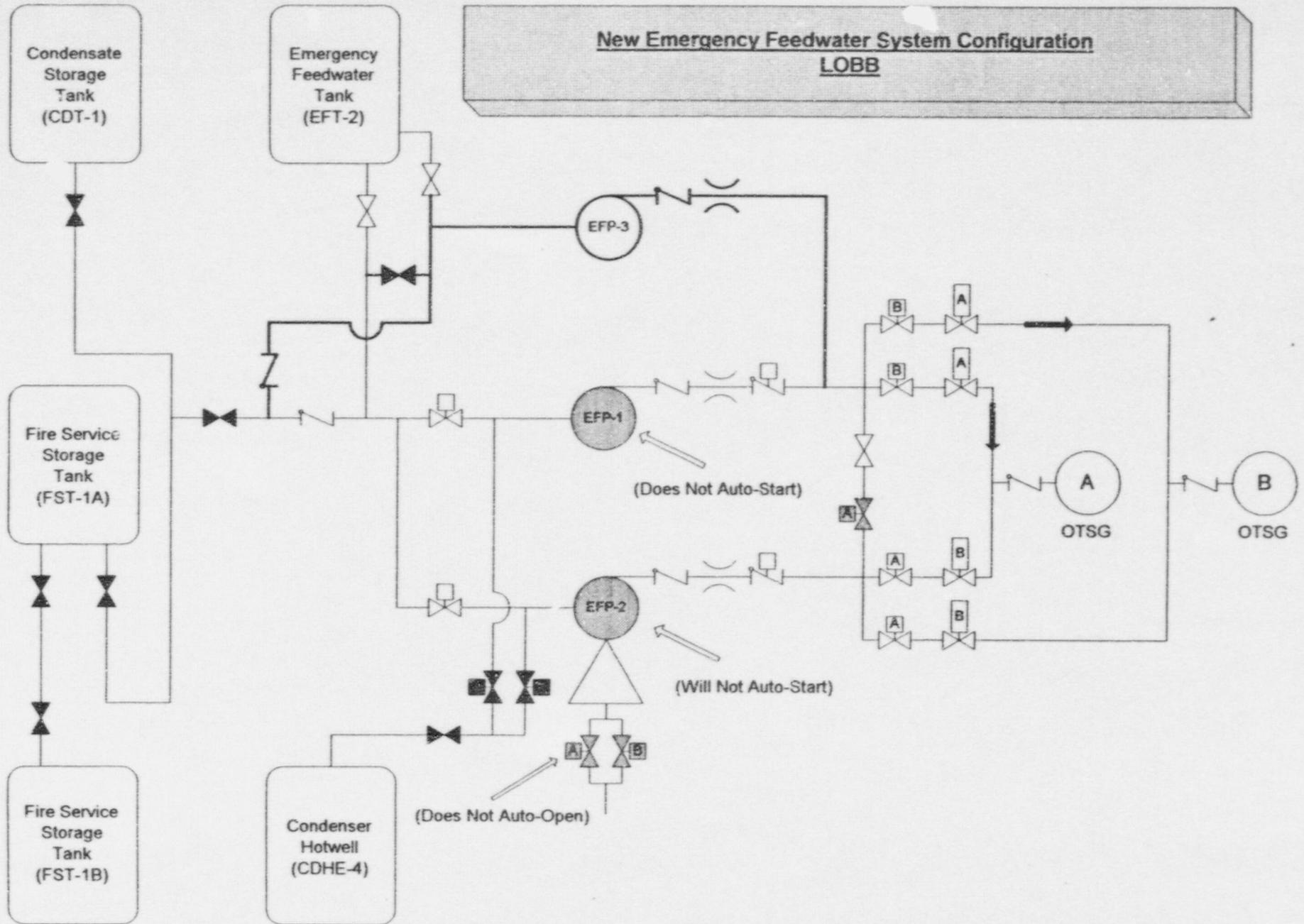
New Emergency Feedwater System Configuration
LOBA



