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Docket Nos. 50-348
50-364

50-348

Alabama Power
the southern electric system

September 27, 1983

Director, Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. S. A. Varga

Joseph M. Farley Nuclear Plant - Units 1 and 2
Inservice Testing of Primary Pressure Isolation Valves

Dear Mr. Varga:

The Inservice Testing (IST) Programs for Farley Nuclear Plant Units 1 and 2 were reviewed by the NRC, and results of these reviews were documented in Safety Evaluation Reports (SERs) issued to Alabama Power Company on May 2, 1983 and April 8, 1983, respectively. Alabama Power Company concurs with these SERs except as described in our letter of July 5, 1983. As discussed in Item 6 of Attachment 1 to the July 5, 1983 letter, Alabama Power Company proposes not to test nineteen of the valves identified in Section H of the NRC SER for Unit 1. Alabama Power Company also proposes not to test these same valves for Unit 2.

Alabama Power Company has evaluated the existing Westinghouse Standard Technical Specification provisions, ASME Code Section XI, Reactor Safety Study (WASH 1400), NUREG-0677 and the EG&G report on "Inservice Leak Testing of Primary Pressure Isolation Valves" as applicable to the design of Farley Nuclear Plant. Results of the evaluation are as follows:

1. Alabama Power Company has established criteria for determining which valves should be tested as primary pressure isolation valves.

2. The list of thirty-five valves which the NRC has proposed testing as primary pressure isolation valves has been reevaluated. Alabama Power Company concludes that sixteen of these valves should be tested as primary pressure isolation valves.

3. A technical justification for deleting the leak rate testing of the remaining nineteen valves has been developed.

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Implementation of leak rate testing for the sixteen primary pressure isolation valves will, in the judgement of Alabama Power Company, provide an adequate margin of safety, resolve double barrier concerns identified in the Reactor Safety Study (WASH-1400) and comply with ASME Section XI Code requirements per 10 CFR 50.55a(g). Alabama Power Company respectfully requests that the NRC review this information, which is being submitted as a supplement to our July 5, 1983 letter, and revise the Unit 1 and 2 SERs accordingly. Upon receipt of the revised SERs, Alabama Power Company will submit changes to the Unit 1 and 2 Technical Specifications in order that the requirements will be consistent for both units.

Existing Selection Criteria

For Unit 2, Alabama Power Company currently performs leak rate tests of thirty-five valves designated as primary pressure isolation valves in accordance with Technical Specification 4.4.7.2.2. Criteria applicable to the selection of these valves are as follows:

1. Isolation of reactor coolant system (RCS) pressure from low pressure and high pressure systems.

2. Prevention of leakage resulting from valve failure occurring outside and inside the containment.

3. Leak rate testing of two redundant primary pressure isolation valves where only two valves exist.

4. For lines with three or more valves, three valves are leak rate tested.

5. Testing check valves and motor operated gate valves upstream of low pressure lines.

For Unit 1, the NRC SER submitted May 2, 1983 requires Alabama Power Company to leak rate test additional valves as primary pressure isolation valves. As a result, the same thirty-five valves are now required to be tested for Unit 1 as for Unit 2. The same criteria for selection of the primary pressure isolation valves now apply to Unit 1 as described above for Unit 2.

Proposed Selection Criteria

Based upon a review of published NRC guidance on the selection of valves to be tested as primary pressure isolation valves, Alabama Power Company has developed valve selection criteria. Applicability of the criteria to the design of Farley Nuclear Plant is discussed in the attached evaluation entitled "Selection of Reactor Coolant System Primary Pressure Isolation Valves." The following criteria are being proposed as the basis for selection of primary pressure isolation valves for Farley Nuclear Plant Units 1 and 2:

1. Isolation of RCS pressure from low pressure systems where overpressure protection is not provided.

2. Prevention of leakage inside and outside containment.

3. Testing two check valves in series upstream of low pressure lines.

Application of these criteria for each unit results in the designation of sixteen valves as primary pressure isolation valves requiring a leak rate test. These valves are identified in Table 1 of the Attachment. The proposed primary pressure isolation valve selection criteria deletes the following:

1. Third check valve in series - NUREG-0677 states that testing two check valves in series on a yearly basis would result in an acceptably low failure probability. In the judgement of Alabama Power Company, performance of leak rate testing every refueling cycle is adequate and testing of the third check valve in series is not required.

2. Motor operated gate valves upstream of low pressure lines - With respect to testing the motor operated gate valves which isolate reactor coolant from low pressure piping where overpressure protection is provided, the EG&G report on "Inservice Leak Testing of Primary Pressure Isolation Valves" identified mechanisms for increasing leakage with service time for valves installed in high pressure systems. These results indicated that "the most common cause of gate valve deterioration is cycling the valve dry prior to operation in service with water." Circumstances leading to this type of failure are not germane to plant operation and such effects would readily be detected through the ASME Code required valve stroke tests.

3. Check valves located in high pressure systems - With respect to testing check valves located on the charging pump discharge header between the RCS and other high pressure systems, the normal operating pressure for the high pressure systems is greater than the RCS pressure. As a result, reactor coolant is prevented from interfacing with the low pressure portions of the High Head Safety Injection System.

Alabama Power Company proposes not to test the nineteen additional valves identified in Table 2 of the Attachment as primary pressure isolation valves. Concurrently performing the leak rate test on these additional valves results in a significant burden without a concomitant increase in safety or a significant reduction in the probability of an intersystem LOCA. It is the judgement of Alabama Power Company that these valves are not primary pressure isolation valves and there is not sufficient basis for requiring leak rate testing.

