

# LIS ORIGINAL

SSINS No.: 6835  
IN 86-60

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

July 28, 1986

IE INFORMATION NOTICE NO. 86-60: UNANALYZED POST-LOCA RELEASE PATHS

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

This information notice is being provided to alert recipients to a potentially significant problem pertaining to substantial possible leakage of radioactive water flowing in pipes outside containment after a loss-of-coolant accident (LOCA). The NRC expects that recipients will review this notice for applicability to their facilities. Suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Reference:

NUREG-0737: "Clarification of TMI Action Plan Requirements," November 1980. Item III.D.1.1: Integrity of Systems Outside Containment Likely to Contain Radioactive Material for Pressurized-Water Reactors and Boiling-Water Reactors.

Description of Circumstances:

On August 2, 1985, the licensee at Haddam Neck Nuclear Power Plant reported to the NRC that two potential post-LOCA release paths from containment had been identified:

1. The following potential post-accident release path resulted from TMI Action Plan modifications completed in 1981. The release path can come about in two ways (Figure 1):
  - a. When the charging system is running and normally aligned, borated water is injected from the volume control tank (VCT) to the reactor coolant pump (RCP) seals past the thermal barrier and into the reactor cooling system (RCS). Some of the seal injection water flows through the Number 1 seal and returns through a filter and the seal water heat exchanger to the charging pump suction. Because a charging pump is operating, the seal water return header does not pressurize. In the post-LOCA situation, the system operates essentially the

same except the injection water is drawn from the refueling water storage tank (RWST) rather than the VCT and the charging pumps will automatically start only if normal power is available. To preserve for the operator the option of running the RCPs after an accident, the licensee removed automatic safety injection and containment isolation signals to the isolation valves for the RCP auxiliaries [i.e., seal water (valve A in Figure 1), thermal barrier, and oil cooler returns]. These isolation valves remain remotely operable from the control room.

Under post-accident conditions, if offsite power is lost, the charging pumps stop and are not automatically restarted. With no operator action, the unisolated RCP seal water return line will pressurize from the seal leakage that is normally routed to the charging pump suction. This line relieves to the VCT at 140 psig; eventually the VCT will overflow to the waste treatment system. If no action is taken to stop the seal water leakage, a flow path for highly radioactive fission products to the plant stack would eventually exist through the waste treatment system. Manual isolation of the seal water return header (closure of valve A in Figure 1) to the VCT or manual start of a charging pump would terminate the scenario.

- b. At some time after a LOCA when 100,000 gallons have been pumped from the RWST, the ECCS will take suction from the containment sump (recirculation mode). If the RCS pressure exceeds the shutoff head of the residual heat removal (RHR) pumps, the charging system will be manually aligned to take a suction on the RHR system and discharge to the RCS at a higher pressure. In this mode of operation, if the seal return header isolation valve (valve B in Figure 1) downstream of the relief valve to the VCT were to be manually closed or to fail closed (for example, on loss of control air), the seal water return header would again pressurize to the point of safety relief at 140 psig.

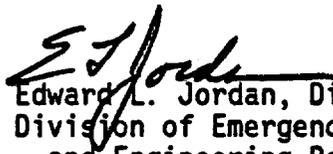
The licensee informed plant operators of these potential post-accident release pathways, of expected indications, and appropriate actions to stop the leakage (either start a charging pump or isolate the return line, based on operator judgment).

2. The second release path is related to the post-LOCA recirculation mode. The licensee had considered only RHR system leakage outside containment as a source of radioactive release during sump recirculation. Because the charging system may also be used in this recirculation, it could be moving highly radioactive water outside containment. Previously, the licensee was monitoring RHR system leakage to assure that it was below the Technical Specification, but not the charging system leakage. The licensee has now expanded its surveillance to include both systems.

Discussion:

These release paths are associated with low frequency events, but because the associated offsite doses may be significant, licensees may want to consider these release paths and other release paths that may be unique to their plants in post-LOCA analyses. Such release paths are related to the referenced TMI Action Plan item for a program to reduce to as-low-as-reasonably-achievable (ALARA) levels the leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient or accident.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

  
Edward L. Jordan, Director  
Division of Emergency Preparedness  
and Engineering Response  
Office of Inspection and Enforcement

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Attachments:

1. Figure 1
2. List of Recently Issued IE Information Notices

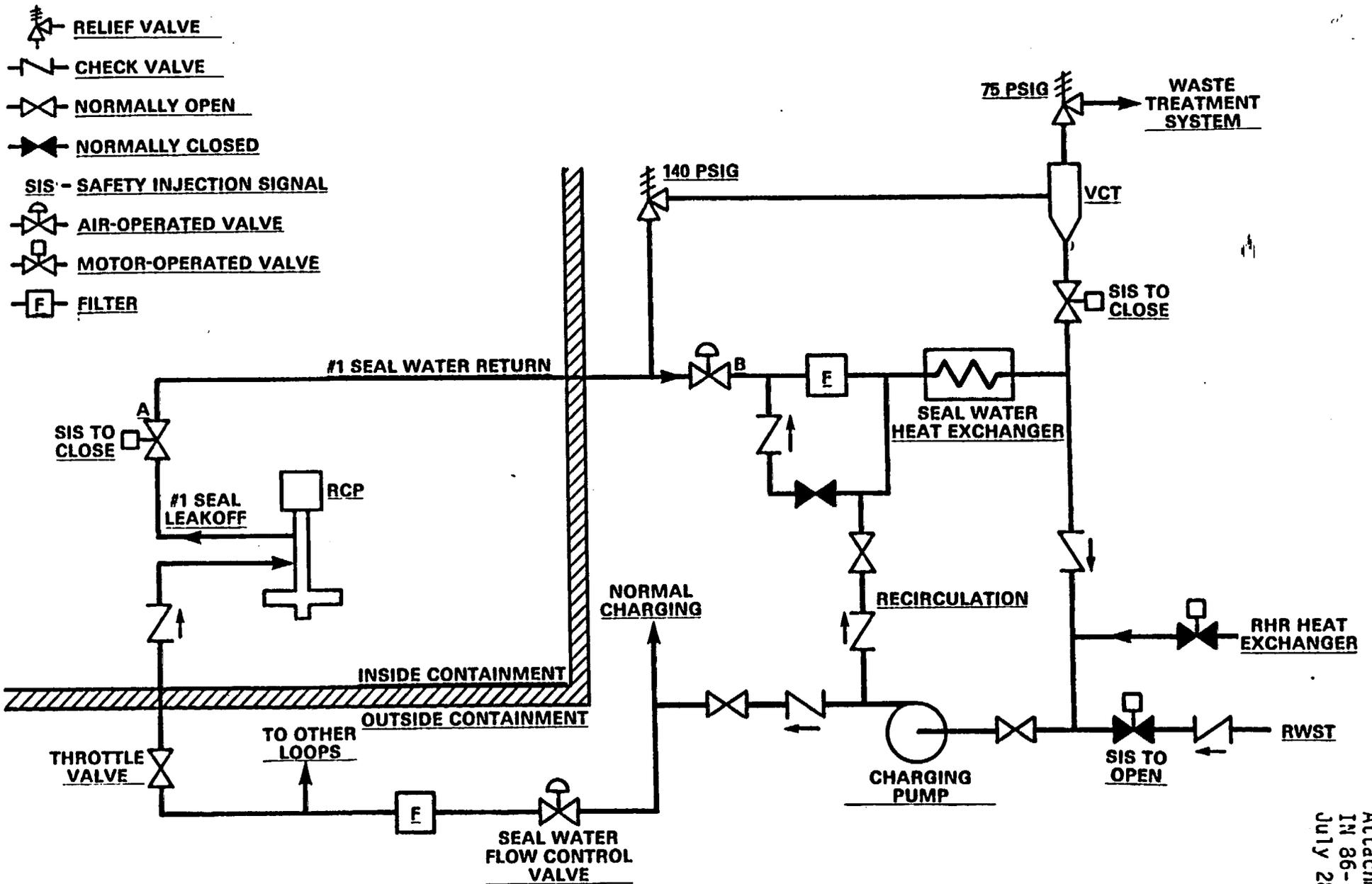


Figure 1 Chemical and Volume Control System Seal Water Supply (Simplified)

LIST OF RECENTLY ISSUED  
 IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-31 Sup. 1	Unauthorized Transfer And Loss Of Control Of Industrial Nuclear Gauges	7/14/86	All NRC general licensees that possess and use industrial nuclear gauges
86-59	Increased Monitoring Of Certain Patients With Implanted Coratomic, Inc. Model C-100 and C-101 Nuclear-Powered Cardiac Pacemakers	7/14/86	All NRC licensees authorized to use nuclear-powered cardiac pacemakers
86-58	Dropped Fuel Assembly	7/11/86	All power reactor facilities holding an OL or CP
86-57	Operating Problems With Solenoid Operated Valves At Nuclear Power Plants	7/11/86	All power reactor facilities holding an OL or CP
86-56	Reliability Of Main Steam Safety Valves	7/10/86	All PWR facilities holding an OL or CP
86-55	Delayed Access To Safety- Related Areas And Equipment During Plant Emergencies	7/10/86	All power reactor facilities holding an OL or CP
86-54	Criminal Prosecution Of A Former Radiation Safety Officer Who Willfully Directed An Unqualified Individual To Perform Radiography	6/27/86	All holders of NRC license authorizing the possession of byproduct, source, or special nuclear material
86-53	Improper Installation Of Heat Shrinkable Tubing	6/26/86	All power reactor facilities holding an OL or CP
86-52	Conductor Insulation Degrada- tion On Foxboro Model E Controllers	6/26/86	All power reactor facilities holding an OL or CP

OL = Operating License  
 CP = Construction Permit