09/21/98

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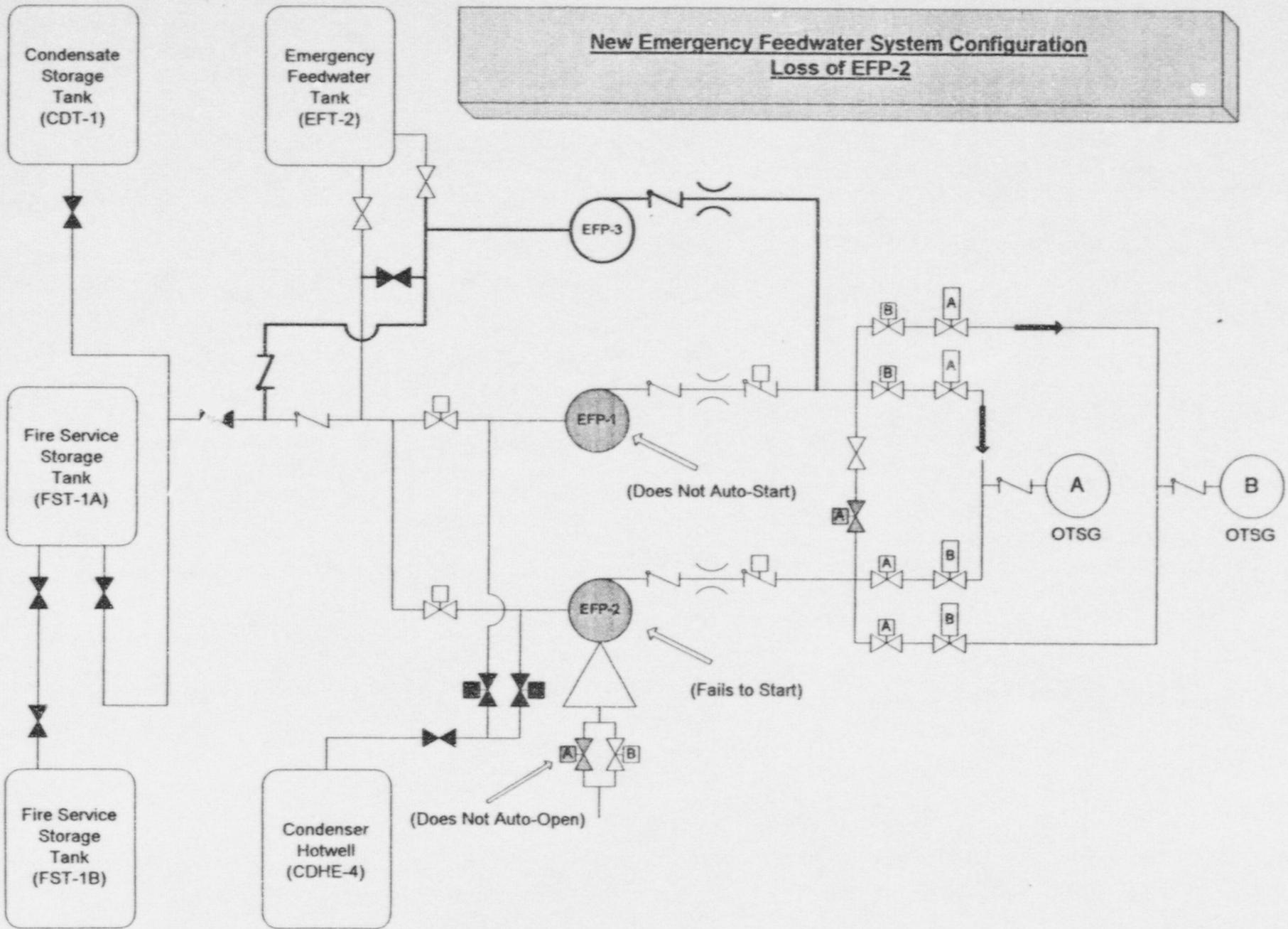
New Emergency Feedwater System Configuration
LOBB



09/21/98

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**New Emergency Feedwater System Configuration
Loss of EFP-2**





Diesel Driven Emergency Feedwater Pump

■ Design Alternatives

- Detailed Study
 - » Replace or Upgrade Both EDGs
 - » Replace Single EDG
 - » Add Third EDG
 - » Add Diesel Driven EFP
- Third Party Evaluation



Diesel Driven Emergency Feedwater Pump

■ Design Features

- New Safety Related Emergency Feedwater Pump (EFP-3)
- New Safety Related Diesel Engine
- Independent Class 1 Building
- Fuel Oil Supply Allows 7 Day Operation Plus Testing
- All Required Indication and Control Power for Diesel Provided by Dedicated Class 1E Batteries Located in New Building
- AC-Independent Design Enhances SBO Coping Strategy
- Applicable Codes and Standards
 - » Building - NUREG 0800, Standard Review Plan
 - » Equipment - Current Approved Codes and Standards (e.g., B31.1, 1967)

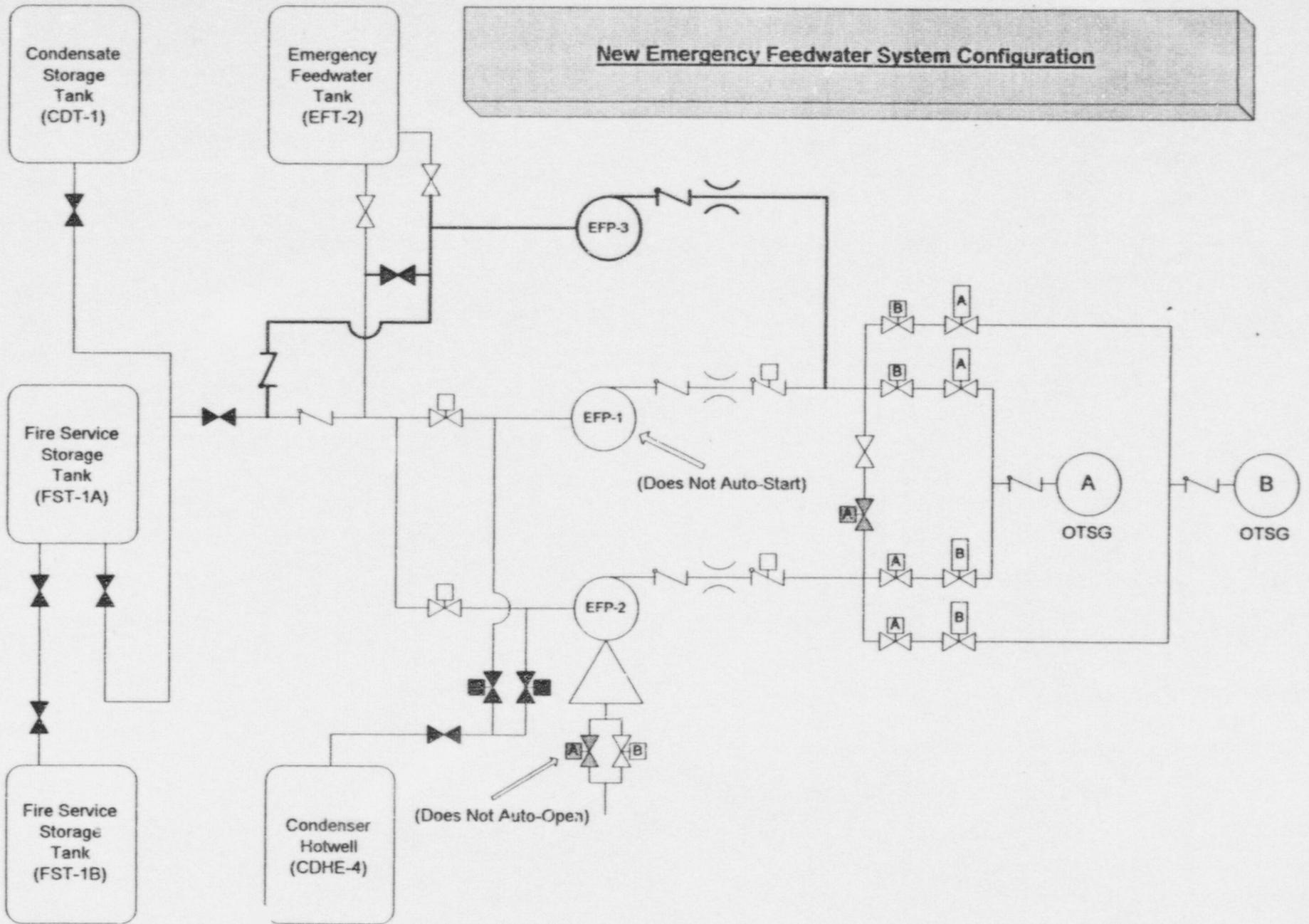


Diesel Driven Emergency Feedwater Pump

■ Design Features (continued)

- Pump Location Allows Suction from All Water Sources Except Condenser Hotwell. Administratively Controlled Inventory Exceeds the Requirement for Natural Circulation Cooldown
- EFP-1, EFP-2, FWP-7 can Transfer Water from the Hotwell to the Emergency Feedwater Tank / Condensate Storage Tank

New Emergency Feedwater System Configuration



09/21/98

(efwnew.vsd)



Diesel Driven Emergency Feedwater Pump

■ Design Features (continued)

- Disposition of EFP-1
 - » Actuation Logic will be Transferred from EFP-1 to EFP-3
 - » Logic Prevents Concurrent Operation of EFP-3 and EFP-1
 - » EFP-1 will be Capable of Being Manually Selected
 - » EFP-1 can be Loaded on the "A" Diesel Generator When Capacity Allows
 - » EFP-1 will be Credited for Post-Seismic Cooldown
- Remove Auto-Open Signal from ASV-204



Diesel Driven Emergency Feedwater Pump

■ Industry Experience

- Diesel Driven Safety Related Emergency / Auxiliary Feedwater Pumps
 - » Byron Units 1 and 2
 - » Braidwood Units 1 and 2
 - » Fort Calhoun
- Other Diesel Driven Safety Related Pumps
 - » Byron Units 1 and 2 (Emergency Service Water)
 - » Braidwood Units 1 and 2 (Emergency Service Water)
 - » Surry Unit 1 (Emergency Service Water)
 - » Prairie Island Units 1 and 2 (Nuclear Service Water)



Diesel Driven Emergency Feedwater Pump

■ Overall Safety Benefits

- Multiple, Diverse Emergency Feedwater Pumps
 - » EFP-2 is Steam Driven Technical Specification Required Pump
 - » EFP-3 is Diesel Driven Technical Specification Required Pump
 - » EFP-1 is Motor Driven Safety Grade Manual Pump
 - » FWP-7 is Defense-in-Depth
- Reduce EDG Load Management in EOPs
- Reduce "A" EDG Auto-Connected Load



Diesel Driven Emergency Feedwater Pump

■ Overall Safety Benefits (continued)

➤ Operator Actions Eliminated

- » Need to Cross-Tie EFP-2 to "A" Train (EFV-12) - [OA9]¹
- » Need to Place SWP-1A and RWP-2A in Pull-to-Lock and EFP-1 in Trip Defeat - [OA11]¹
- » Need to Place EFP-1 in Trip Defeat Prior to LPI/EFP-1 Interlock (500 psig) - [OA15]¹
- » Need to Manage Overfill Protection on Loss of "B" Battery

¹ Operator Actions were Identified in the NRC Safety Evaluation Report for License Amendment No. 163.