Adopting this proposed isolation valve selection criteria for both units will provide a consistent list of valves to be tested for both units. The reduced number of valve leak rate tests will decrease personnel exposure to potentially hazardous conditions, will significantly decrease personnel exposure in accordance with ALARA commitments and will decrease the critical path outage time required to perform tests prior to returning the unit to service.

Schedule

NRC revision of the Unit 1 SER is requested by January 1, 1984 in support of the Unit 1 fifth refueling outage which will begin approximately February 1, 1984. The next scheduled performance of leak rate tests will be performed during this outage. Since administrative testing of primary pressure isolation valves is conducted at the start of the outage, the list must be finalized prior to the beginning of the outage to allow for procedural changes and outage scheduling.

Revision of the Unit 2 SER is needed prior to the third refueling outage currently scheduled for early 1985. Since the application of consistent valve selection criteria will result in a similar review for each unit, the Unit 2 SER revision is requested as soon as possible following the Unit 1 SER revision, but no later than June 1, 1984. Upon receipt, Alabama Power Company will prepare and submit Technical Specification change requests for both units reflecting the revised SERs. NRC approval of the Unit 2 Technical Specification change by January 1, 1985 will be requested in support of the Unit 2 third refueling outage.

Conclusion

Alabama Power Company requests that the Nuclear Regulatory Commission revise the IST Program Safety Evaluation Reports to include only the valves listed in Table 1 for Farley Nuclear Plant Units 1 and 2. The information provided herein is supplementary to Alabama Power Company's letter of July 5, 1983 which documented these exceptions taken to the SER.

This review is designated as Class III for Unit 1 and Class II for Unit 2 in accordance with 10 CFR 170.22 requirements. Enclosed is a check for $4,400.00 to cover the total amount of fees required.

Yours truly,

F. L. Clayton, Jr.

STB:kc/D-301
Attachment
cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford

ATTACHMENT

SELECTION OF
REACTOR COOLANT SYSTEM
PRIMARY PRESSURE ISOLATION VALVES

Based on the proposed primary pressure isolation valve selection criteria, the valves identified in Table 1 have been selected for leak rate testing. The referenced figures show typical Farley Nuclear Plant system design configurations and depict the location of valves in each system.

TABLE 1
PROPOSED PRIMARY PRESSURE ISOLATION VALVES

Valve ID Number	Figure	Valve Function
Q1/2E11V021A, B & C	A	RHR Pump Discharge to RCS Hot Leg Loops 1, 2 & 3
Q1/2E11V042A & B	A	RHR Pump Discharge to RCS Hot Leg Loops 1, 2 & 3
Q1/2E21V032A, B & C	F	Accumulator Tank Discharge Check Valves to RCS Cold Leg Loops 1, 2 & 3
Q1/2E21V037A, B & C	F	Accumulator Tank Discharge Check Valves to RCS Cold Leg Loops 1, 2 & 3
Q1/2E21V076A & B	B	Water from Residual Heat Exchanger to SI to RCS Hot Leg Loops 1 & 2
Q1/2E21V077A & B	B	HHSI/LHSI and RHR to RCS Hot Leg Loops 1 & 2
Q1/2E21V077C	E	HHSI to RCS Hot Leg Loop 3

Currently, the Unit 2 Technical Specification and the NRC's Unit 1 Safety Evaluation Report transmitted by letter dated May 2, 1983 from S. A. Varga to F. L. Clayton, Jr. identifies additional valves as primary pressure isolation valves. Listed below are these additional valves and Alabama Power Company's bases for not considering these valves as primary pressure isolation valves.

TABLE 2
VALVES NOT CONSIDERED TO BE PRIMARY
PRESSURE ISOLATION VALVES

	Valve ID Number	Figure	Valve Function
1.	Q1/2E11V001A & B	G	RHR Pump Suction Isolation Valve from RCS
	Q1/2E11V016A & B	G	RHR Pump Suction Isolation Valve from RCS
2.	Q1/2E11V051A, B & C	A	RHR Pump Discharge to RCS Hot Leg Loops 1, 2 & 3
3.	Q1/2E21V062A, B & C	C	HHSI (BIT) to RCS Cold Leg Loops 1, 2 & 3
	Q1/2E21V066A, B & C	D	HHSI (BIT Bypass) to RCS Cold Leg Loops 1, 2 & 3
	Q1/2E21V078A, B & C	E	HHSI to RCS Hot Leg Loops 1, 2 & 3
	Q1/2E21V079A, B & C	E	HHSI to RCS Hot Leg Loops 1, 2 & 3

BASES

1. It is the judgement of Alabama Power Company that motor operated valves Q1/2E11V001A&B and Q1/2E11V016A&B should not require leak rate testing in order to protect the RHR/LHSI low pressure systems. Below is the basis for this position.

   a. Valves are interlocked such that they cannot be opened when the reactor coolant system pressure is above 402.5 psig.

   b. Valves Q1/2E11V001A&B currently receive a Type C local leak rate test per Appendix J of 10CFR50.

   c. In the event of high to low pressure system leakage, the RHR suction relief valves would operate to protect the RHR system from overpressurization. These relief valves have their setpoints verified as required by Technical Specifications. The RHR suction relief valves discharge to the Pressurizer Relief Tank (PRT), which is inside the containment.

