



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 23, 1994

Docket Nos. 50-277  
and 50-278

LICENSEE: Philadelphia Electric Company (PECO)  
FACILITY: Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3  
SUBJECT: MEETING SUMMARY, PLANNED MODIFICATION TO INSTALL ADJUSTABLE SPEED  
DRIVES AT PBAPS (TAC NO. M88487)

On January 27, 1994, an open meeting was held in Rockville, Maryland, between PECO and the NRC staff (the staff). Enclosure 1 is the agenda used by the licensee, Enclosure 2 is the licensee's presentation slides, and Enclosure 3 is the list of meeting attendees.

The licensee began the meeting with a brief introduction and discussion of the purpose of the meeting. The licensee requested the meeting in order to inform the staff of PECO's planned modification regarding the power supplies of the recirculation pumps at PBAPS.

Currently the PBAPS recirculation pumps receive variable frequency power through motor-generator (MG) sets (the frequency is varied to change pump speed and thereby change reactor power). The planned modification would replace the MG sets with adjustable speed drives (ASDs). The ASDs use solid-state electronics along with microprocessor controls to provide the variable frequency power required. Since the use of ASDs for this application is relatively new, the licensee wanted to make a presentation to the staff to give the staff the opportunity to voice any concerns and ask questions.

The licensee continued the meeting with a discussion of the project's scope and anticipated benefits. The licensee plans to replace two complete MG sets (per unit) with ASDs. The modification will also incorporate a recirculation pump trip system. The licensee expects that the modification will result in reduced maintenance requirements and increased reliability. The licensee estimates that it will receive an annual savings of approximately 1.6 million dollars per unit after this modification is installed. The non-monetary benefits noted by the licensee included:

1. Improved recirculation pump speed control.
2. Reduced wear on the recirculation pump motors by providing a soft start.
3. Reduced fire hazard by removal of an oil system from inside the plant.
4. Provides additional critical power ratio margin.
5. Increased flow capacity of recirculation pumps.

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The staff asked the licensee to address the potential for low power flow increases to reach a higher power level prior to mitigation, thus violating the safety limit MCPR.

The staff asked the licensee to include the effect of the ASD on power rerate and ARTS/MELLLA license amendments.

The staff asked the licensee to address the Emergency Operating Procedures, training, and human factors changes/considerations that are affected by this amendment.

The licensee agreed to address all of the staff's concerns and questions in their ASD license amendment submittal.

/s/

Stephen Dembek, Project Manager  
 Project Directorate I-2  
 Division of Reactor Projects - I/II  
 Office of Nuclear Reactor Regulation

Enclosures:  
 As stated

cc w/enclosures:  
 See next page

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DATE:	2/23/94	2/23/94	2/23/94		

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 DOCUMENT NAME: B:MEETING.MIN

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Units 2 and 3

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AGENDA FOR NRC PRESENTATION  
MOD P00086  
PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3

January 27, 1994

- |      |                                 |                      |
|------|---------------------------------|----------------------|
| I.   | INTRODUCTION/PURPOSE OF MEETING | Tom Loomis/Licensing |
| II.  | PROJECT SCOPE                   | Terry Nezter/PM      |
| III. | DESIGN CHANGES                  | Giuseppe Termine/LRE |
| IV.  | PLANT CHANGES                   | Todd Strayer/LSR     |
| V.   | LICENSING CHANGES               | Tom Loomis           |
| VI.  | CONCLUSION                      | Tom Loomis           |

## PECO ENERGY COMPANY ATTENDEES

George Beck	Senior Manager
Terry Nezter	Project Manager (PM)
Marilyn Kray	Licensing Manager
Tom Loomis	Licensing Engineer
Giuseppe Termine	Lead Representative Engineer (LRE)
Todd Strayer	Lead Station Representative (LSR)
Nelso Petroni	GE - Enginner
Kurt Schefer	GE - Licensing