Diesel Driven Emergency Feedwater Pump

- **Required Technical Specification Revisions**
 - **Removal of License Amendment No. 163 Cycle 11 Specific Limitations**
 - **Removal of Technical Specifications for EFP-1**
 - **New Technical Specifications for New Equipment**



Diesel Driven Emergency Feedwater Pump

■ Project Schedule

	1998												1999											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Design																								
Design Review Board																								
Design Review Board																								
Licensing Submittal																								
Construction																								
OPs Revised																								
Simulator Modified																								
EOP Validation																								
EOP Training (First Cycle)																								
Requested NRC Review & Approval																								
EOP Training (Second Cycle)																								
Outage 11R Begins																								



HPI Upgrade Project

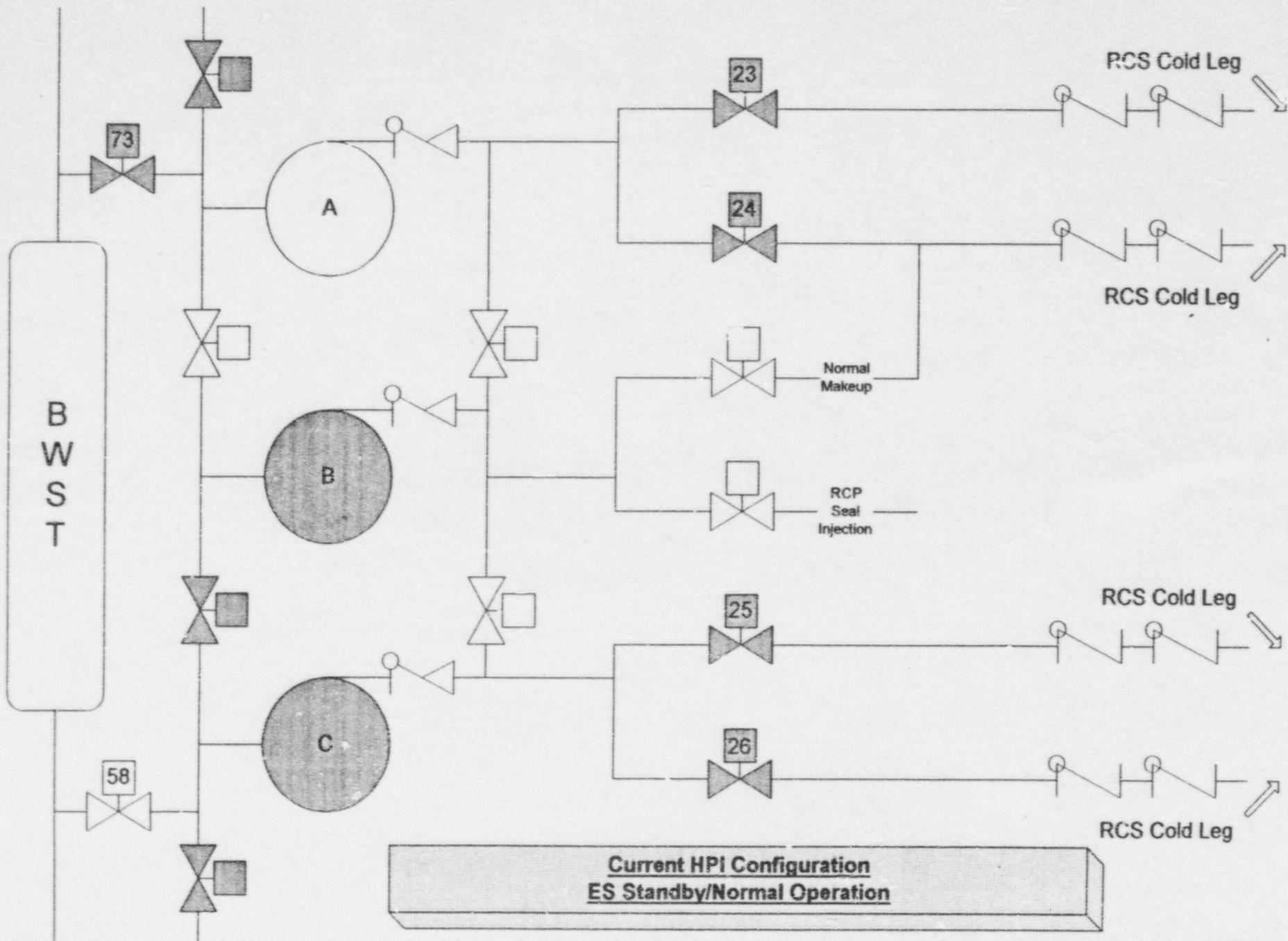
- **HPI Configurations and Operation**
 - **License Amendment No. 163**
 - **SBLOCA**
 - » **Spectrum that Requires
OTSG Cooling / Emergency Feedwater**
 - **Operator Actions Required to Mitigate Accident**
 - **Elevated Peak Clad Temperature (PCT) for Cold Leg
Pump Discharge (CLPD) Break**

