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July 21, 1982
OG-76

TMI ACTION PLAN ITEM I.C.1

Mr. D. G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Mr. Eisenhut:

Transmittal of Low Pressure Version
of Emergency Response Guidelines

The purpose of this letter is to formally transmit all completed portions of the low-pressure version (designated LP-BASIC) of the Emergency Response Guideline (ERG) Set to the NRC. The ERG information transmitted herewith consists of four copies of each of ERG Volumes IIA and IIB, Optimal Recovery Guidelines and Emergency Contingencies.

Due to the extensive modifications made to the low-pressure version of the ERGs as compared to the high-pressure version (BASIC Revision, dated September 1, 1981; see WOG transmittal to NRC, letter OG-64, Jurgensen to Eisenhut, dated November 30, 1981), the associated background documents will not be available for transmittal until October, 1982. The LP-BASIC issue of the Function Restoration Guidelines and associated background documents will also be available in October, 1982.

The material enclosed with this letter includes the following:

- Summary Description of the Reference Plant - ERG LP-BASIC Revision
- Low Pressure Version of Emergency Response Guidelines Volumes II-A and II-B - LP-BASIC Optimal Recovery Guidelines and Emergency Contingencies

The reference plant that was used in developing the low-pressure version of the ERGs is of a Ginna/Point Beach vintage with no safety-grade charging pumps and no Boron Injection Tank. Refer to the appropriate material enclosed (Summary Description of the Reference Plant) for a more detailed description of the reference plant.

A046
1/4 cm
Shelf

Per M. Smith

Encls TO:
Reg File
POR
LPDR
NSIC
NTIS

To my knowledge, this is the original. I could not locate any other copy. /Smith 8/3/82

It should be noted that the LP-BASIC Optimal Recovery Guidelines (ORGs) enclosed with this letter contain not only low-pressure plant changes, but also general improvements in structure, wording and flow of guideline steps and the modifications resulting from the pressurized thermal shock review of the ERGs. In particular, the LP-BASIC guidelines associated with steam generator tube rupture (E-3, ES-3.1, 3.2 and 3.3) have been reworded and restructured (and in some cases renamed) for better flow and comprehensibility of guideline steps. The majority of these changes were due to concerns resulting from the Ginna steam generator tube rupture event and NRC questions in this area. Though the ECA-3 guideline, SGTR CONTINGENCIES, has been eliminated from the LP-BASIC ORG set, part of it has been retained in the new ES-3.2 guideline, MULTIPLE SGTR CONTINGENCY. A more detailed summary of the low-pressure version modifications to the Emergency Response Guideline Set is given in Table 1.

As mentioned earlier, the background documents associated with the low-pressure version of the guidelines in Volumes IIA and IIB will be available in October, 1982. In addition, the contents of the low-pressure version of Volume III, which contains the Critical Safety Function Status Trees and Function Restoration Guidelines and Background Documents will be available in October, 1982.

Should you have any questions concerning the attached material, representatives of the Westinghouse Owners Group and Westinghouse will be available to discuss the low-pressure version of the ERG set with members of NRC staff.

Very truly yours,

O. D. Kingsley, Chairman
Westinghouse Owners Group

/bh

Attachments:
1. Table 1 - Low Pressure Version Modifications to Emergency Response Guidelines
2. Summary Description of the Reference Plant - ERG LP-BASIC Revision
3. Volumes IIA and IIB of the Low Pressure Version of the Emergency Response Guideline Set - Optimal Recovery Guidelines and Emergency Contingencies

cc: Hugh L. Thompson, Jr.
Acting Director
Division of Human Factors Safety
(1 copy)

TABLE 1

LOW PRESSURE VERSION MODIFICATIONS
TO EMERGENCY RESPONSE GUIDELINES

SUMMARY OF CHANGES

GUIDELINE	LOW PRESSURE ONLY*	GENERAL**
E-0 Immediate Actions	N/A	• Reordered steps. • Moved steps to subsequent actions - valve alignments, flows, and RCS heat removal. • Added steps to Immediate Actions - containment fan coolers, MSI actuation.
Subsequent Actions	• Added step - RCP seal cooling. • Changed RCS pressure criteria for SI term. • Added steps to start charging pumps for seal injection and charging flow.	• Added steps as above. • Clarified RCS integrity check. • Added contingency (go to E-3, SGTR) for increasing SG level.

*These ERG modifications apply to low-pressure plants only.

**These ERG modifications apply to both low-pressure and high-pressure plants.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ES-0.1	N/A	• Renamed REACTOR TRIP RESPONSE. • Combined and reworded steps - verify RCS heat removal. • Reordered and reworded steps - check pressurizer level control, pressure control. • Added contingency for increasing SG level (go to FR-H.3, RESPONSE TO SG HIGH LEVEL). • Reworded stable plant conditions step - pressurizer pressure at NOP, RCS TAVG at no-load. • Combined and reworded last steps - Go to ES-0.2, NATURAL CIRCULATION COOLDOWN or return to appropriate plant procedure.
ES-0.2	• Removed reference to charging/SI pump only.	• Added PTS changes - maintain RCS temperature and pressure within certain limits.
ES-0.3	• Added new steps to stop SI pumps. • Added new steps to establish charging. • Added new steps for RCP seal cooling and RCP seal return flow.	• Reordered and reworded steps - check VCT makeup, establish letdown or excess letdown, align charging to VCT. • Expanded SG level step as in ES-0.1. • Reworded steps to establish pressurizer level and check pressurizer pressure control. • Added PTS change - maintain RCS temperature and pressure within certain limits. • Reworded stable plant conditions as in ES-0.1.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
E-1	• Added steps to start charging pumps for seal injection and charging flow. • Changed RCS pressure criteria for SI term.	• Moved RCP trip step to Step 1. • Reworded RWST level step. • Combined steps on pressurizer PORVs and block valves. • Clarified step to implement ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION. • Added reference to FR-I.3 RESPONSE TO VOID IN REACTOR VESSEL, for head venting step.
ES-1.1	• Added new steps to stop SI pumps. • Added new step to establish desired charging flow.	• Similar changes as in ES-0.3. • Removed first RCP status check and RCS subcooling check.
ES-1.2	• Added new steps to start charging pumps for seal injection only. • Removed steps - charging/SI flow, normal charging path, RCS pressure check.	• Added PTS changes - eliminate step on comparing RCS and SG pressures. - add caution on maintaining RCS pressure and temperature with normal cooldown limits. - add reference to FR-P.2, RESPONSE TO ANTICIPATED PRESSURIZED THERMAL SHOCK CONDITION, before cooldown step.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ES-1.3	• Removed reference to charging/SI pumps.	• Added new step to stop charging pumps, if necessary. • Added new step to start safeguards pumps, as necessary. • Removed all substeps to high-level steps (plant specific).
ES-1.4	N/A	• Removed all substeps to high-level steps (plant specific). • Reworded steps to align flow paths.
E-2	• Reworded MSI step to include only affected SG. • Reworded faulted SG isolation step. • Added steps to start charging pumps for seal injection and charging flow. • Changed RCS pressure criteria for SI term.	• Combined steps on pressurizer PORVs and block valves. • Added step to check RCS pressure and go to E-0, REACTOR TRIP OR SAFETY INJECTION, to rediagnose potential LOCA. • Reworded check on containment conditions. • Added caution on SI term for RV integrity.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ES-2.1	• Added new steps to stop SI pumps.	• Added PTS change - reword SI reinitiation step to remove RCS pressure criterion. • Changed pressurizer level criteria for SI reinitiation - greater than 20%. • Added new steps to control RCS heat removal. • Similar changes as ES-0.3 and ES-1.1, SI TERM. • Reworded step to control pressurizer pressure. • Removed step to transfer to pressure control mode. • Added PTS change - reference to FR-P.2, RESPONSE TO ANTICIPATED THERMAL SHOCK CONDITION, to determine cooldown limits.
ES-2.2	N/A	• Similar changes as in ES-1.3.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
E-3	• Added steps for RCP seal cooling and to establish maximum charging flow. • Similar changes as in ES-2.1 to stop SI pumps and establish charging, etc.	• Extensive rewording and reordering of steps due to Ginna SGTR event and NRC concerns. • Changed ECA-3, SGTR CONTINGENCIES, references to new ES-3.2, MULTIPLE SGTR CONTINGENCY. • Included old ES-3.1, SI TERM, into E-3 with similar changes as in ES-0.3, ES-1.1 and ES-2.1, SI TERM. • Added step to minimize secondary system contamination. • Added steps to equalize charging and letdown, check pressurizer water temperature and level. • Added contingency to check reactor vessel level before starting RCP to avoid losing PZR level from void collapse. • Reworded last step to determine cooldown method.
ES-3.1A	N/A	• Changed to SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS. • Many changes made for improvement in flow of steps and consistency with other SGTR alternate cooldowns, ES-3.1B and ES-3.1C. • Added cautions to quickly cooldown and maintain RCS temperature and pressure within normal limits.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ES-3.1A (Cont'd.)	N/A	• Added step to check if RCPs should be stopped. • Added step to cool down PZR.
ES-3.1B	N/A	• Changed to SGTR ALTERNATE COOLDOWN USING SG BLOWDOWN. • Many changes made for improvement in flow of steps and consistency with other SGTR alternate cooldowns, ES-3.1A (see above) and ES-3.1C. • Added steps and tables to control RCS pressure to minimize break flow.
ES-3.1C	N/A	• Changed to SGTR ALTERNATE COOLDOWN BY STEAMING RUPTURED SG. • Extensive changes made to the remaining portion of E-3 that describes this method for improvement in flow of steps and consistency with other SGTR alternate cooldowns, ES-3.1A (see above) and ES-3.1B. • Added PTS change - caution to perform accumulator isolation concurrently with other steps. • Added step and table to control PZR level and ruptured SG levels to minimize break flow. • Added step and table to control RCS pressure to minimize break flow.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ES-3.2	N/A	• Changed to MULTIPLE SGTR CONTINGENCY. • Contains first part of ECA-3, SGTR CONTINGENCIES to cover multiple SGTRs. • Contingency to E-3, SGTR, and E-3.3, SGTR WITH SECONDARY DEPRESSURIZATION. • Must return to E-3 or ES-3.3 for SI term.
ES-3.3	• Similar changes as in E-3.	• Remained SGTR WITH SECONDARY DEPRESSURIZATION (to cover SGTRs up to double-ended break). • Similar changes as in E-3, SGTR, and the SGTR ALTERNATE COOLDOWNS. However, steps in different, more appropriate order.
ECA-1	• Removed caution on charging pump miniflow valves.	• Added isolation of dilution paths to rapid boration step and moved it to Step 4 as an immediate actions.
ECA-2	• Minor changes to step on closing valves associated with RCP seals. • Removed reference to BIT.	• Clarified caution and note before step on depressurizing non-faulted SGs.