d. Motor operated gate valves are not subject to the same type of catastrophic failure as check valves. This is substantiated in the Reactor Safety Study (WASH 1400) which included "the investigation of a number of piping systems that connect to the reactor coolant system and also go through the containment. Such connections have the potential to cause a LOCA in which the interior of a reactor vessel may communicate to the environment. All, except the Low Pressure Injection System check valve situation...were dismissed." Thus, the use of motor operated gate valves in a system interfacing with the RCS was considered to render a LOCA much less probable than the use of check valves. The EG&G report on "Inservice Leak Testing of Primary Pressure Isolation Valves" identified mechanisms for increasing leakage with service time for valves installed in high pressure systems. The results concluded that "the most common cause of gate valve deterioration is cycling the valve dry prior to operation in service with water." Circumstances leading to this type of failure are not germane to plant operation and such effects would readily be detected through the ASME Code required valve stroke tests.

2. Valves Q1/2E11V051A,B&C should not require testing because these check valves are in series with the proposed leak rate tested valves Q1/2E11V021A,B&C and Q1/2E11V042A&B (Refer to Figure A). Testing valves Q1/2E11V021A,B&C and Q1/2E11V042A&B will protect the RHR System (low pressure) from interfacing with the RCS and, in the case of safety injection actuation, the HHSI pump discharge pressure.

   The leak rate tests performed on two check valves in series are sufficient to establish system integrity. NUREG-0677 states that testing two check valves in series on a yearly basis would result in an acceptably low failure probability. This was also recognized in the Reactor Safety Study (WASH 1400) which established that two "check valves, when functioning as a double barrier between the interfacing systems, make the probability of LOCA due to rupture of both barriers small. In this specific design, however, no test provisions or procedures were found to exist which would assure availability of double barriers for plant operation." Through the implementation of Technical Specification and IST Program requirements, Alabama Power Company has developed test provisions and procedures to assure the availability of the double pressure isolation barrier.

3. Valves Q1/2E21V062A,B&C; Q1/2E21V066A,B&C; Q1/2E21V078A,B&C; and Q1/2E21V079A,B&C are located downstream of the HHSI/CVCS pump. It is the judgement of Alabama Power Company that these check valves are not required to be leak rate tested to protect the HHSI/CVCS system on the low pressure suction side of the pumps. Below is the basis for this position.

   a. The three centrifugal charging pumps provide a dual function of providing flow for the CVCS and the HHSI. On some other plants, the charging pumps and the HHSI pumps are separate pumps.

   b. During normal operation (Modes 1, 2 & 3), two charging pumps are required to be operable by the Technical Specifications. During hot shutdown (Mode 4), the Technical Specifications require that one charging pump be operable.

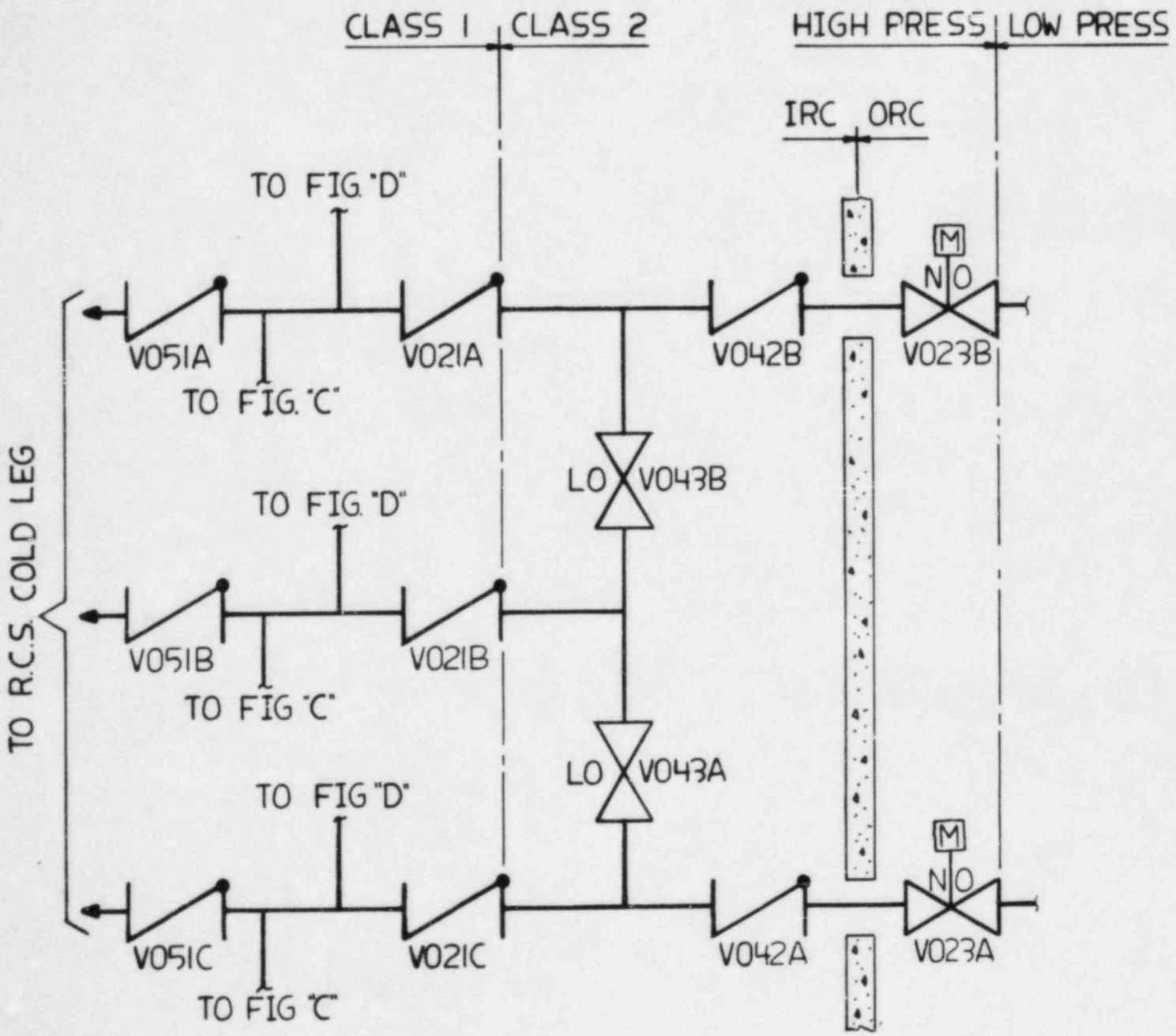
   c. During normal operation (Modes 1 through 3) and hot shutdown (Mode 4), at least one charging pump is running to provide normal charging to the RCS and to provide flow to reactor coolant pump seals. Therefore, the charging pump discharge header is at normal charging pressure which is higher than RCS pressure. This precludes the RCS from interfacing with low pressure portions of the HHSI/CVCS.

