ENCLOSURE 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 1 1 1980

MEMORANDUM FOR: Richard H. Vollmer, Director, Division of Engineering
Roger J. Mattson, Director, Division of Safety Technology
Stephen H. Hanauer, Director, Division of Human Factors Safety
Denwood F. Ross, Director, Division of Systems Integration
Bernard J. Snyder, Program Director, TMI Program Office
Brian K. Grimes, Program Director, Emergency Preparedness Program Office

FROM: Darrell G. Eisenhut, Director, Division of Licensing

SUBJECT: OPERATING REACTOR EVENT MEMORANDUM NO. 80- 10 : OPERATING REACTOR EVENTS WHICH RESULT IN CONTAINMENT FLOOR FLOODING

PROBLEM

Enclosure 1 is summary of 15 LERs which describe events at operating reactors which resulted in quantities of water on the containment floor greater than 1000 gallons. Volumes less than 1000 gallons were considered insignificant because they are about the size of the containment sumps. It should be noted that other flooding events may have occurred and not have been reported as LERs.

BACKGROUND

The events listed in the enclosure resulted in between 1000 gallons and 600,000 gallons (TMI-2 Accident) being released to the containment. The average amount, disregarding the TMI-2 accident, is about 30,000 gallons. These occurrences, except for the TMI-2 accident, have resulted in little or no measured radioactive effluents from containment and no reported equipment damage from the water.

The water is normally primary coolant water released from the RCS because of main coolant pump seal failure. Another pathway is the lifting of the pressurizer PORV and/or code safety valves to the pressurizer relief tank with the rupture of the relief tank rupture disk allowing flow to the containment floor. Enclosure 2 is a diagram of the reactor coolant system with the pressurizer PORV and the pressurizer relief tank. To date, two plants, TMI-2 and Crystal River 3, have released significant quantities of water to containment via this pathway. These events are also listed in Enclosure 1.

SAFETY SIGNIFICANCE

Water on the containment floor seems only to be significant during a major loss-of-coolant accident. The amount of water available to containment for a typical nuclear plant is several hundred thousand gallons and may go over one million gallons. This water can be from the reactor coolant system (about 80,000 gallons), the refueling or borated water storage tank (up to 1,000,000 gallons), and the condensate storage tank (about 500,000 gallons). The amount of water in the TMI-2 containment after the accident was about 600,000 gallons. These volumes are significantly greater than the amounts of water listed in Enclosure 1 for non-accident operational occurrences.

In general, we see minimal safety concerns with excess water on the containment floor during operational occurrences. Excess coolant injection during these events is preferrable to a TMI situation where ECCS systems were throttled backed. The staff is concerned, however, with the initial causes of these events such as the frequency of RCS pump seal failures and transients which lead to pressurizer relief valves openings. AEOD is looking into RCS pump seal failures but is not expected to reach any conclusions soon. DST is following these developments. The concerns on transients which lead to pressurizer relief valve openings is being handled through short term Lessons Learned (L^2) and NUREG-0660.

Another concern is that ESF equipment and useful non-ESF equipment in containment may become submerged during an accident and fail to operate. This is part of the basis for the ACRS short term TMI-2 L^2 requirement for containment water level instrumentation. NRR branches review the placement of ESF equipment inside containment with respect to the post-accident water level by requiring all ESF equipment to be qualified for operating submerged or to be located above the maximum design basis water level for the LOCA. NRR branches do not review the placement of non-ESF equipment inside containment, unless it affects an ESF system, with respect to post-accident water levels. This may include equipment which may be useful during an accident. An example would be the TMI-2 pressurizer level indicator transmitters, which were relied on during the recovery from the accident. In addition, the maximum water level defined for TMI-2 during an LOCA was exceeded during the accident probably because the ECCS recirculation was not used.

ACTIONS BEING TAKEN

NRR efforts in this area of concern are in Generic Task B-11, flooding of equipment important to safety and in Action Item II.F.5, Classification of Instrumentation, Control and Electrical Equipment, TMI-2 Accident Action Plan, NUREG-0660.