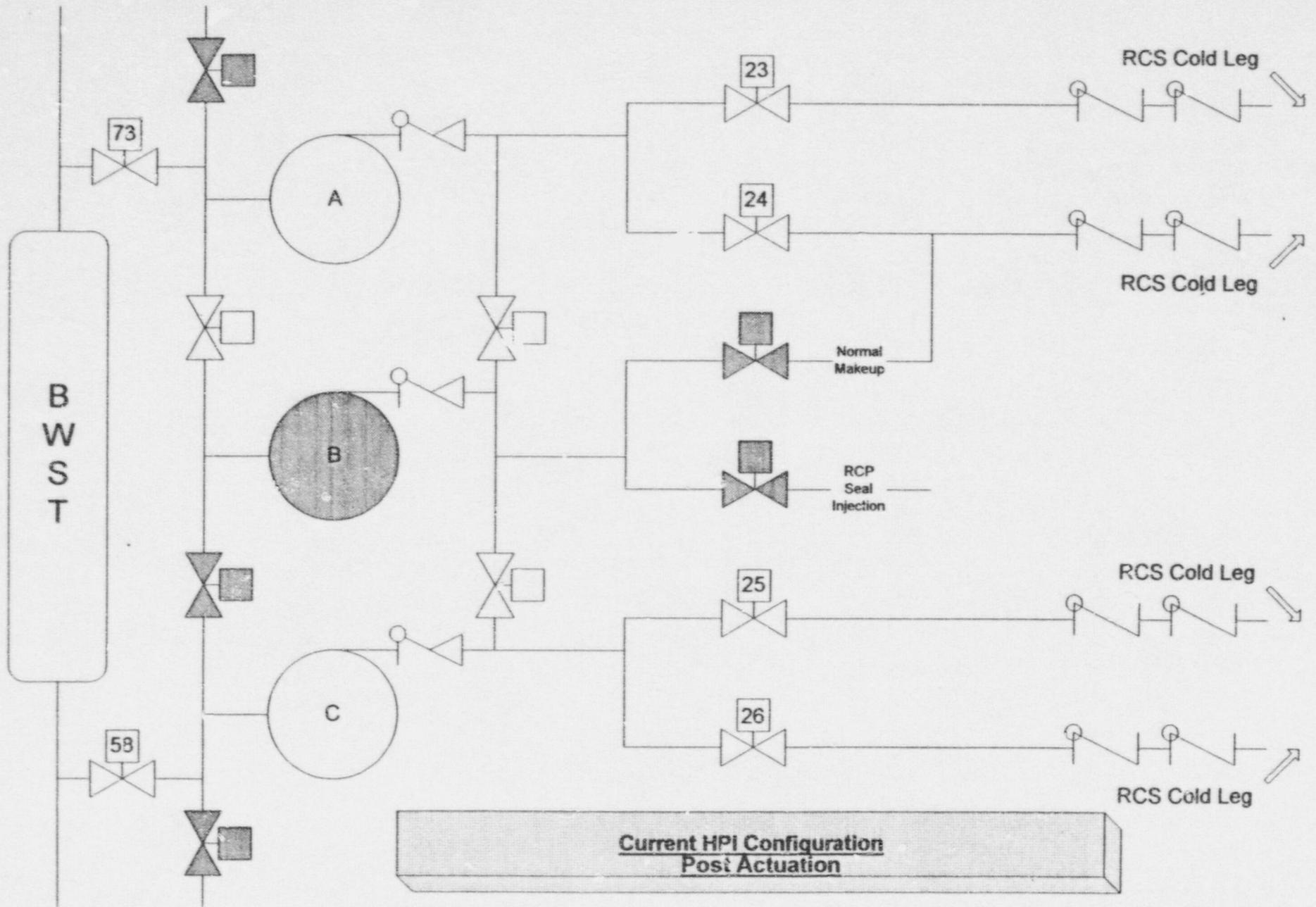


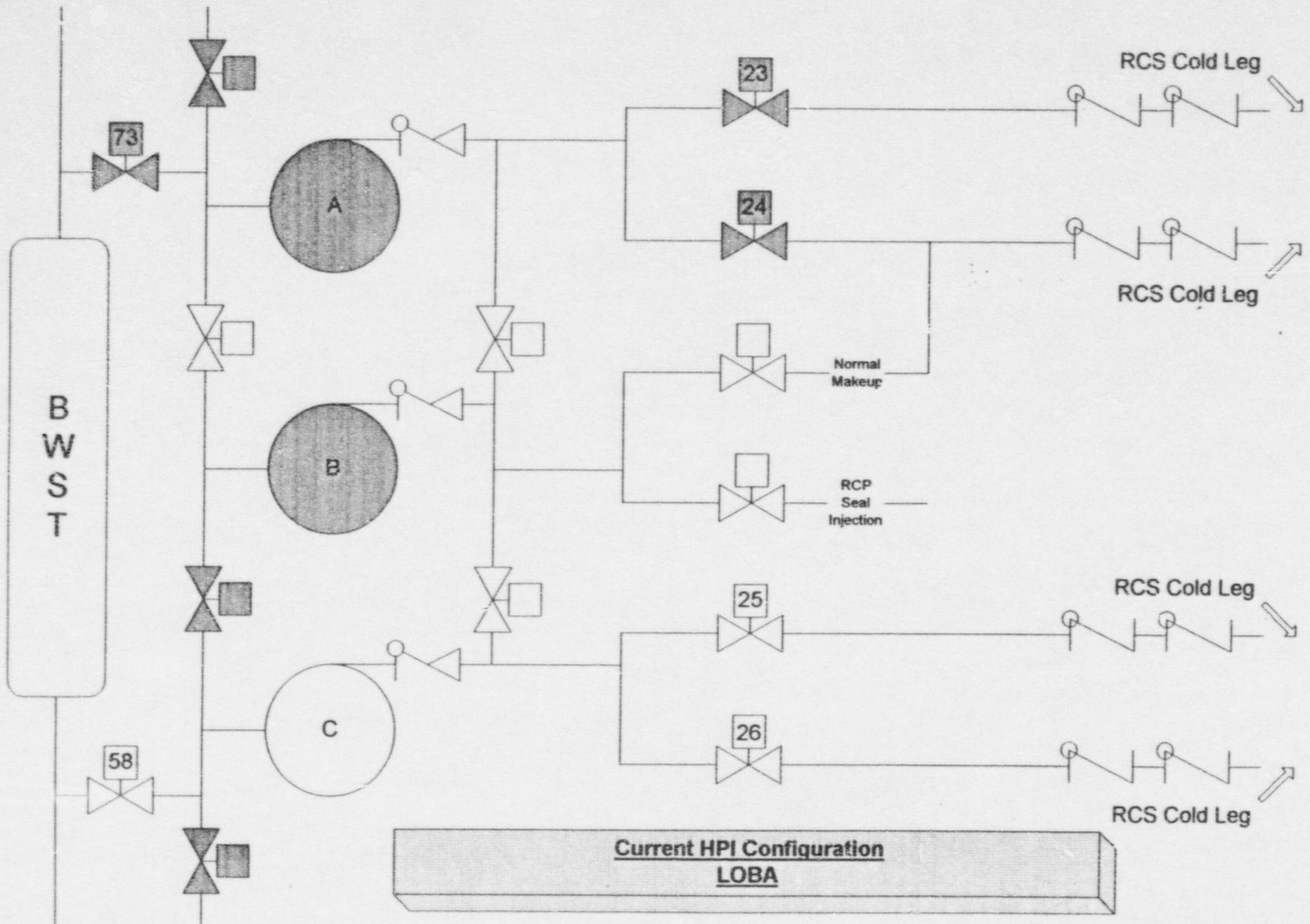
HPI Upgrade Project

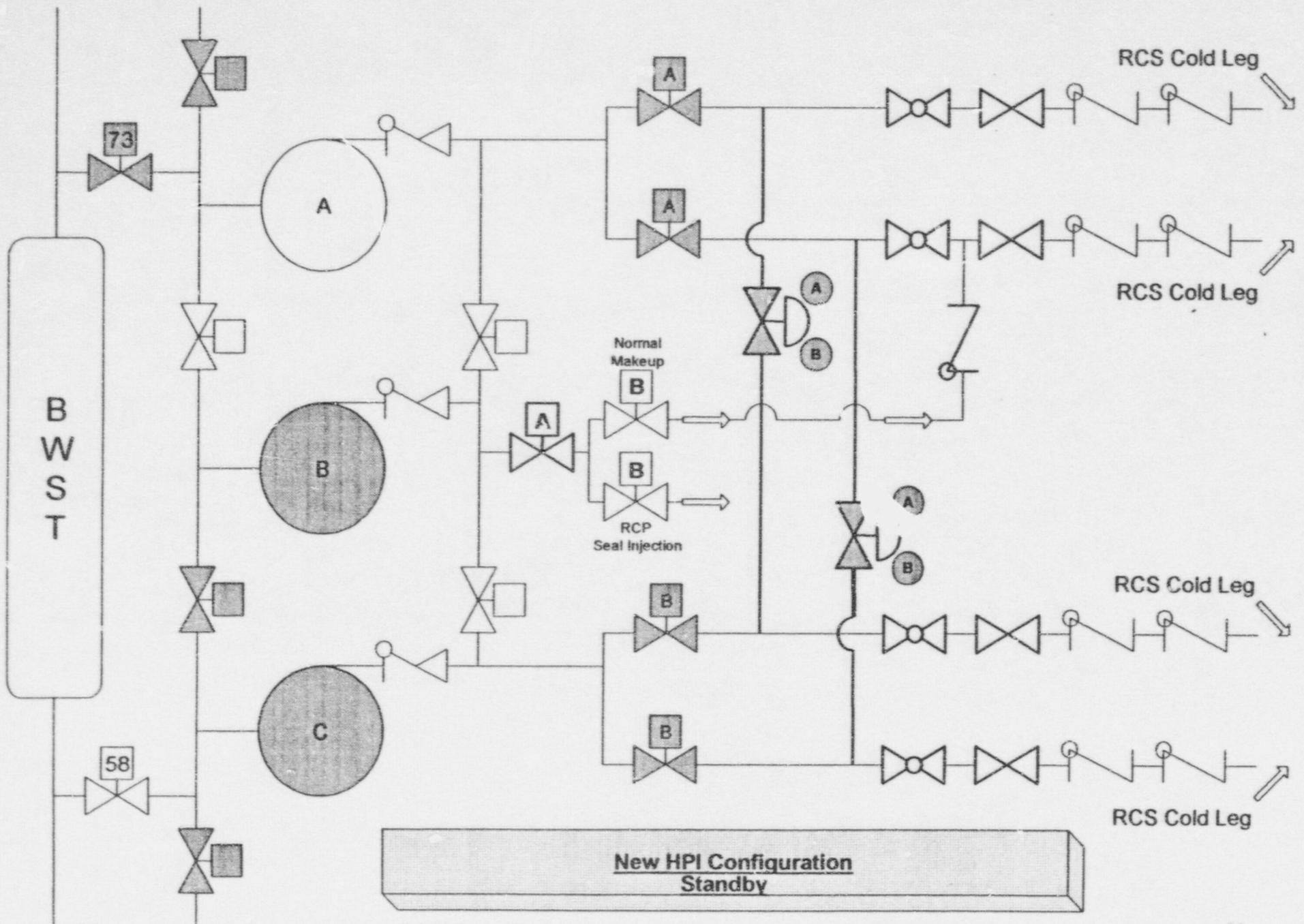
■ Operator Actions