   d. In series with check valves Q1/2E21V062A,B&C exist two normally closed motor operated valves, the HHSI pump discharge check valve and valves Q1/2E11V051A,B&C. The motor operated valves only open on a safety injection signal.

      In series with check valves Q1/2E21V066A,B&C exist one normally closed motor operated valve, the HHSI pump discharge check valves and valves Q1/2E11V051A,B&C. This motor operated valve would only be opened during the recirculation phase following safety injection actuation and low-low level in the RWST.

      In series with check valves Q1/2E21V078A,B&C and Q1/2E21V079A, B&C exists one normally closed motor operated valve, the HHSI pump discharge check valve and valves Q1/2E21V077A,B&C which Alabama Power Company proposes to leak rate test. As required by Technical Specifications, the breaker for the motor operated valve is locked open, with the valve in the closed position. In addition, this motor operated valve is only opened during the recirculation phase following safety injection actuation and low-low level in the RWST.

FIGURE "A"
CHECK VALVE CONFIGURATION
LOW HEAD INJECTION, COLD LEG



NOTE:
ALL VALVE NUMBERS ARE PRECEEDED BY E11.

FIGURE "B"
CHECK VALVE CONFIGURATION
LOW HEAD INJECTION, HOT LEG

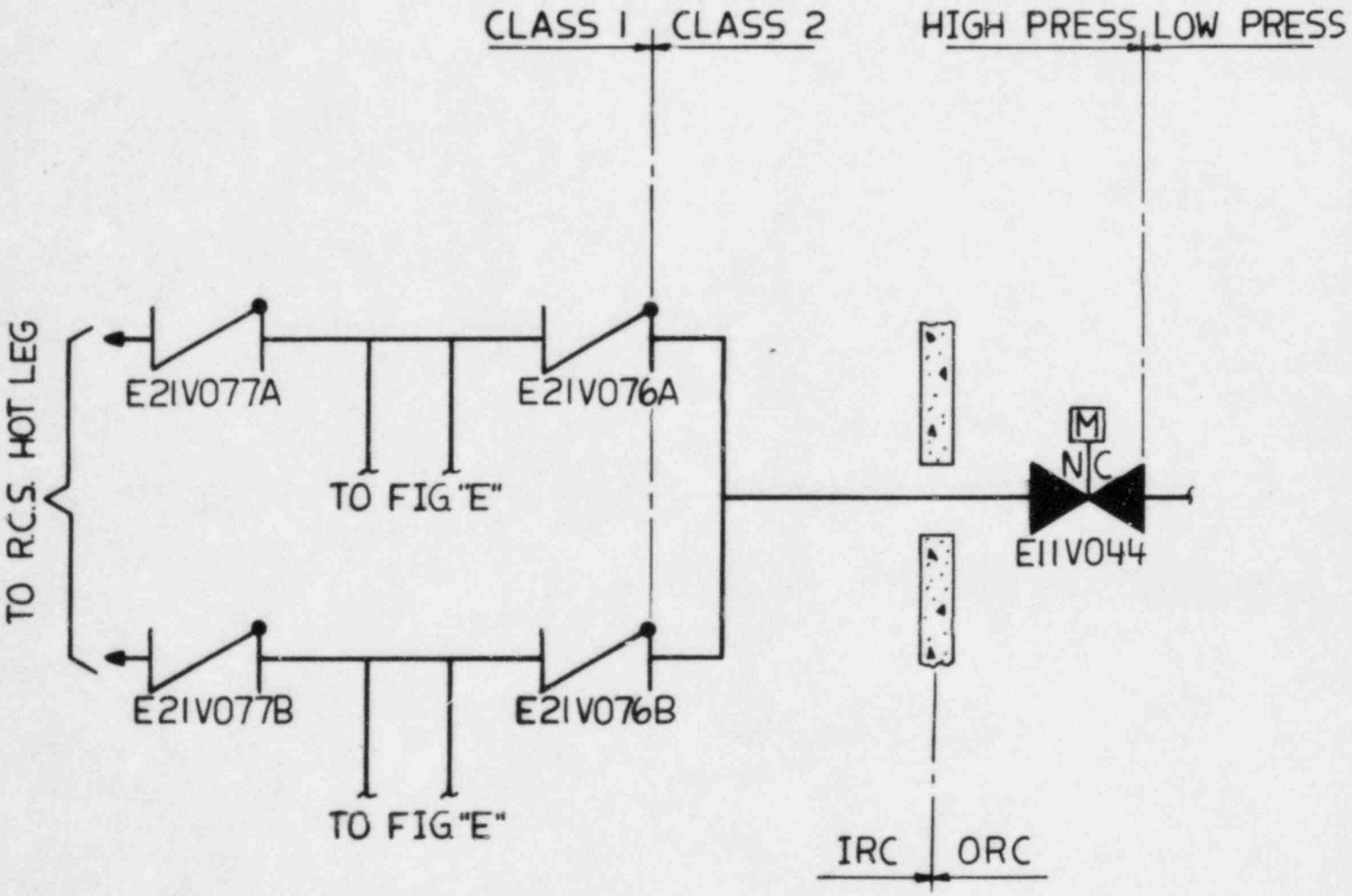


FIGURE "C"
CHECK VALVE CONFIGURATION
HIGH HEAD (BIT) INJECTION, COLD LEG

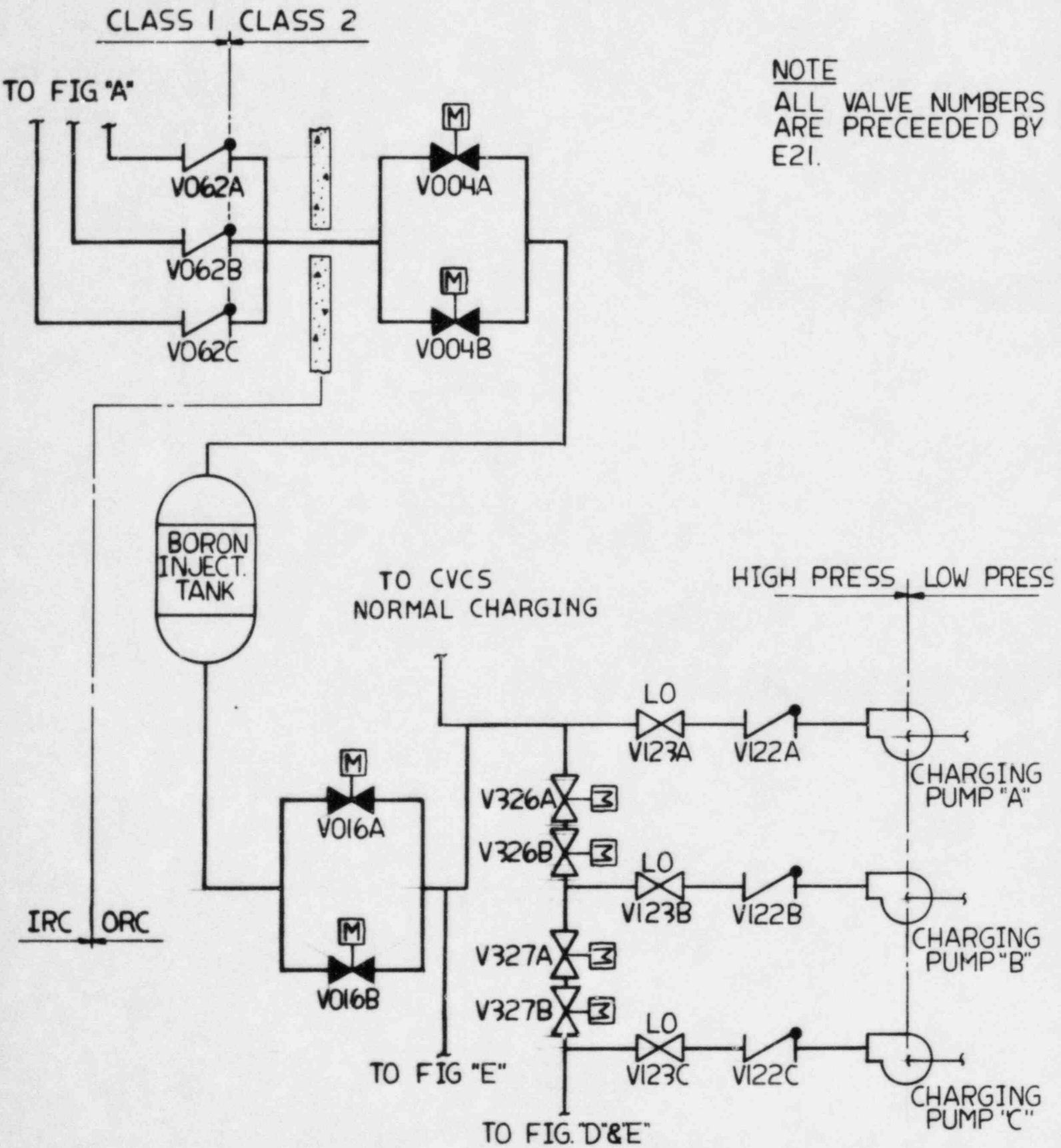


FIGURE "D"

CHECK VALVE CONFIGURATION
HIGH HEAD INJECTION, COLD LEG

NOTE
ALL VALVE NUMBERS ARE PRECEEDED BY E21.

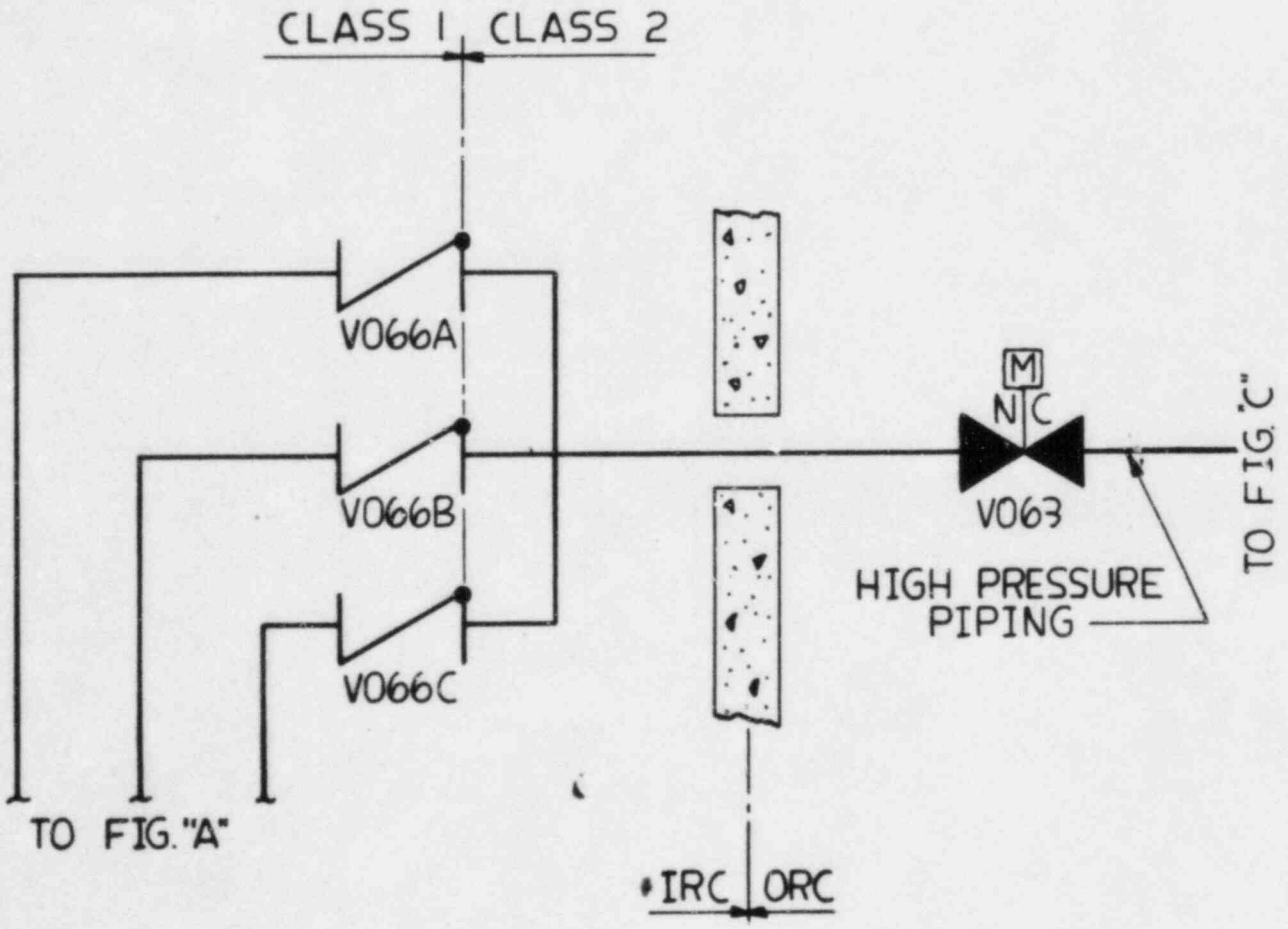
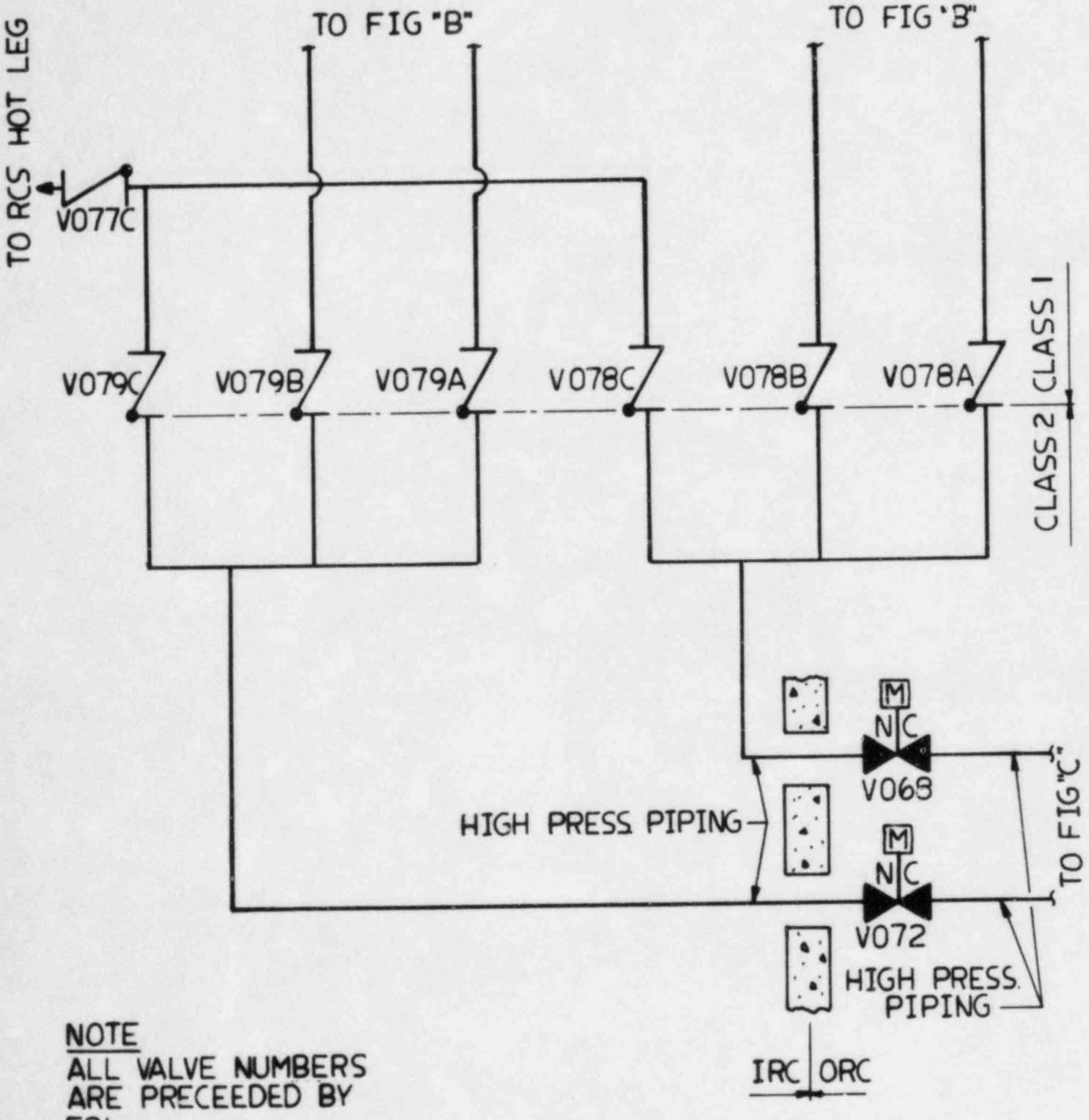