TABLE 1 (Cont'd.)

GUIDELINE	LOW PRESSURE ONLY	GENERAL
ECA-2.1	• Reordering and rewording of steps to reflect no charging/SI pumps and no BIT.	• Minor reordering and rewording of steps. • Added step on pressure - temperature relationship. • Changed last step to go to ES-0.2, NATURAL CIRCULATION COOLDOWN, or return to appropriate plant procedure.
ECA-2.2	• Similar changes as in ECA-2.1, where necessary.	• Similar changes as in ECA-2.1, where necessary.
ECA-3	N/A	• Remaining steps of ECA-3, SGTR CONTINGENCIES, which cover multiple SGTRs with secondary depressurization has been eliminated from ERG set at this time.

WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

SUMMARY DESCRIPTION
OF
THE REFERENCE PLANT

ERG LP-BASIC REVISION

I. INTRODUCTION

This document contains a summary description of the reference plant design assumed for the development of the Low Pressure Version of the Westinghouse Emergency Response Guideline (ERG) set. To the greatest practicable extent, the Low Pressure ERGs have been constructed to be generic and applicable to Westinghouse-designed commercial PWR plants with Safety Injection pumps whose shutoff head is less than RCS design pressure. A brief description of the relevant systems comprising this reference design are contained in the following sections.

Each utility must review the specific plant design against this reference design to insure that the reference guideline steps are directly applicable to the specific plant. Modifications to guideline steps may be required where plant design differences exist. For each guideline step, the utility must confirm that the specific plant design is the same as the reference design, or determine that the design difference does not affect the step. If the design difference does affect the step, the guideline step must be modified to account for the specific plant design.

As a general note, in the reference plant the CVCS charging pumps are <u>not</u> safety grade and therefore are not part of the S.I. system.

II. REACTOR COOLANT SYSTEM (RCS)

The reference RCS is shown on Figure 1; although the ERG's are applicable to any plant size, a two-loop plant is shown for convenience. Identical heat transport loops consist of a reactor coolant pump and steam generator. Each loop has an RTD bypass connection containing temperature sensors used for control and protection functions on hot and cold legs, returning flow through

a common header to the RCP suction pipe. The pressurizer surge line connects to one hot leg, and the pressurizer spray lines connect to the cold legs. The pressurizer has two PORVs (with associated block valves) and three code safety valves. The reactor vessel head vent discharges directly to containment.

III. CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS)

The reference CVCS is shown on Figure 2. It consists of three positive displacement charging pumps (not used for SI). For normal operation, one of these pumps takes suction from the VCT and provides charging and RCP seal injection flow. The letdown flow to the VCT passes through the regenerative heat exchanger (heating the charging flow), letdown heat exchanger, mixed bed (and sometimes cation bed) demineralizer and reactor coolant filter before reaching the VCT. The boric acid makeup system contains 12 weight percent boric acid solution. Either of two boric acid transfer pumps can feed the charging pumps through the normal Reactor Makeup Control System path or through an emergency boration path. All containment isolation valves are either motor-operated valves, or check valves.

IV. SAFETY INJECTION SYSTEM (SIS)

The reference SIS contains three subsystems: high head SI, low-head RHR/SI, and accumulators.

A. The high head SI system is shown on Figure 3. It consists of two centrifugal pumps with design shutoff heads of about 1500 psig. Each pump can take suction from the RWST, the Boric Acid Storage Tanks, or the discharge of the low-head SI pumps. The normal alignment of this subsystem is for SI operation on demand. The flow path is from the Boric Acid

Tanks to the pumps to the RCS cold legs (through the accumulator discharge lines). These pumps can also inject into the RCS hot legs.

B. The low head SI/RHR system is also shown on Figure 3. For normal RHR operation, the two low head centrifugal pumps take suction from one RCS hot leg and return flow to the cold legs. For the injection phase of SI operation, these pumps take suction from the RWST, and inject into the RCS cold legs (if RCS pressure is low). During the recirculation phase of SI, these pumps take suction from the containment sump, and inject into the RCS (cold legs) while concurrently feeding the high head SI pumps.

C. The accumulator subsystem is also shown on Figure 3. It consists of one accumulator tank per RCS loop, each containing borated water with a nitrogen cover gas providing overpressure. When the RCS pressure decreases below the accumulator nitrogen pressure, the water is injected into the RCS.

V. CONTAINMENT

During normal operation, the containment atmosphere is cooled by fan cooler units. During accident conditions, the fan cooler units continue to provide heat removal; the containment spray system assists in pressure reduction and also provides for gaseous iodine removal.

Containment isolation signals are generated by overpressure conditions inside containment to prevent leakage of potentially contaminated fluids through the containment boundary. Phase A isolation (T signal) closes all non-safeguards fluid penetrations through the containment wall. Phase B isolation (P signal) is actuated at

a higher pressure than Phase A and additionally closes the component cooling water supply into containment.

VI. STEAM GENERATOR FEED SYSTEM

The main feedwater system consists of two steam turbine driven main feed pumps discharging into a common header. Flow to each steam generator is controlled by main and bypass feedwater regulating valves in parallel; each feedline also has a single isolation valve. The main and bypass regulating valves and the isolation valve all go closed on a Feedwater Isolation Signal (FWIS).

The auxiliary feedwater system consists of two motor-driven centrifugal pumps and a steam-turbine driven centrifugal pump all taking suction on the condensate storage tank.

VII. VALVE INTERLOCKS

Many of the valves in the Chemical and Volume Control System (Figure 2) and the Safety Injection Systems (Figure 3) are designed to operate automatically (under certain conditions) or to be limited in operation unless certain conditions are satisfied. The more significant of these interlocks, as they affect the ERGs, are presented below.

A. Chemical and Volume Control System

1. The letdown orifice isolation valves close automatically on a low pressurizer level signal; they cannot be opened until the low pressurizer level signal clears and the (loop) letdown isolation valve is open.

2. The (loop) letdown isolation valve closes automatically on a low pressurizer level signal and a coincident signal that the orifice isolation valves are closed.

3. The VCT outlet isolation valve closes automatically on a low-low VCT level signal conincident with a signal that the PD pump suction valve from the RWST is open.

4. The PD pump suction valve from the RWST opens automatically on a VCT low-low level signal.

5. A safety injection signal causes all PD pumps to trip. The coincident Phase A (T) signal will cause containment isolation valves on the letdown, charging and seal return lines to close.

B. Low Head Safety Injection (RHR)

1. The RHR suction valves from the RCS hot leg will not open unless:

   a) RCS wide range pressure is less than ~425 psig.
   b) Suction valve from RWST is closed.
   c) Containment sump suction valve is closed.
   d) RHR pump discharge valves to high head SI pump suction are closed.

2. One suction valve from the RCS hot leg will close automatically if RCS wide range pressure increases above ~600 psig.

3. The suction valve from the RWST is normally open in the line up for normal power operation and does NOT automatically close on any signal.

4. The suction valves from the containment sump do NOT automatically open on any signal. These valves will not open if the suction valves from the RCS hot leg are open.

C. High Head Safety Injection (HHSI)

1. The suction valves from the Boric Acid Tanks (BAT) open automatically on an "S" signal.

2. The suction valves from the RWST open automatically on a low-low BAT level signal.

3. The HHSI pump suction valves from the discharge of the Low Head SI (RHR) pumps will not open unless the High Head SI pump recirculation lines to the RWST are closed and the RHR pump suction valves from the RCS hot leg are closed.

4. The recirculation lines from the HHSI pumps to the RWST cannot be opened unless the pump suction valves from the Low Head pump discharge are closed.

D. Accumulators

1. The accumulator isolation valves automatically open on an "S" signal and cannot be closed as long as the "S" signal is present.

2. The accumulator isolation valves automatically open whenever RCS pressure is above the SI unblock (P-11) pressure.

E. Other Interlocks Affection Operation

1. The pressurizer heaters are automatically turned off on low pressurizer level (as well as letdown being isolated). When pressurizer level recovers above the "low"

setpoint, the backup heaters only are restored to automatic operation. The variable heaters must be manually restored, and letdown must be manually re-initiated.