LIST OF ATTENDEES  
MEETING BETWEEN NRC AND PECO ON  
ADJUSTABLE SPEED DRIVE MODIFICATION  
January 27, 1994

<u>NAME</u>	<u>ORGANIZATION</u>
M. Lombard	MDM Engineering Corp.
J. Witter	NRR/DSSA/SRXB
S. Dembek	NRR/DRPE/PDI-2
P. Loeser	NRR/DRCH/HICB
R. Frahm	NRR/DSSA/SRXB
G. Beck	PECO
N. Petroni	General Electric Co.
K. Schaefer	General Electric Co.
T. Loomis	PECO
M. Kray	PECO
G. Termine	PECO
T. Strayer	PECO
T. Netzer	PECO

**MODIFICATION P-0086**  
**PEACH BOTTOM ATOMIC POWER STATION**  
**UNITS 2 AND 3**

## SCOPE

1. Replace 2 complete Motor Generator (M-G) Sets per unit with Adjustable Speed Drives (ASD).
2. Incorporate into the design a Nuclear Fuels Strategy Improvement to provide the Recirc Pump Trip (RPT) System.



## REASONS

### 1. Reduce Maintenance

- M-G Set Bailey Scoop Tube Positioner, Scoop Tube Linkage and Knuckles are problematic.
- Generator Tachometer has caused numerous problems.
- Outage recovery has been impacted by the time to return the M-G Sets to service.

### 2. Increase Reliability

- Total full power hours (FPH) due to specific hardware causes average 53 FPH per year (60% derate).
- Reduced troubleshooting & repair required to keep units at power.
- M-G Set lockups can remove automatic operation of pump runbacks during plant transients.

## **TANGIBLE BENEFITS (ANNUAL)**

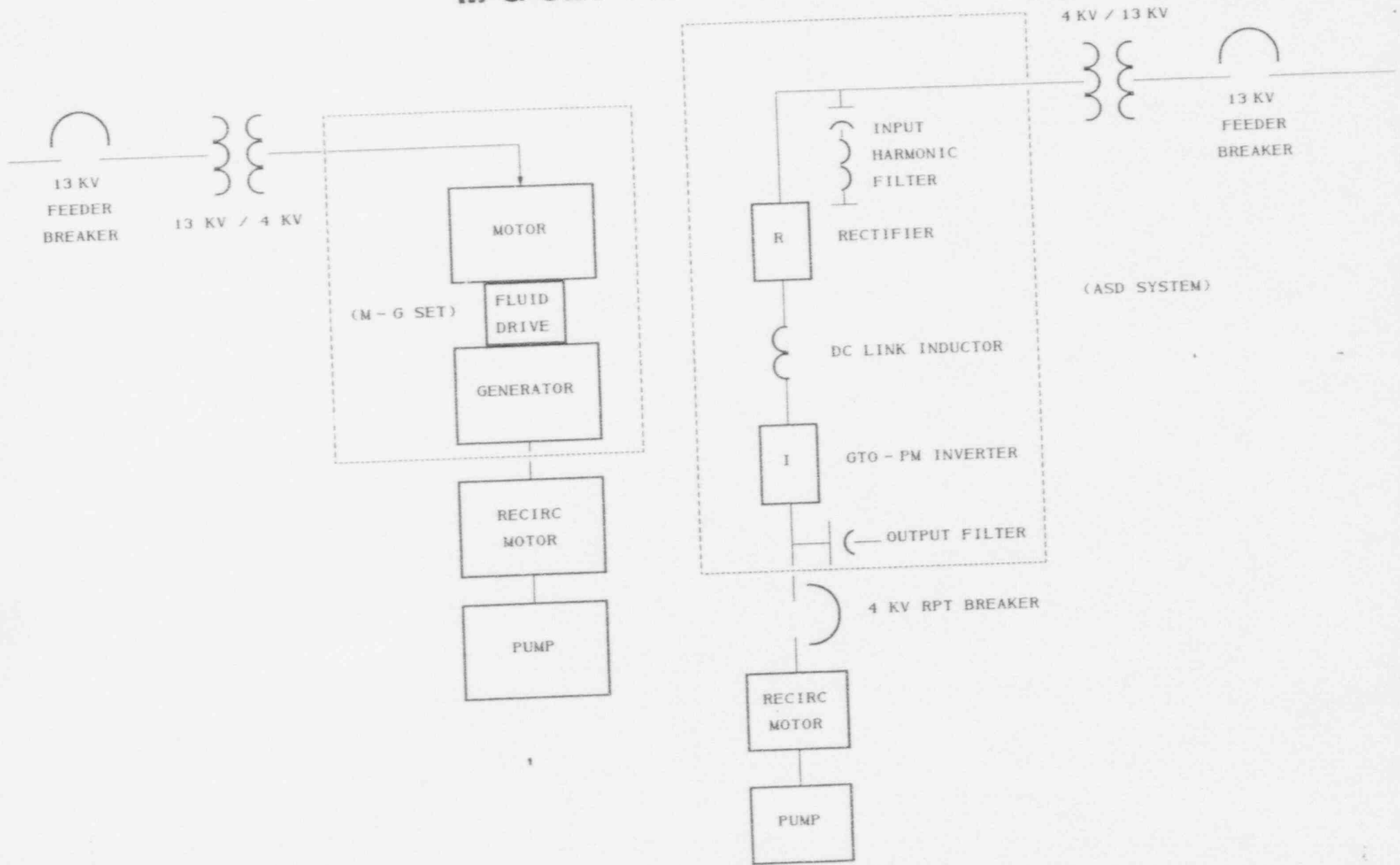
1. Estimated reduction of \$50K O&M Costs.
2. Reduction in plant derates due to M-G Set maintenance \$897K.
3. Reduction in house loads (2.7 MW/Unit) \$267K.
4. Reduction in outage duration \$419K.

