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ELECTRIC

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November 10, 1992

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to NRC Request for Additional Information Concerning Relief Request from the American Society of Mechanical Engineers (ASME) Code, Section III, Article 9, for Calvert Cliffs Nuclear Power Plant, Unit 1 (TAC No. M83999) and Unit 2 (TAC No. M84000)

REFERENCES:

(a) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BG&E), dated September 16, 1992, Request for Additional Information Concerning Relief Request from the American Society of Mechanical Engineers (ASME) Code, Section III, Article 9, for Calvert Cliffs Nuclear Power Plant, Unit 1 (TAC No. M83999) and Unit 2 (TAC No. M84000)

(b) Letter from Mr. G. C. Creel (BG&E) to Mr. D.G. McDonald, Jr. (NRC), dated June 30, 1992, Request for Relief from 1968 ASME Boiler & Pressure Vessel Code Section III, Article 9

Gentlemen:

This letter provides Baltimore Gas and Electric (BG&E) Company's response to your request for additional information (RAI) (Reference a). The RAI pertains to our request for relief from 1968 ASME Boiler & Pressure Vessel Code Section III, Article 9 (Reference b). This relief request would allow a stop valve to remain installed downstream of a thermal overpressure relief device for the Regenerative Heat Exchangers (RHX) of both units. Your specific information request and our response are as follows:

NRC Request

The installation of a manual stop valve on the discharge side of a pressure relieving device i typical design at many nuclear facilities but the safety significance of the worst failure scenario of the manual stop valve varies significantly from plant to plant. BG&E has indicated that a failure of a manual stop valve will result in damages to the regenerative heat exchanger. To determine the safety significance of the event, provide the following: (1) postulated damages including rupture of the heat exchanger; (2) design features and emergency operating procedures for isolating the damages; and (3) the adverse impact of the damages on the performance of the High Pressure Safety Injection system.

BG&E Response

(1) The postulated worst-case scenario of the charging header being isolated occurs when all valves downstream of the RHX, including the manual stop valve, are closed. This event is highly improbable. Baltimore Gas and Electric Company believes that adequate controls exist for CVC-188 to preclude the possibility of RHX failure. However, if CVC-188 were inadvertently closed, there are still two other normally open flow paths (CV-518 & CV-519) to allow for thermal relief. It is highly unlikely that all other flow paths would be closed at the same time. Therefore, an inadvertent closure of the manual stop valve by itself would not damage the RHX. Please refer to Attachment 1 for system configuration.

If all normally-opened flowpaths from the RHX were inadvertently isolated at the same time, there could be damage to the RHX. Rupture of both the shell and tube sides of the RHX is bounded by our Cold Leg Loss-of-Coolant Accident (LOCA) analysis in Chapter 14 of the Updated Final Safety Analysis Report (UFSAR).

The RHXs are located in Reactor Coolant Pump bays 12B and 22A. Major equipment in the pump bays include the RCPs, Letdown Isolation Control Valves (CV-515 and CV-516) and Steam Generators. If the heat exchanger ruptures, there should be no major equipment/components damaged in the respective pump bays.

(2) If charging and letdown were simultaneously isolated with CVC-188 mispositioned and the RHX ruptured, the operators might not be aware of the failure. With the RHX isolated, the maximum amount of water released in containment would only be that in the heat exchanger (shell volume is 5.53 cubic feet and tube volume of 0.742 cubic feet) and the two-inch connecting pipe. When the damaged RHX is unisolated, a low charging header pressure alarm would notify operators of a charging header problem. Additionally, if only the shell side failed, the temperature of the letdown fluid leaving the heat exchanger would increase until a high temperature alarm (470 °F) would automatically isolate letdown flow.

There is a possibility that the RHX could have a tube side failure resulting in some charging fluid directly entering the letdown flowpath. Operations would be notified of this by either a high volume control tank level or a low pressurizer level alarm.

If, contrary to Operating Instructions, charging was isolated and letdown flow continued, the letdown fluid would continue to transfer heat to the charging fluid on the shell side. When letdown fluid reached 470 °F, the high temperature alarm would automatically isolate letdown. If the RHX shell side failed prior to the letdown high temperature alarm, letdown would probably not be automatically isolated. Letdown would blow down through the

damaged heat exchanger into containment. The operators would notice the failure by either pressurizer level, containment sump, or radiation alarms. The transient would be terminated by closure of either CV-515 or CV-516. The consequences would be bounded by the small-break-LOCA in Chapter 14 of the UFSAR. When alerted to the failure of the charging system, operators would be required to use alternate lineups for charging or boration. These lineups are specified in the appropriate plant instructions (OI-2A).