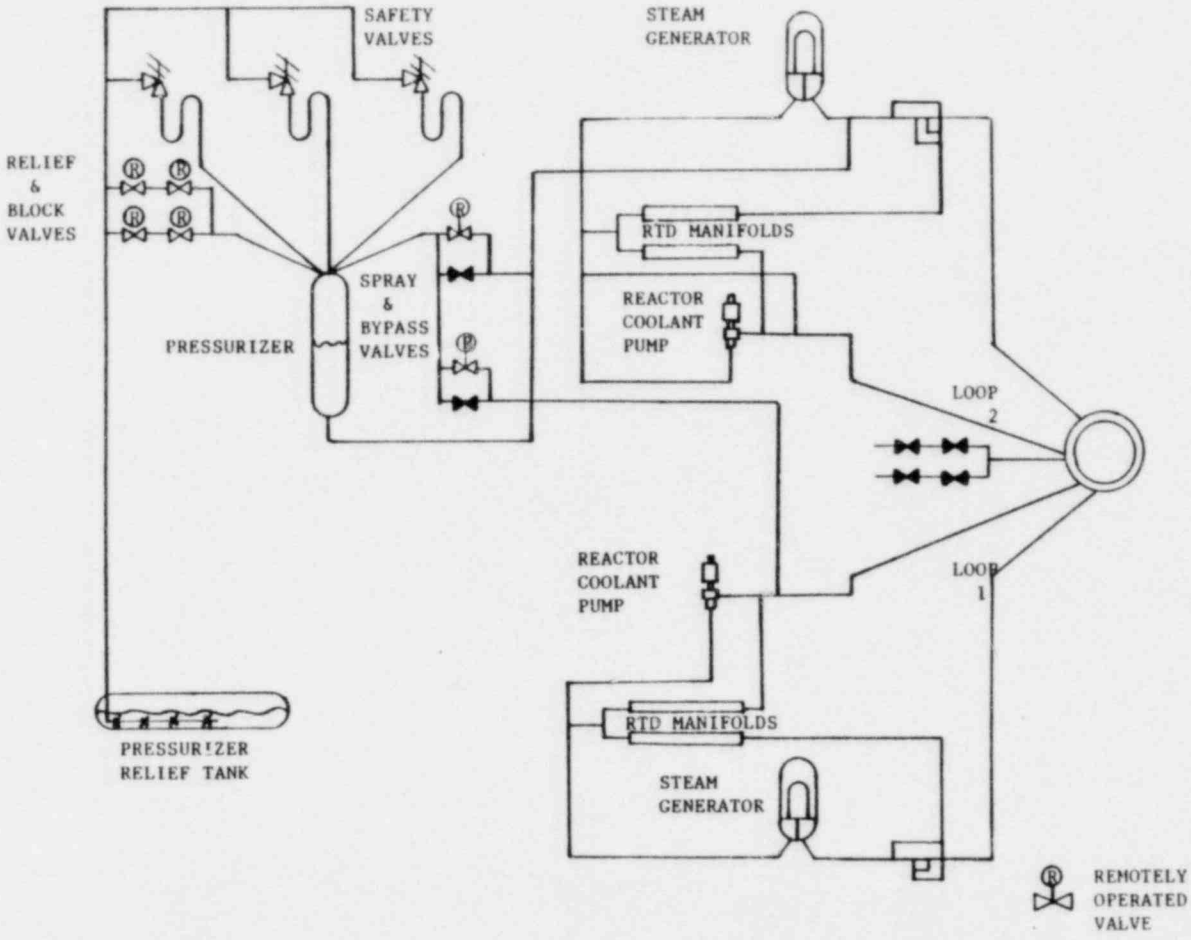
2. Instrument air to containment is isolated on a Phase A isolation (T) signal. All air-operated valves inside containment will very shortly move to their "failed" positions, and remain there until instrument air is restored unless an air or nitrogen accumulator is provided.

Valve	Fail Position
CVCS letdown isolation	Open
Letdown orifice isolation	Closed
Excess letdown	Closed
Normal charging line	Closed
Pressurizer spray	Closed
Pressurizer PORV	Closed

3. A Feedwater Isolation Signal (FWIS) is generated separately by a Safety Injection (S) signal, and a coincident Lo-RCS Tavg and Reactor Trip (P-4). In order to operate the main feed regulating valves (or bypass valves), the safety injection signal must be RESET, the FWIS must be RESET, and the reactor trip breakers must be CLOSED.