## INTANGIBLE BENEFITS

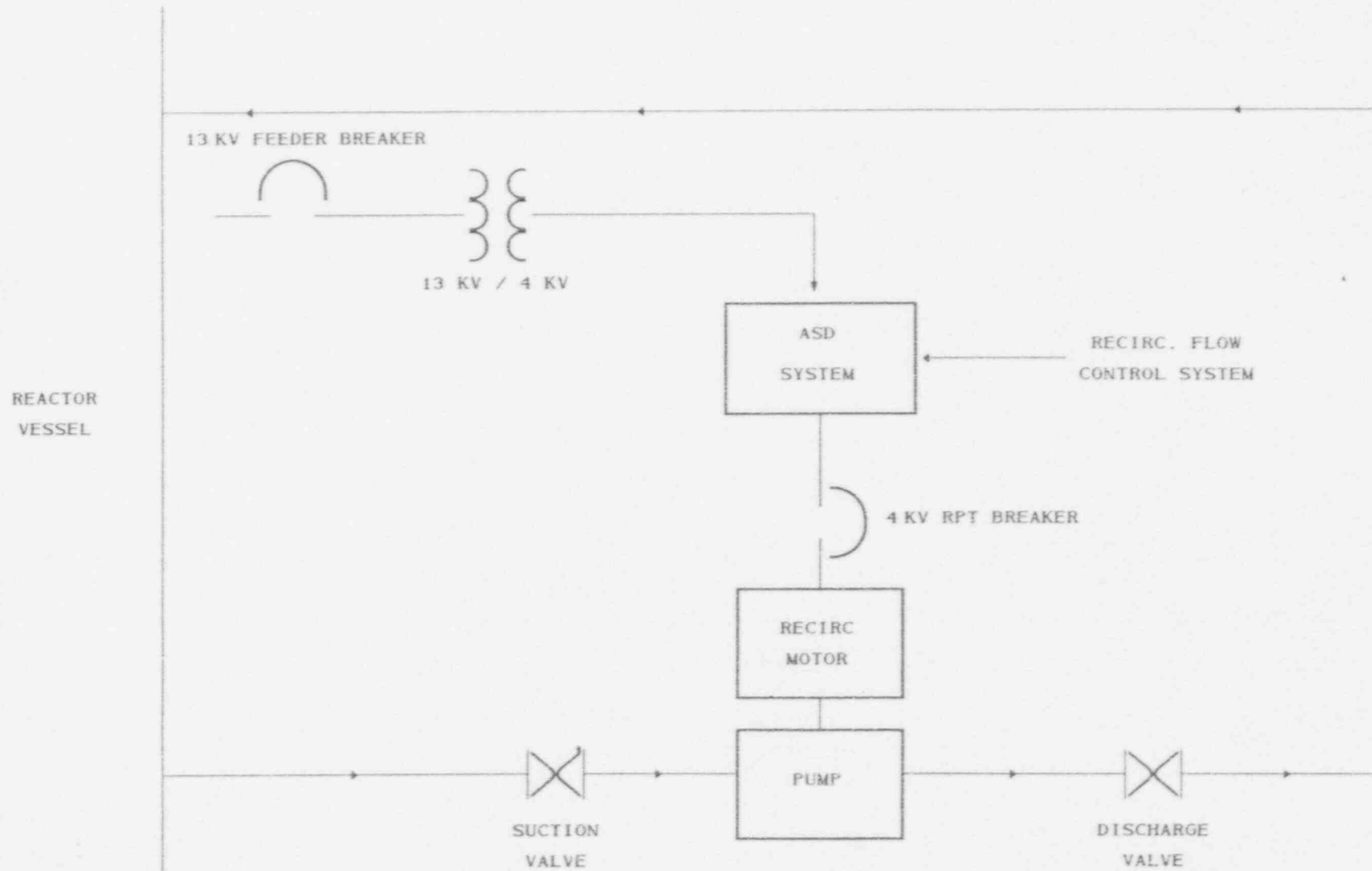
1. Give the operators improved speed control at all speed settings.
2. Operational Flexibility.
3. Reduces wear on the recirc motors by providing soft start.
4. Reduces System Manager and operator time and attention required to keep the current system operational.
5. Reduces fire hazard by removal of an oil system from inside the plant.
6. Reduces inventory on spare parts.
7. Reduces heat loads on service water and building ventilation system.
8. Provide additional Critical Power Ratio (CPR) Margin.
9. Increased flow capability.

**PLANT DESIGN CHANGES**

# M-G SET VS. ASD SYSTEM

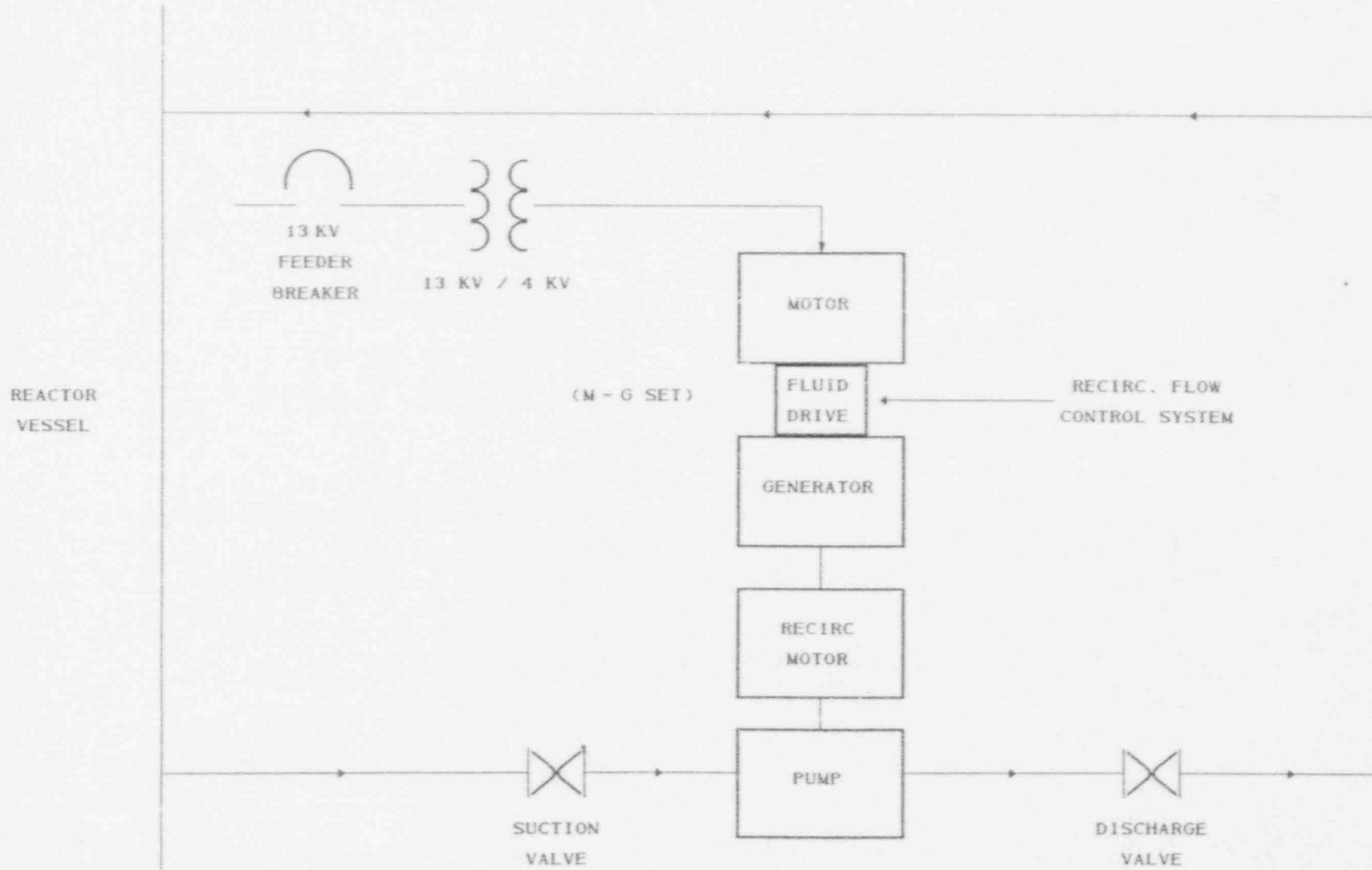


# PBAPS REACTOR RECIRCULATION SYSTEM WITH ADJUSTABLE SPEED DRIVE AND RPT SYSTEM





# PBAPS REACTOR RECIRCULATION SYSTEM WITH M-G SET



## ASD TECHNICAL ISSUES

1. Effects of harmonics on pump motor and main power buses.
2. Effects of torque pulsations on RRS piping and valves.
3. Effects on transient and accident analyses.
4. Analog vs. digital replacement
5. EMI/RFI Effects
6. Effects of pressure pulsation frequency changes on vibration of vessel internals.
7. ASD failure modes.
8. Installation requirements.
9. Testing requirements.

## RELIABILITY

1. 54 U.S. Utility Installations
  - Fan and Pump Applications
2. 15% of Drive Population Surveyed