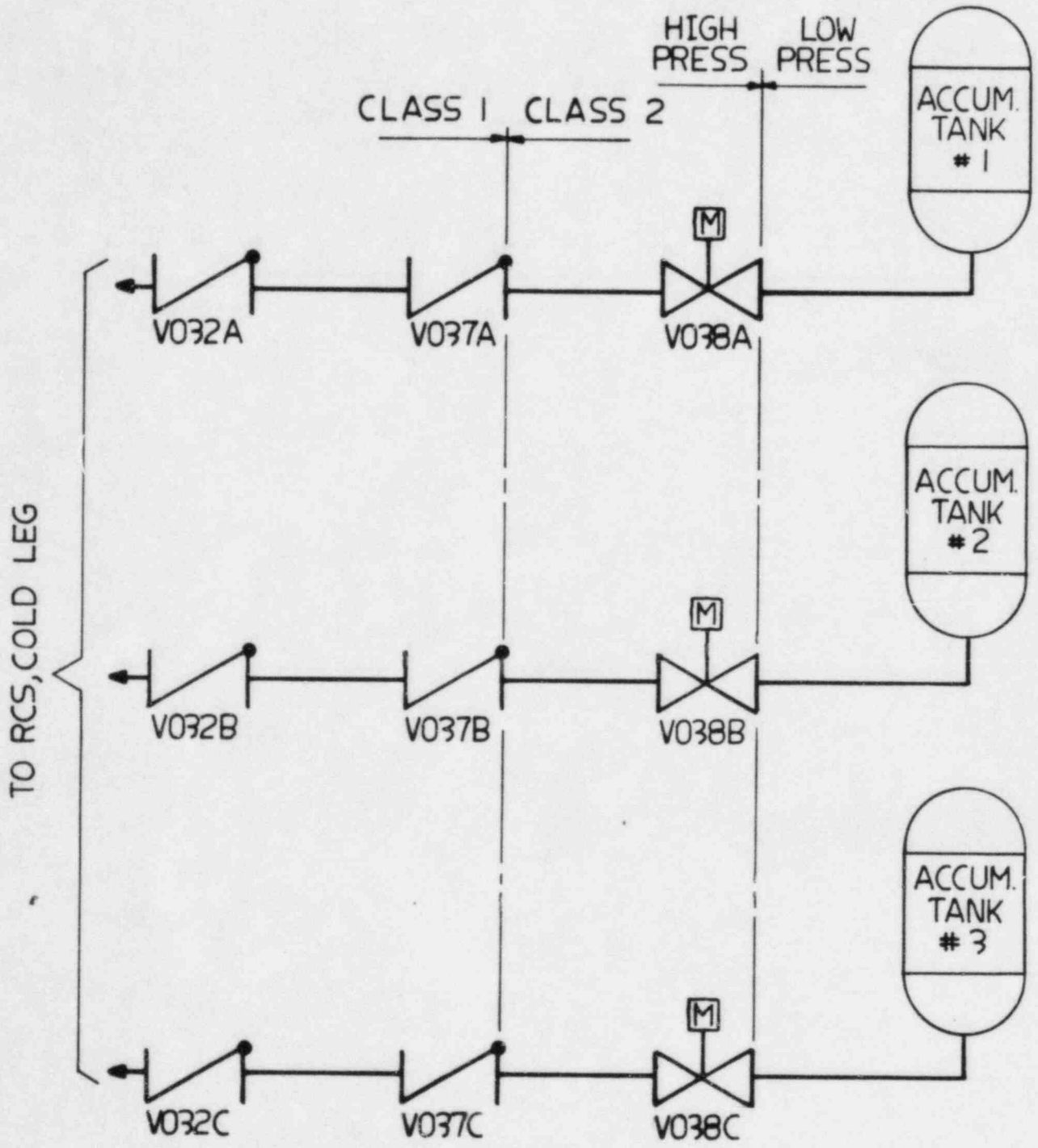