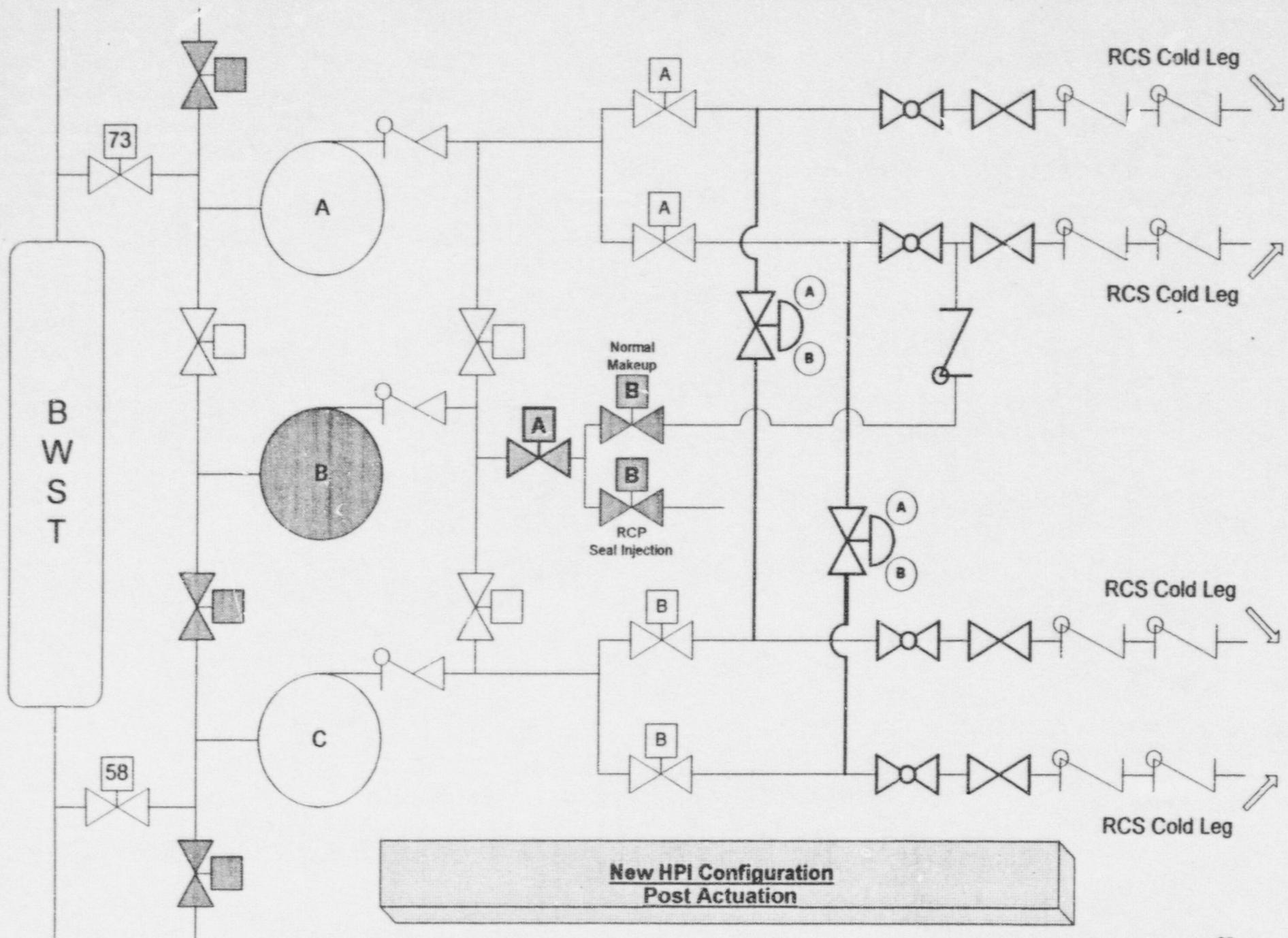
- Trip RCPs
- Ensure all 4 HPI Valves Open
 - » Includes Power Transfer
- Isolate Normal Makeup
 - » Includes Power Transfer
- Isolate Broken HPI Line
 - » Initial Evaluation
- Monitor HPI Flow
 - » Subsequent Evaluation if OTSG Heat Transfer Upset
- Isolate RCP Seal Injection
- Raise OTSG Level to 95%