System Drives

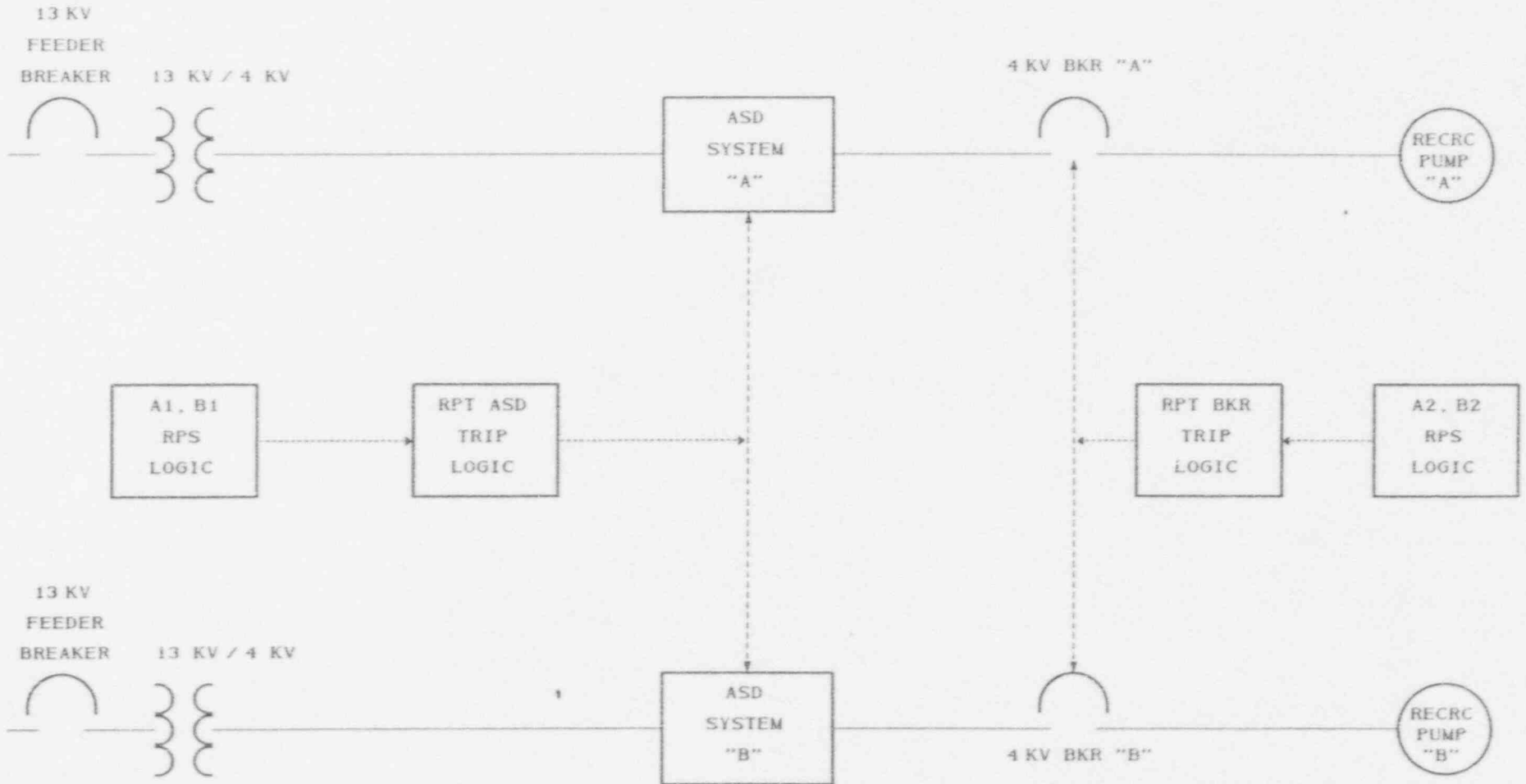
Unit Hrs =  $1.4 \times 10^6$

Failures = 4

## **RPT SYSTEM DESIGN**

1. Utilizes ASD System with one output breaker.
2. Two independent and redundant trip systems.
3. Utilizes RPS Logic for Trip initiation.
4. Follows RPS electrical separation requirements (e.g. rigid steel conduits).

# RPT SYSTEM DESIGN



**PLANT CHANGES  
REQUIRED  
TO  
IMPLEMENT ASDs  
AND  
RPT SYSTEM**



## OUTSIDE RADIOLOGICAL CONTROL AREA

1. Replace 13 Kv Transformers w/new dry type transformers.
2. Install harmonic filters.

## CONTROL ROOM CHANGES RECIRC CONTROL PANEL

1. Remove existing RRS control equipment
  - M-G Sets lube oil pumps switches/lights
  - Analog indicators
  - Alarm windows
  - M-G Sets lube oil temperature recorder
  
2. Install new RPT System
  - Breakers control switches/lights
  - Breakers trip coil lights
  - RPT logic test switches w/reset
  - Alarm windows
  
3. Install new ASD System
  - Start/stop control switches/lights
  - Speed lock/reset switches
  - Video Display Unit (VDU) for status and alarms

## M-G SET ROOM CHANGES

### 1. Removal of:

- M-G Sets and pedestals
- Service Water System and Lube Oil Piping/Tubing/Instrumentation
- Control Panels
- Fire Protection around M-G Sets

### 2. Modify HVAC System

### 3. Installation of:

- ASD systems on skids
- RPT breakers
- Sprinkler system for fire protection

## TECHNICAL SPECIFICATION CHANGES

- Delete Fire Protection Requirements for M-G Sets (Tech Spec. Section 3.14.E)
- Add surveillance test requirements to Section 3.3 for RPT System

## SCHEDULE

- Submittal for Licensee Changes 3/94
- Unit 2
  - Ready to Work Date 6/10/94
  - Outage Start Date 9/1/94
- Unit 3
  - Ready to Work Date 6/10/95
  - Outage Start Date 9/1/95