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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, DC 20555

February 25, 1986

IE INFORMATION NOTICE NO. 86-11: INADEQUATE SERVICE WATER PROTECTION AGAINST
CORE MELT FREQUENCY

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP)

Purpose:

This notice is to alert recipients of a potentially significant problem concerning the possible failure to provide sufficient redundancy in the essential service water system (ESW). Failure of all ESW may be an accident-initiating event that could lead to a core melt. It is expected that recipients will review the information for applicability to their facilities and consider action, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Past Related Correspondence:

Circular 78-13, "Inoperability of Service Water Pumps," July 10, 1978.

Description of Circumstances:

In May 1984, the Byron Unit 1 licensee, Commonwealth Edison, submitted to the NRC a probabilistic risk assessment (PRA) to justify extending allowable outage times for certain equipment from 3 days to 7 days. The NRC reviewed the study and determined that loss of both ESW pumps on Unit 1 was not considered as an accident-initiating event. At present, Byron Unit 1 is operating and has two ESW pumps--one operating and one on standby. If the operating train failed and the standby train would not start, the component cooling water system (CCW) would heat up. The nuclear steam supply system vendor, Westinghouse, has estimated that the heatup of the CCW would trip the CCW pumps in 6 minutes. CCW is essential for cooling the reactor coolant pump (RCP) seals, either directly or via tie charging pumps, which also are cooled by CCW. Without cooling, the RCP seals may possibly fail and cause a loss-of-coolant accident (LOCA).¹ Assuming that case in the PRA the ECCS pumps, needed to mitigate the ensuing

¹ The NRC Office of Nuclear Reactor Regulation currently has the subject of RCP seal failure under study in its Generic Issue 23.

LOCA, also would fail without CCW. Thus, loss of ESW could result in a core melt.

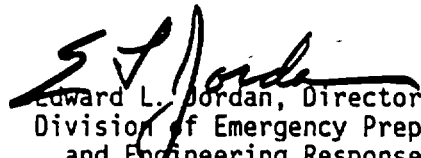
On reevaluation of the study under the assumption that loss of ESW is a LOCA-initiating event, the core melt frequency was estimated at 0.001 per year. This result also assumed that additional pumps, such as the ESW pumps for Unit 2, would not be available to mitigate the LOCA at Unit 1. To lower the estimated core melt frequency, the licensee committed to make at least one of the Unit 2 ESW pumps available to Unit 1 by means of a crosstie piping arrangement in the event of either of the Unit 1 ESW pumps becoming inoperable. The availability of the Unit 2 ESW pump reduces the core melt frequency estimated from this sequence of events by a factor of 25, and the overall core melt frequency by a factor of 5. These estimates reaffirm the perceived weakness of the two-train system and the desirability of making the Unit 2 ESW pump available.

Discussion:

In the Byron design, each of the two Unit 1 ESW pumps will supply 100 percent of the system's requirements for Unit 1. The system was licensed as meeting single failure safety criteria. The PRA, however, identified a circumstance in which even such a licensed system may represent significant risk, so the licensee remedied the situation by committing to make available an additional 100 percent capacity ESW pump from Unit 2 when one Unit 1 ESW pump becomes inoperable.

The NRC has surveyed pressurized water reactor (PWR) designs that are in operation and under construction as to availability of sufficient pumping capacity for ESW. This preliminary information indicates only one of these PWR designs may be subject to the same question discussed here for Byron. This is being pursued by the NRC staff. Boiling water reactor (BWR) designs have not been similarly surveyed; it has not been determined by a PRA whether loss of ESW could similarly result in a high core melt frequency for BWRs. Thus, due to uncertainty resulting from the incompleteness of this survey, this notice is being published.

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.


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Attachment: List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
84-69 Sup. 1	Operation Of Emergency Diesel Generators	2/24/86	All power reactor facilities holding an OL or CP
86-10	Safety Parameter Display System Malfunctions	2/13/86	All power reactor facilities holding an OL or CP
86-09	Failure Of Check And Stop Check Valves Subjected To Low Flow Conditions	2/3/86	All power reactor facilities holding an OL or CP
86-08	Licensee Event Report (LER) Format Modification	2/3/86	All power reactor facilities holding an OL or CP
86-07	Lack Of Detailed Instruction And Inadequate Observance Of Precautions During Maintenance And Testing Of Diesel Generator Woodward Governors	2/3/86	All power reactor facilities holding an OL or CP
86-06	Failure Of Lifting Rig Attachment While Lifting The Upper Guide Structure At St. Lucie Unit 1	2/3/86	All power reactor facilities holding an OL or CP
86-05	Main Steam Safety Valve Test Failures And Ring Setting Adjustments	1/31/86	All PWR facilities holding an OL or CP
86-04	Transient Due To Loss Of Power To Integrated Control System At A Pressurized Water Reactor Designed By Babcock & Wilcox	1/31/86	All power reactor facilities holding an OL or CP
86-03	Potential Deficiencies In Environmental Qualification Of Limatorque Motor Valve Operator Wiring	1/14/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit