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September 9, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Charging Pump Miniflow Lines
NRC Docket Nos. 50-454, 50-455,
50-456 and 50-457

Dear Mr. Denton:

This is to provide information regarding the design change to be incorporated at the Byron/Braidwood Stations to address the potential for charging pump deadheading in the event of a secondary side line break. The Attachment to this letter provides a conceptual outline of the design change. This material will be incorporated into the FSAR in a future amendment.

One signed original and fifteen copies of this letter and the Attachment are provided for your review.

Please address questions regarding this matter to this office.

Very truly yours,

F. G. Lentine

F. G. Lentine
Nuclear Licensing Administrator

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B001

Attachment

4984N

Byron and Braidwood Stations
Charging Pump Miniflow Lines
Design Modification

I. Problem Description

Under secondary pipe rupture conditions, specifically feedline break, the pressure in the reactor coolant system may increase such that either or both centrifugal charging pumps may not be able to deliver against the pressure head in the reactor coolant system. Since the charging pump miniflow is isolated by the "S" - signal generated during the course of the accident, the centrifugal charging pumps could be deadheaded. The advent of more restrictive safety injection termination criteria may preclude credit for operator action to reset safety injection and stop the charging pumps under conditions where the operation of the pumps is not of immediate importance. Continued operation in the deadheaded mode damages the centrifugal charging pumps so that they are not available in later stages of the same event when their performance becomes a significant factor.

II. Conceptual Description

The centrifugal charging pumps can be protected under the conditions described in Section I by removing the safety injection closure signal from the pump miniflow valves 8110 and 8111. The concept to be evaluated utilizes an RCS pressure signal to automatically open and close the miniflow valves as required. Figures 1 and 2 will serve to illustrate the logic for operating the miniflow valves. RCS pressure signals will be available from four hot leg pressure transmitters to be supplied in the future. These four transmitter signals will be used to form redundant two-out-of-four high and low RCS pressure signals (Figure 1). Four instruments appear to be sufficient to satisfy the IEEE-279 requirements for on line test-ability and single failure.

With the spring return valve control switch in auto, RCS pressure above a predetermined value will open the miniflow valves 8110/8111 and pressure below a second setpoint will clsoe the miniflow valves (figure 2). It is considered necessary to provide the capability to open the miniflow valve as well as to close it because repressurization of the RCS may follow an initial depressurization for the accidents considered. Two distinct and separate open/close setpoints have been chosen as opposed to a single setpoint to minimize the possibility that an oscillating pressure signal for a given event might cycle the miniflow isolation valves repeatedly. In order to prevent the miniflow isolation valve from stopping and possibly reversing in mid-travel, provisions have been included in Figure 2 to ensure that a miniflow valve completes a closure cycle which may be in progress before it can be re-opened and vice-versa. This latch-in feature in-turn requires provisions to ensure that the valve does not receive conflicting signals simultaneously as could be the case if the pressure signal increases above the open setpoint during a latched in closure cycle. These features could be accommodated in the valve control circuit utilizing limit switch signals. These admittedly elaborate considerations are being included because we are using motor driven isolation valves for a control application which was not part of the original design and because the RCS pressure transient varies with the postulated break area.

Figure 2 also indicates that the RCS pressure signal will operate the miniflow valves only in the presence of a safety injection signal. Without the "S" signal permissive, the valves would be closed automatically on low RCS pressure during modes 4,5,6, and possibly mode 3. The inclusion of an "S" signal leads to a further requirement that in individual retentive memory with manual reset be provided for each miniflow valve. This satisfies the protection system requirement that equipment actuated by an "S" signal be individually latched such that the status remains unchanged if the "S" signal is removed. If the operator resets safety injection to take control of the transient, the miniflow valves will remain under automatic control until deliberate intentional action is taken to reset the retentive memory. These retentive memories do not necessarily have to be on the main control board, but they must be different than similar retentive memories used in the logic for sump valves 8811A/B because it is conceivable that the operator might want to reset the memories for 8110 and 8111 without defeating the ECCS sump valve logic.

If the positive displacement pump is operating, the centrifugal charging pump miniflow valves must be opened above an RCS cold leg pressure of 2018 psig to ensure at least 60 gpm from the weakest centrifugal charging pump, assuming both centrifugal charging pumps are operating.

The recommended closing setpoint is 1400 psig cold leg pressure.