(3) All required safety functions can still be achieved in the unlikely event of either a RHX failure during a LOCA response, or a failure prior to, but undiscovered until, the LOCA. A pressure boundary failure of the RHX (both charging and letdown) would not affect the operation of the High Pressure Safety Injection (HPSI) System. The two systems are normally isolated from each other by MOV-269. In a post-LOCA condition, RHX failure would prevent the use of the HPSI System for core flush via Pressurizer Injection. Pressurizer Injection uses HPSI pumps to provide containment sump water to the Pressurizer via the Auxiliary Pressurizer Spray header/Charging header. A RHX failure would make the Charging System header inoperable. However, post-LOCA core flush can be accomplished via Hot Leg Injection (Low Pressure Safety Injection Pump takes suction from the containment sump and delivers water to RCS hot leg via shutdown cooling return header).

An RHX failure would eliminate the normal flow path for boration of the RCS. If such a failure occurred, Operating Instruction (OI-2A) provides directions and appropriate valve lineups to allow boration of the RCS from Chemical and Volume Control System via the Safety Injection cross-connect MOV-269. Manual isolation valve CVC-183 located in the Auxiliary Building would be closed to isolate the damaged portion of the charging header and to ensure that the borated water reaches the RCS via MOV-269. Use of this cross-connect removes a HPSI header from Safety Injection service. Calvert Cliffs has two HPSI headers, each of which is capable of providing flow to all four RCS cold legs. Therefore, boration of the RCS via the MOV-269 cross-connect would not impact the performance of the HPSI System.

NRC Request

10 CFR 50.55a provides the staff with two approaches of reviewing and granting relief from ASME Code requirements. 50.55a (a)(3)(i) requires demonstration of an alternative that would provide an acceptable level of quality and safety, and 50.55a(a)(3)(ii) requires demonstration that compliance with Code requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety. BG&E proposes no design changes or system modifications, and has indicated that the cost associated with certain changes or modifications does not offset the minimal increase in safety. Based on 50.55a(a)(3)(ii), provide a cost/benefit analysis to substantiate the sustained hardship or unusual difficulties as a result of complying with the Code requirement.

BG&E Response

Option 1 - Remove CVC-188 (For schematic see Attachment 2.)

The estimated cost for this modification is $ 293,000. If this modification were implemented, a freeze seal would have to be performed on the Class 1 section of piping to perform the local leak rate test (LLRT) on CVC-435 and other maintenance activities. The cost of this freeze seal would be about

$20,000 per Unit, per refueling outage. This modification would present a significant hardship without a compensating increase in the level of quality or safety.

Option 2 - Replace CVC-435 and CVC-188 with a Relief Valve (For schematic see Attachment 3.)

The estimated cost for this modification is $1 million. The potential for a new failure mode is introduced as charging capacity could be reduced if the relief valve leaks. This modification would involve working in a high radiation area. This modification would present a significant hardship without a compensating increase in the level of quality or safety.

Option 3 - Install interlocks between CV-519 and CVC-188 (For schematic see Attachment 4.)

The estimated cost for this modification is $685,000. This modification introduces the potential for two new failure modes: loss of remote closure capability on CV-519 and inadvertent closure of CV-519. Additional components will have to be added to our Environmental Qualification (EQ) Program. This modification would present a significant hardship without a compensating increase in the level of quality or safety.

NRC Request

Address the need of a continuous or periodic valve position verification program as an alternative for ensuring that the valves are maintained in the locked open position.

BG&E Response

Baltimore Gas and Electric Company has initiated procedural changes that will modify Operating Instructions to explicitly state that any time CVC-188's position is altered (for maintenance, testing, etc.) the valve's thermal relief capacity will be verified by a physical test. This will ensure that the valve has been properly positioned. This testing requirement will be maintained only while CVC-188 is maintained in a throttled position. Once CVC-435 is modified to control pressurizer auxiliary spray flow rate, BG&E will maintain CVC-188 in a full open position. A physical flow test to verify adequate thermal relief capacity is not necessary for a fully open manual valve. CVC-188 will be maintained in the Locked Valve Program (Calvert Cliffs Instruction 309) when it is in the full open position.

CVC-188 is physically located in containment. Because of the valve location, limited access to the valve, the chain, padlock, and lockwires, continuous valve position verification is not warranted.