Lead DL Manager: D. Verrelli (X27872)

Darrell G. Eisenhut

Darrell G. Eisenhut, Director
Division of Licensing

Contact:
J. Donohew, X28901

Enclosure:
As stated

cc w/enclosure:
H. Denton
C. Michelson
DL ADs
DL BCs
M. Ernst
V. Noonan
P. Check
E. Jordan
J. Donohew
K. Wichman
C. Berlinger
D. Verrelli

WATER IN CONTAINMENT

Reactor	Date	LER#	Quantity of H_2O (gall.)	Event
TMI-2	3/28/79		600,000	PORV Failure
H.B. Robinson 2	5/1/75	75-01T	132,500	RCP Seal Failures
Indian Point 2	7/2/77	77-01T	90,000	RCP Seal Failure
Arkansas 1	5/80		60,000	RCP Seal Failure
Crystal River 3	2/26/80	80-010/ 01T-1	40,000	Instrument and Control System Failure
Zion 1	6/6/75	75-01T	15,000	Personnel Error Valve Left Open
Salem 1	10/21/78	78-070 01T-0	15,000	RCP Seal Failures
Ginna 1	8/15/75	75-01T	12,000	Personnel Error Refueling Water Storage Tank
Brunswick 1	12/1/79	79-091 03L-0	10,700	Recirculation Pump Valve Failure
Point Beach 1	6/20/77	77-01T	7,000	Pressure Sensing Line Failure
Haddam Neck 1	8/21/77	77-99X	4,020	RCP Seal Failures
Fort Calhoun 1	1/1/77	77-03L	3,360	Operator Error Containment Spray
Brunswick 2	8/24/75 9/5/75	75-01T " "	1,500 2,600	RCP Seal Failures
Duane Arnold	7/20/74	74-01T	507 GPM*	Check Valve Failure
Palisades 1	10/23/72	72-01T	28 GPM*	Control Rod Drive Seal Failure