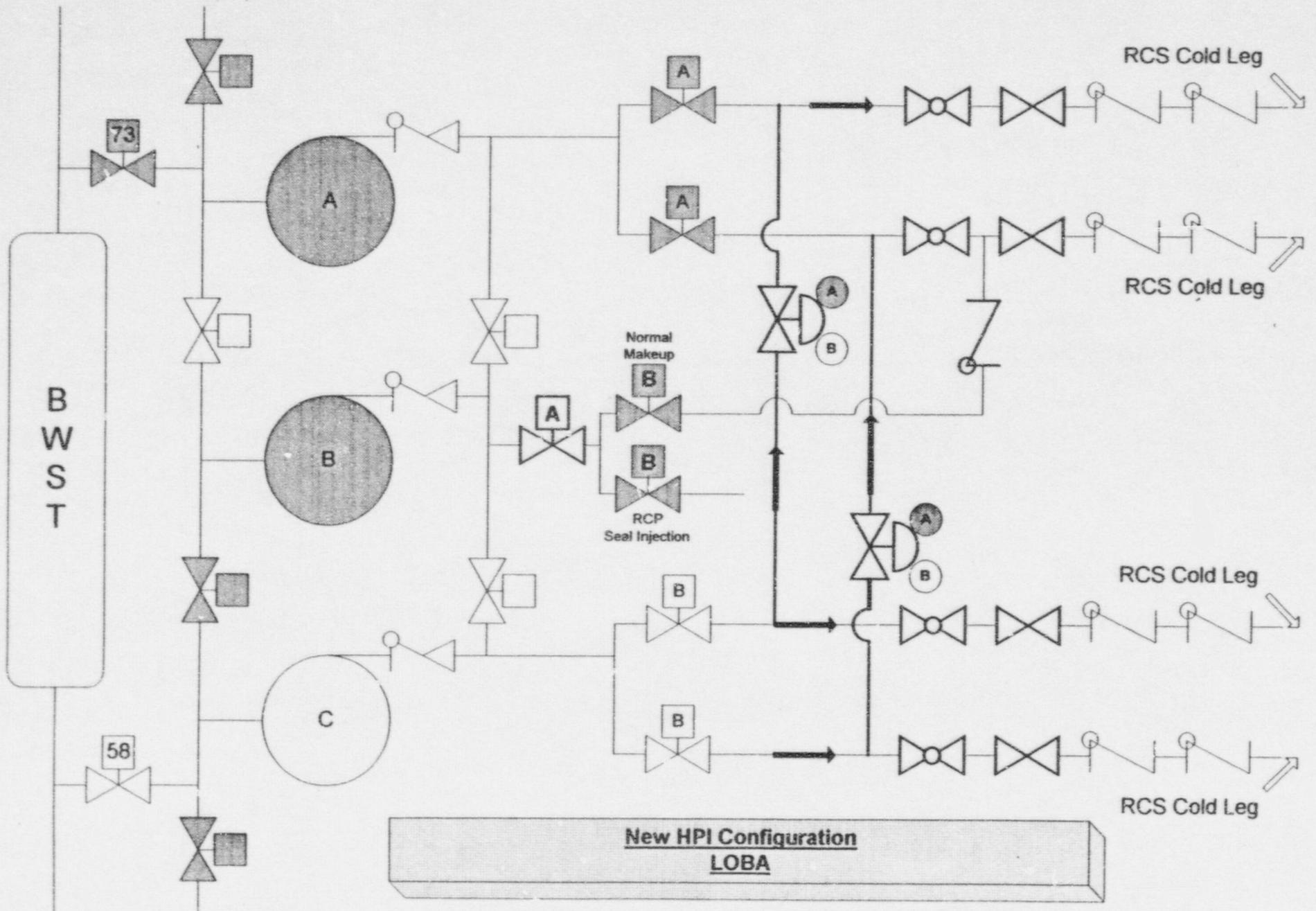














HPI Upgrade Project

■ Design Alternatives

- Detailed Evaluation of Alternatives

■ Design Features

- Cross-tie Lines Between HPI Lines to Ensure Flow in All Four Injection Lines
- Isolation Valves in Cross-tie Lines to Limit Thermal Fatigue Cycles
- Throttle Valves Downstream of Cross-ties to Balance Injection Line Flow and Limit Flow During a Postulated HPI Line Break
- Auto-Isolation of Normal Makeup and Seal Injection Flow
- Increased ES Actuation Setpoint
 - » Currently 1500 psig (nominal)
 - » Will be ~1600 psig
 - » Other Setpoints (RCS Trip and Bypass, ES Bypass) Adjusted Accordingly



HPI Upgrade Project

- **Required Technical Specification Revisions**
 - **Add Surveillance Requirements for New Configuration**
 - **Revise Reactor Protection System and Engineered Safeguards Setpoints**



HPI Upgrade Project

■ Overall Safety Benefits

- Reduced PCT (RELAP5)
- Reduced Operator Actions
 - » Eliminate Need to Open All 4 HPI Valves [OA3]¹
 - » Eliminate Need to Isolate RCP Seal Injection [OA4]¹
 - » Eliminate Need to Isolate Normal Makeup
 - » Eliminate Need to Isolate Broken HPI Line [OA5]¹
 - » Eliminate Need to Periodically Evaluate HPI Line Break Criteria on Repressurization [OA17]¹

¹ Operator Actions were Identified in the NRC Safety Evaluation Report for License Amendment No. 163.



HPI Upgrade Project

- **Overall Safety Benefits (continued)**
 - **Brings CR-3 in Line with Other B&W Plants**
 - » **Peak Clad Temperature (PCT)**
 - » **Setpoints**
 - » **Design**



HPI Upgrade Project

■ Project Schedule

	1998												1999											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
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Diesel Driven Emergency Feedwater Pump and HPI Upgrade Projects

■ Conclusion

- Net Safety Benefits
 - » Reduces Operator Burden in EOPs
 - » Reduces Worst Case SBLOCA PCT
 - » Increases EFW Redundancy/Diversity
 - » Eliminates EDG Load Management Requirements
 - » Eliminates EFW Cross-train Relationships
- Meets NRC Commitments
- Schedule Considerations