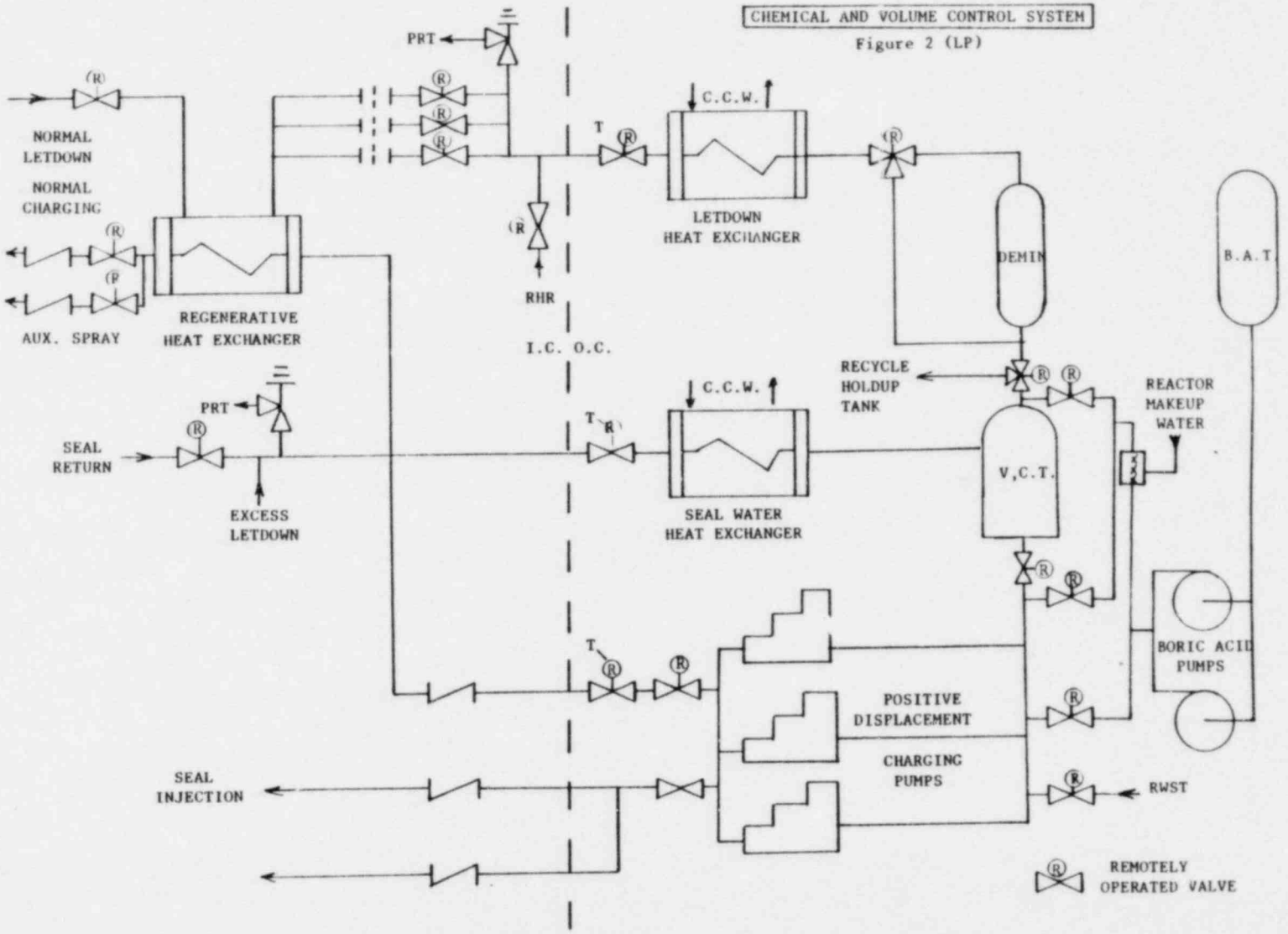
REACTOR COOLANT SYSTEM

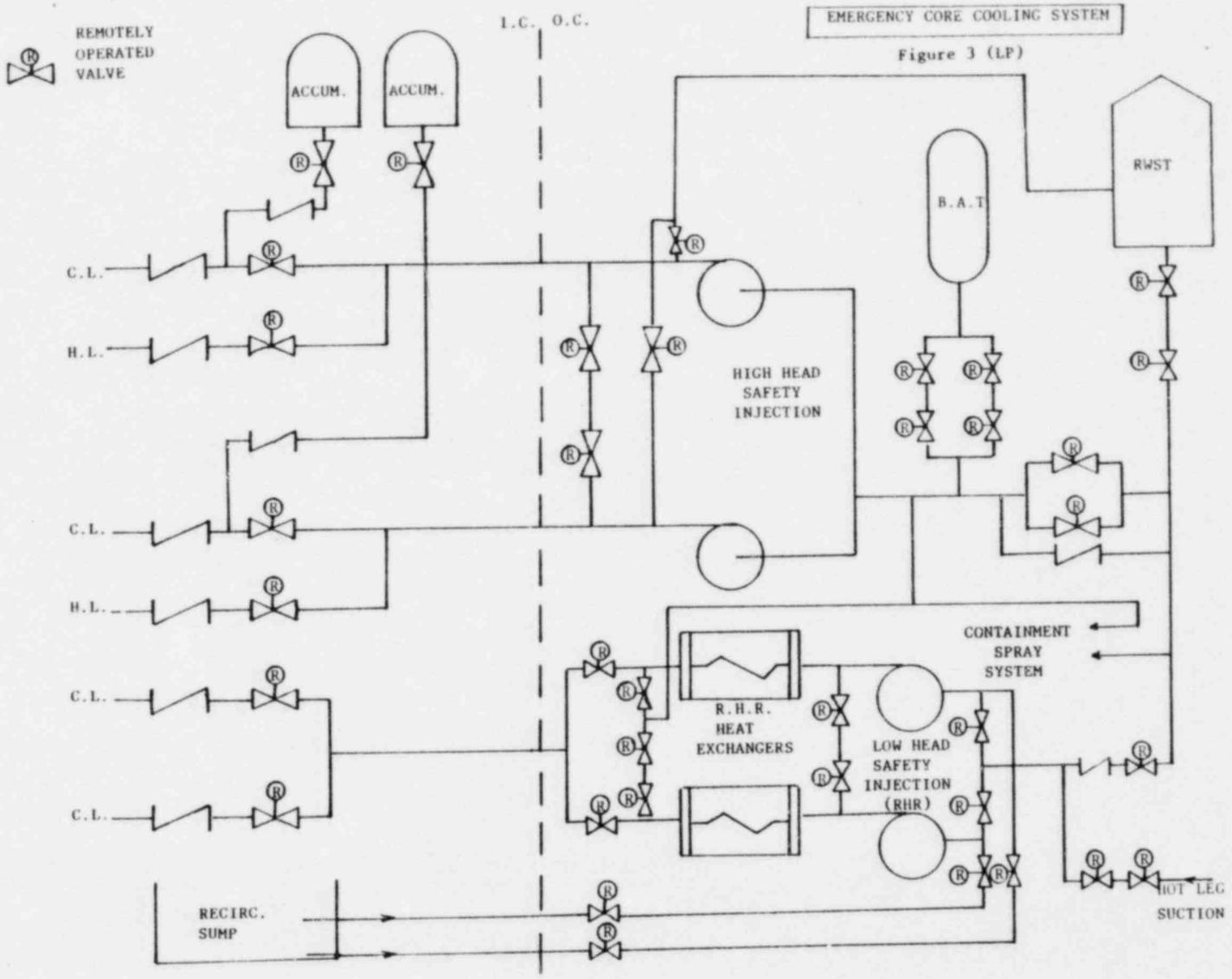
Figure 1 (LP)



CHEMICAL AND VOLUME CONTROL SYSTEM

Figure 2 (LP)




REMOTELY OPERATED VALVE
I.C.
O.C.
EMERGENCY CORE COOLING SYSTEM
Figure 3 (LP)
ACCUM.
ACCUM.
B.A.T
RWST
C.L.
H.L.
C.L.
H.L.
C.L.
C.L.
HIGH HEAD SAFETY INJECTION
CONTAINMENT SPRAY SYSTEM
R.H.R. HEAT EXCHANGERS
LOW HEAD SAFETY INJECTION (RHR)
RECIRC. SUMP
HOT LEG SUCTION

LP-11