The existing miniflow arrangement (Figure 3) features miniflow isolation valves 8110 and 8111 in series in the common portion of the miniflow line. If either of these two valves fails to re-open upon an increasing RCS pressure transient, then both centrifugal charging pumps could be deadheaded. This problem can be circumvented by moving the valves to the individual portions of the miniflow lines as shown in Figure 3.

RCS HOT LEG PRESSURE TRANSMITTERS

SYSTEM

NO.

DATE

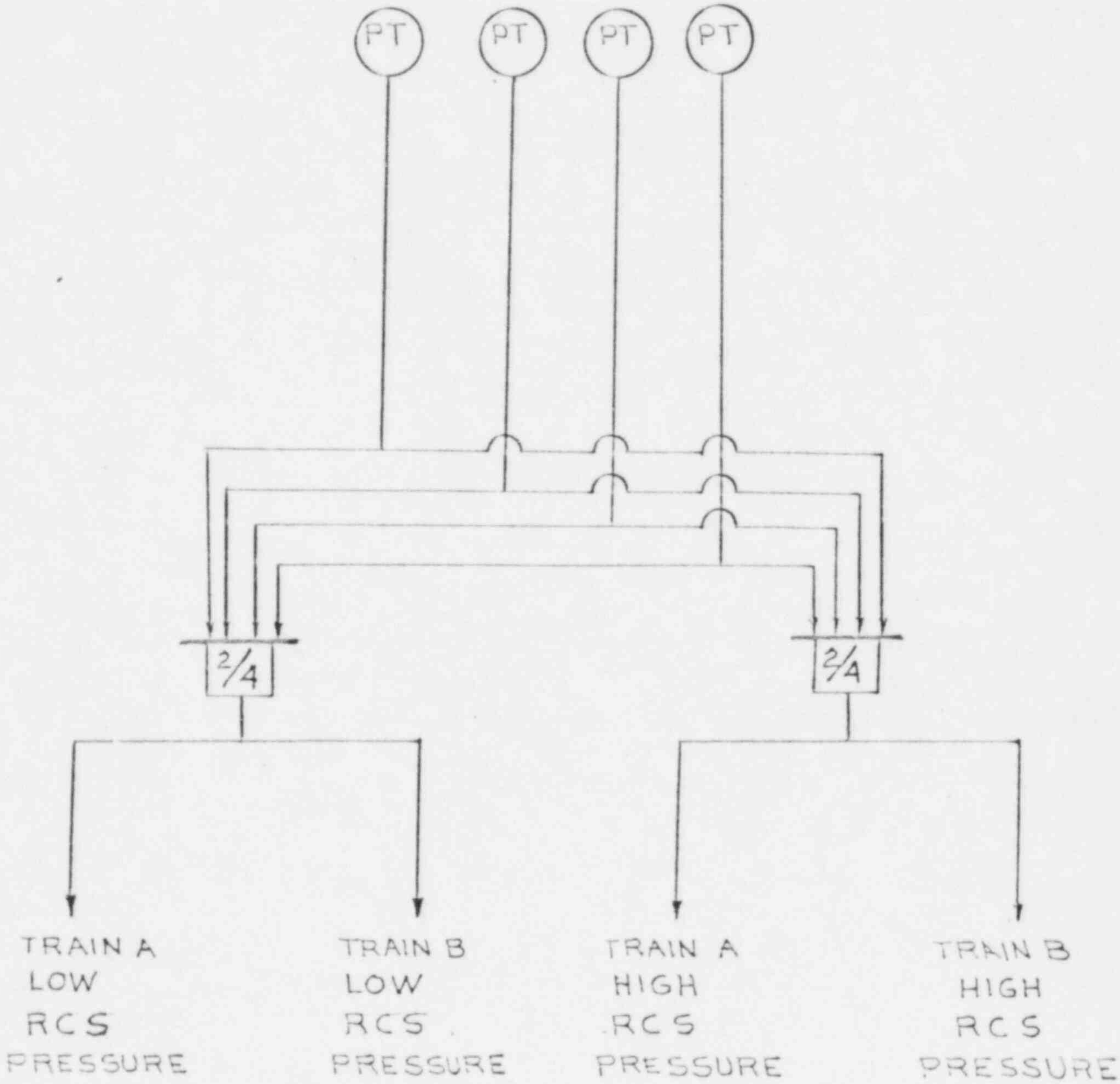
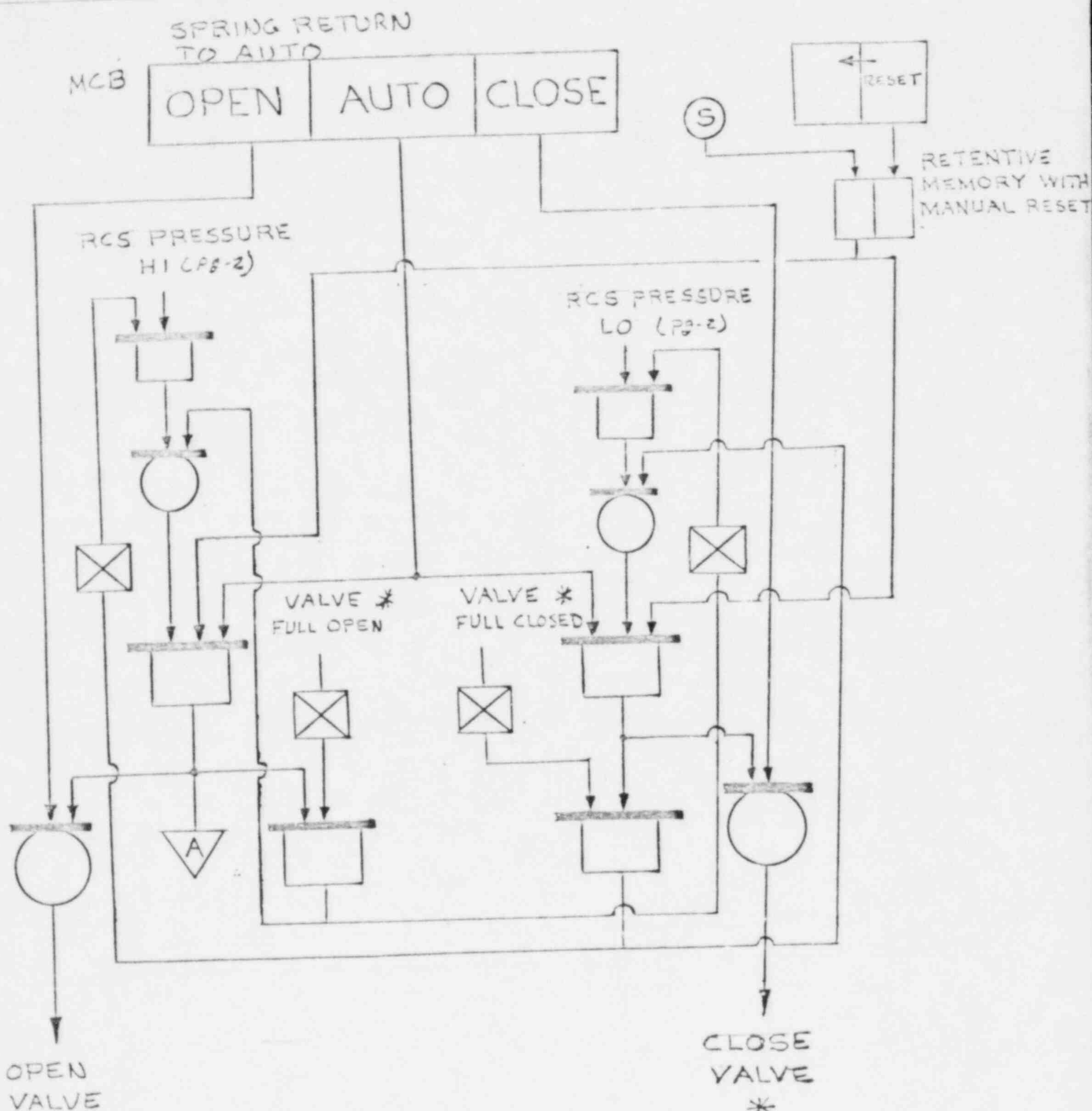


FIGURE-2

PROJECT: CHARGING PUMP MINIFLOW VALVE LOGIC BYRON, BRAIDWOOD
SYSTEM
NO.
DATE
ENGINEER



TRAIN	VALVE
A	8110
B	8111

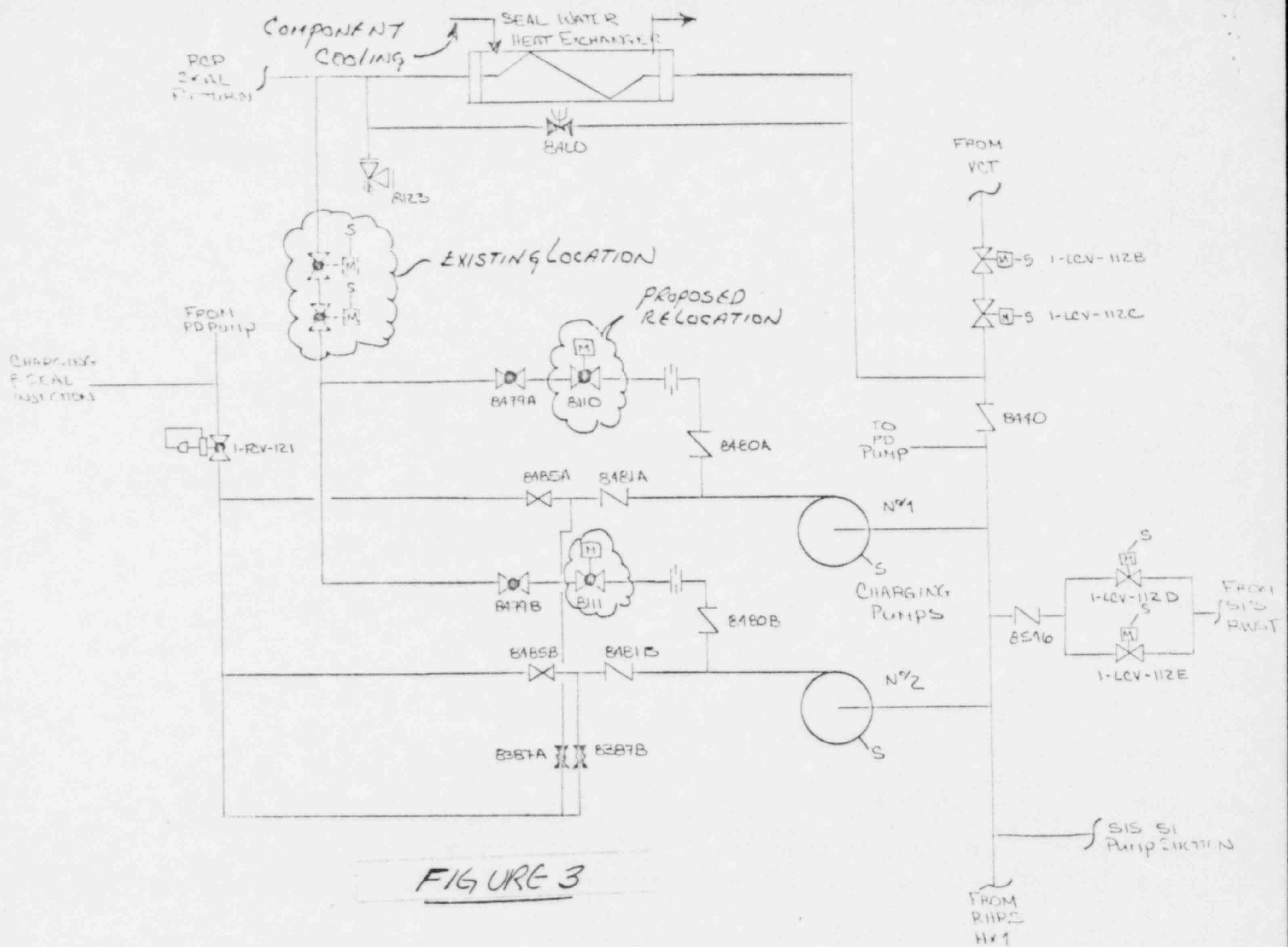

COMPONENT COOLING
SEAL WATER HEAT EXCHANGER
RCP SEAL RETURN
8410
8123
EXISTING LOCATION
PROPOSED RELOCATION
FROM PD PUMP
8479A
8110
8480A
1-FCV-121
8485A
8481A
8479B
8111
8480B
8485B
8481B
8387A
8387B
FROM VCT
1-LCV-112B
1-LCV-112C
8440
TO PD PUMP
No 1
No 2
CHARGING PUMPS
8546
1-LCV-112D
1-LCV-112E
SIS SI
FROM RHRS

FIGURE 3