NRC Request

Specify the method for locking the valves in the open position. The NRC has accepted a chain or cable in series with a key or combination lock; or a lead seal in series with a chain or cable as acceptable locking devices.

BG&E Response

CVC-188's handwheel position is locked in place by a standard Operations chain and padlock and two swaged type lockwires. The two lockwires are around the valve and handwheel such that the valve's position cannot be changed. Each lockwire is held together with a piece of metal crimped around both ends of the lockwire. Additionally, there is a stainless steel information tag attached to the handwheel. This tag states, "This valve shall have a standard operations lock and two swaged lock wires to satisfy ASME code requirements."

The Locked Valve Program states that a locked valve shall be secured by a "cable or chain and padlock." Additionally, this procedure requires CVC-188 to have a yellow metal tag which indicates that it is maintained as a locked throttled valve. When CVC-188 is no longer throttled, it will be locked in the open position and the yellow tag will be replaced with a red tag.

Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

for
R. E. Denton
Vice President - Nuclear Energy

RED/LMD/lmd/dlm

Attachments: (1) System Configuration
(2) Option 1 - Remove CVC-188
(3) Option 2 - Replace CVC-435 & CVC-188 with a Relief Valve
(4) Option 3 - Install Interlocks Between CV-519 and CVC-188

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
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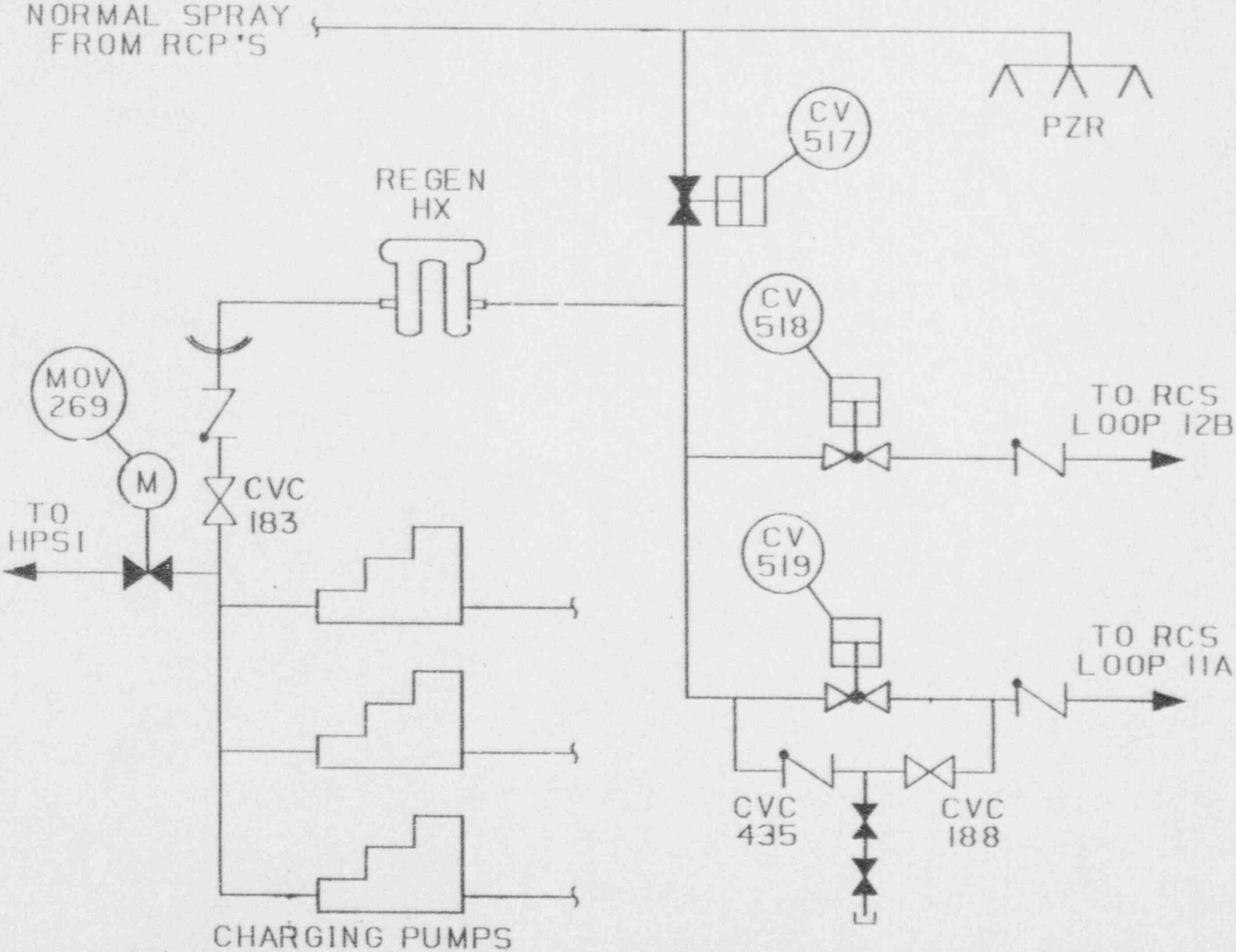
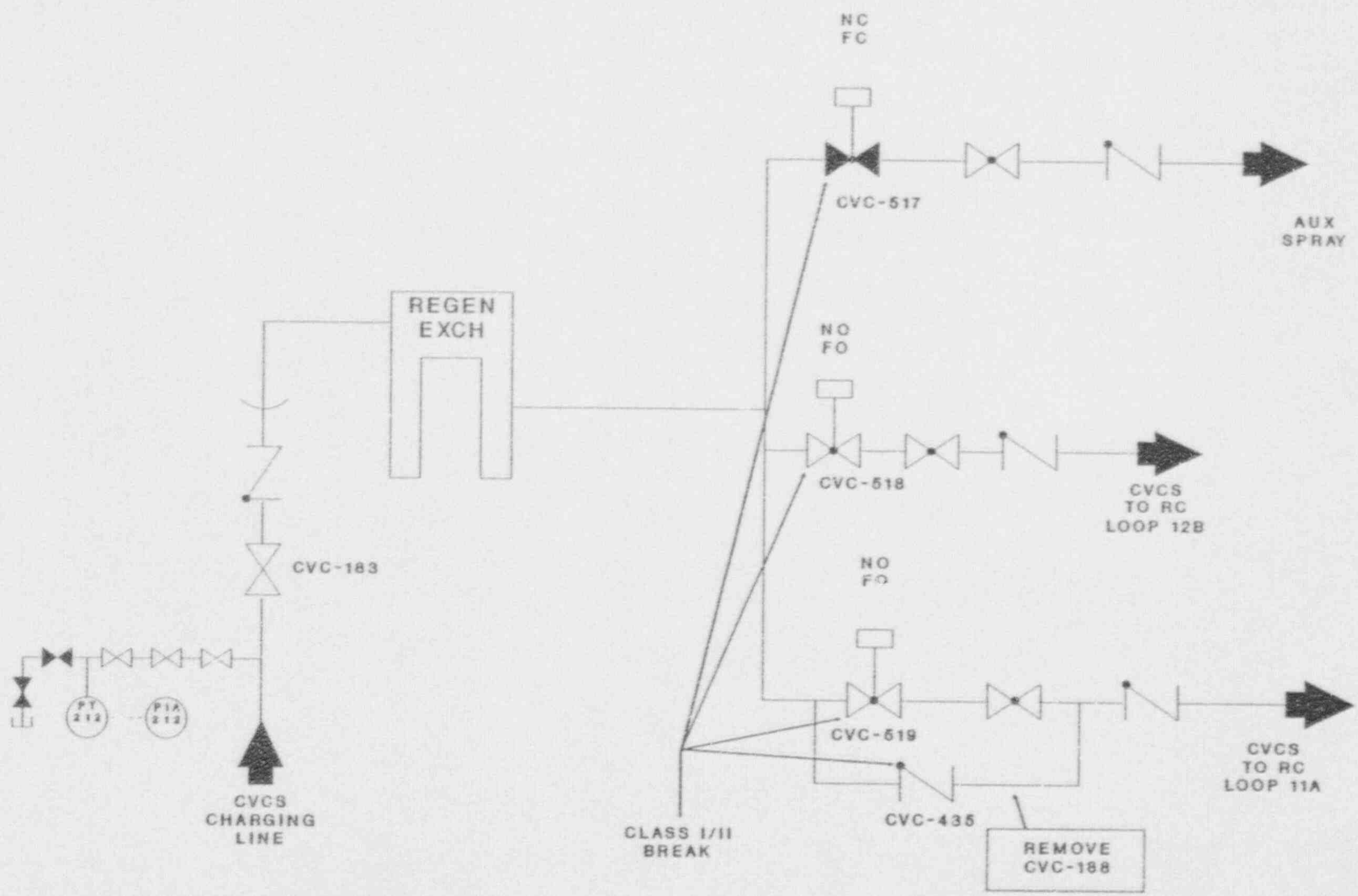
ATTACHMENT (1)