*LERs do not give total leakage to containment

ENCLOSURE 2

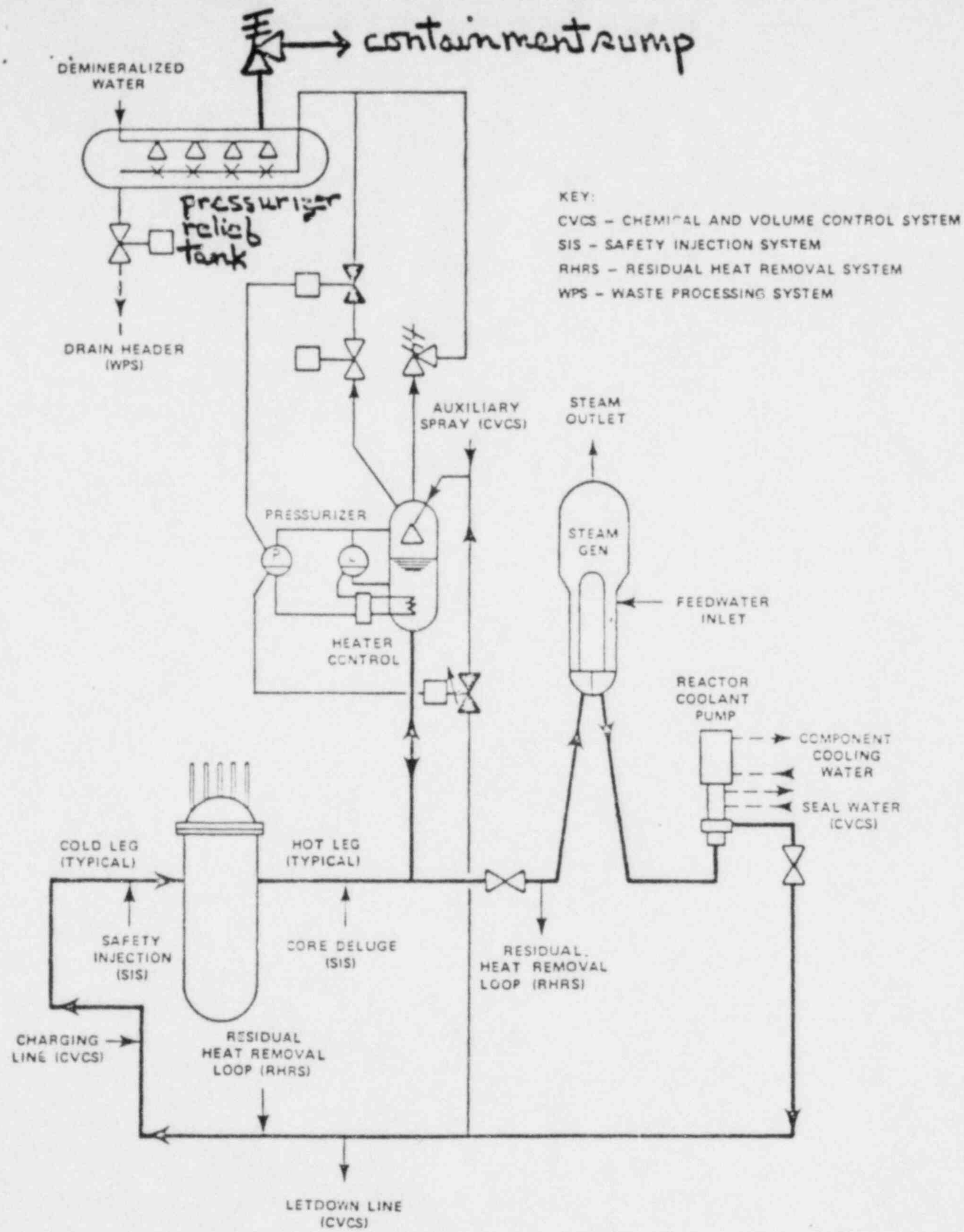

Figure 1-2. Reactor Coolant System, Flow Diagram

ENCLOSURE 3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 1 1 1980

MEMORANDUM FOR: Richard H. Vollmer, Director, Division of Engineering
Roger J. Mattson, Director, Division of Safety Technology
Stephen H. Hanauer, Director, Division of Human Factors Safety
Denwood F. Ross, Director, Division of Systems Integration
Bernard J. Snyder, Program Director, TMI Program Office
Brian K. Grimes, Program Director, Emergency Preparedness Program Office

FROM: Darrell G. Eisenhut, Director, Division of Licensing

SUBJECT: OPERATING REACTOR EVENT MEMORANDUM NO. 80-11: ARKANSAS NUCLEAR ONE, UNIT 1 - REACTOR COOLANT PUMP SEAL FAILURE

PROBLEM AND BACKGROUND

At 1:45 a.m., CDT, Saturday, May 10, 1980, the pump seal for primary reactor coolant pump (RCP) C at Arkansas Nuclear One, Unit 1 experienced a leak that eventually released approximately 60,000 gallons of reactor coolant water into the containment. A leak of approximately 12 gpm was discovered while the operators were performing the normal procedure for leakage rate determination. Technical Specifications require shutdown if that reactor coolant system leakage is greater than 10 gpm.

As the reactor was being brought to a normal controlled shutdown, the leakage rate increased until, when the reactor coolant pump was secured (shut off at 3:00 a.m.), the leakage was 200 to 300 gpm. The reactor was tripped at 2:50 a.m. High pressure injection was manually used for make up coolant by operating and throttling charging pumps. The small break LOCA procedures were used to control the transient. Pressurizer level and pressure were used to control make up coolant. Margin to saturation was at least 100°F at all times. Decay heat removal was initiated by the RHR pumps at 9:00 a.m.

For their convenience, the operators closed the core flood tank isolation valves to bring the reactor to a cold shutdown and therefore atmospheric pressure. These valves are required by Technical Specifications to be locked open during power operation. To do this, the power to the operati[illegible] e breakers which

DUPLICATE DOCUMENT

Entire document previously entered into system under:

ANO 8007290213

No. of pages: 4