FIGURE "E"
CHECK VALVE CONFIGURATION
HIGH HEAD INJECTION-HOT LEG



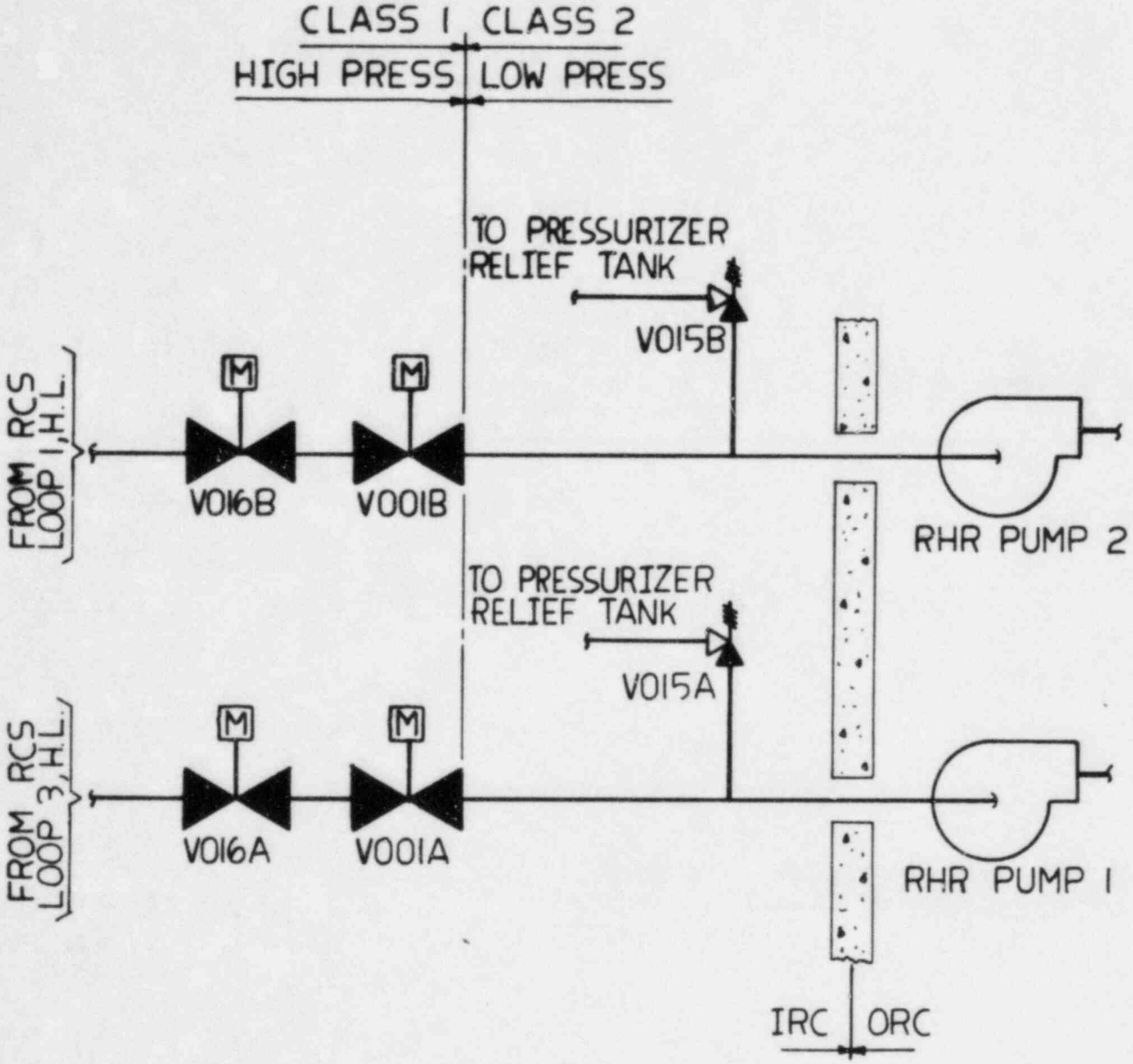
NOTE
ALL VALVE NUMBERS ARE PRECEEDED BY E21.

FIGURE "F"
CHECK VALVE CONFIGURATION
ACCUMULATORS



NOTE
ALL VALVE NUMBERS ARE PRECEEDED BY E21.
ENTIRE SYSTEM IS INSIDE REACTOR CONTAINMENT.

FIGURE "G"
VALVE CONFIGURATION
RHR SUCTION



NOTE
ALL VALVE NUMBERS ARE PRECEEDED BY E11.