SYSTEM CONFIGURATION



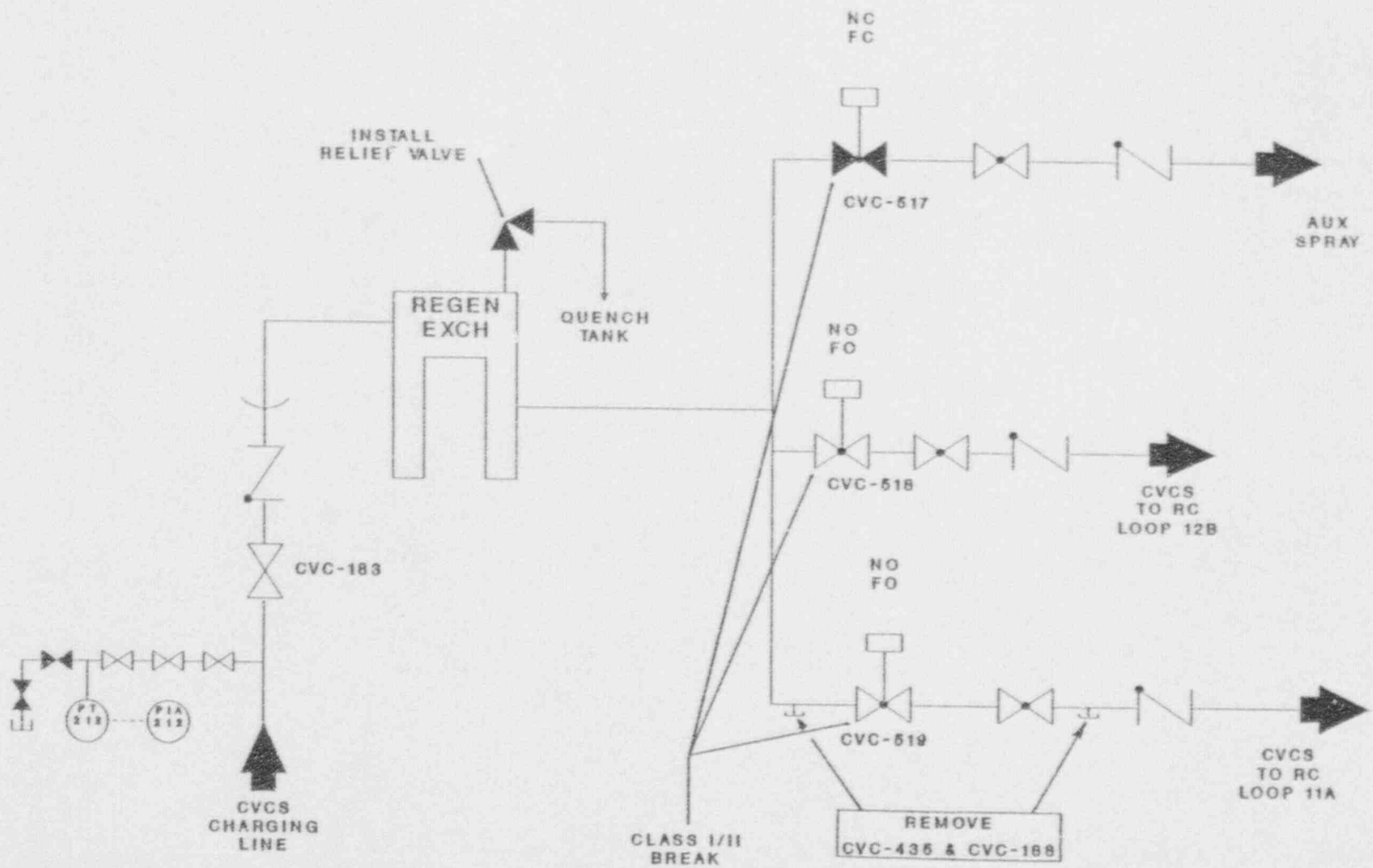
ATTACHMENT (2)

OPTION 1 - REMOVE CVC-188



ATTACHMENT (3)

OPTION 2 - REPLACE CVC-435 AND CVC-188 WITH A RELIEF VALVE



ATTACHMENT (4)

OPTION 3 - INSTALL INTERLOCKS BETWEEN CV-519 AND CVC-188