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

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IE INFORMATION NOTICE NO. 86-38: DEFICIENT OPERATOR ACTIONS FOLLOWING DUAL FUNCTION VALVE FAILURES

Addressees:

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

Purpose:

This notice is provided to alert licensees to recent events that resulted from confusion regarding the proper actions to be taken on failure of dual function valves (e.g., those that must accommodate emergency core cooling system flow and also provide containment isolation). It is expected that recipients will review this information for applicability to their facilities and consider actions, if appropriate, to preclude similar problems at their facilities. However, the suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

The emergency core cooling systems for all light water reactors (LWRs) are equipped with numerous valves that serve both core cooling functions and containment isolation functions. The failure of one of these valves to function as designed results in the degradation of at least one of its safety functions. The following events illustrate instances in which one of the functions was not promptly recognized following various types of failures.

Peach Bottom Unit 3: On January 7, 1985, a residual heat removal (RHR) system torus spray valve malfunctioned following a reactor core isolation cooling (RCIC) system test. The valve had been opened to provide suppression pool cooling for the test and could not be reclosed using the attached motor operator. To satisfy its containment isolation function, the valve was closed with a wrench, deactivated, and declared inoperable. However, the licensee failed to declare the torus cooling function of the RHR train inoperable. On January 15, with the unit operating at 87 percent power and one emergency diesel generator inoperable, causing the equipment including the remaining RHR train to be inoperable, the NRC Resident Inspector discovered that the previously described train of RHR was inoperable as a result of the closed torus spray valve. The licensee declared an "Unusual Event" and began an orderly shutdown of the unit.

The operability of the containment cooling mode of RHR requires the operability of such equipment as the RHR pumps, the RHR heat exchangers, an open flow path to the containment and the high pressure service water (HPSW) system. However, review of the Peach Bottom Unit 3 Technical Specifications by the resident inspectors revealed that only the HPSW system is specified for containment cooling system operability. It is believed that the absence of the usual open flow path requirement statement in the plant technical specifications contributed to the failure to declare the RHR train inoperable. The licensee agreed to provide interim administrative controls for ensuring operability of the containment cooling subsystem until the issue is permanently addressed through a revision to the plant technical specifications or by some other means.

Brunswick Units 1 and 2: On May 23, 1984, operations personnel at Unit 2 observed that the minimum flow valve for the 2A core spray system (CSS) pump would not stay in the closed position following receipt of a "close" signal from the remote manual operator in the control room. (These valves do not receive a close signal on actuation of the containment isolation system.) Engineering personnel determined that the control logic for the minimum flow valves was such that the valves would reopen after closure whenever a low flow condition was sensed in the core spray line, including conditions in which the CSS pumps were not running.

On June 1, the normally open minimum flow valves for the CSS trains in both units were declared inoperable, closed, and deactivated in accordance with the technical specification requirement for inoperable primary containment isolation valves (PCIVs). The action statement requires that the line be isolated if the valve has not been restored to operability within 8 hours.

The technical specifications did not explicitly list an open minimum flow path as a requirement for CSS operability, and the licensee failed to declare the CSS trains inoperable. The licensee did establish procedures intended to ensure effective operator action to minimize the potential for pump damage in the event of a CSS pump start. However, from subsequent discussions with the pump vendor, the licensee learned that damage to the CSS pumps could occur in as little as 1 minute of operation at shutoff head without the required minimum flow. The plant staff re-evaluated the situation and concluded that the risk of pump damage with the valves closed was unacceptable. On June 12, the minimum flow valves were reopened and actuator power was restored. Administrative controls and special procedures were implemented to ensure closure of the valves when required for containment isolation. The licensee plans to modify the logic to allow remote isolation capability for the valves when their associated pumps are not running so that minimum flow and containment isolation functions can both be ensured.

Dresden Unit 3: On February 8, 1983, a low pressure coolant injection (LPCI) system suppression pool suction valve was cycled closed and failed to reopen. The valve, which provides both an emergency core cooling system (ECCS) and a containment isolation function, was then manually opened and electrically deactivated. This ensured the LPCI function of the valve, but negated the

containment isolation function. Because the swing diesel generator that supports the redundant train of LPCI was out of service, an "Unusual Event" was declared, and unit shutdown was initiated.

In reviewing the event, it was noted that, during the period when the valve was deactivated in the open position, the licensee did not declare the valve inoperable or enter the technical specification action statement for an inoperable PCIV. Although the LPCI suction valves are listed in the Dresden Final Safety Analysis Report (FSAR) as containment isolation valves, they were not listed as such in the technical specifications. The licensee was requested to submit an application for a license amendment to add to the technical specification PCIV list all dual function valves not already listed.

Discussion:

The locations and purposes of dual function valves are diverse. They are found in the suction lines, discharge lines, and minimum flow lines of a variety of diverse ECCS pumps. Some of the suction sources are inside containment, and some are outside. Some recirculation paths penetrate containment, and some do not.

In general, limiting conditions for operation (LCOs) for inoperable PCIVs allow reactor power operations to continue provided that at least one valve in the line having the inoperable valve is closed. However, in the case of an inoperable dual function valve, this generally would defeat the ECCS function of the line and would require entry into the action statement for an inoperable ECCS train. Alternatively, the decision to maintain the ECCS function generally requires entry into the action statement for an inoperable PCIV.

The operating staff occasionally may have difficulty determining the most appropriate valve position (open or closed) and valve technical specification requirement status (enabled or disabled) when a dual function valve fails. This difficulty is compounded when the technical specifications are not specifically provided in the plant license for one or the other function of the failed valve, as illustrated by the events described.

With regard to the technical specifications for operability of safety systems, all licensees were requested by a generic letter dated April 10, 1980, to adopt the standard definition that had been developed for NRC's Model Technical Specifications. That definition requires all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication, or other auxiliary equipment that are required for the system to perform its function(s) to be capable of performing their support functions.

No specific action or written response is required by this information notice. If you have any questions regarding this matter, please contact the Regional Administrator of the appropriate NRC 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
86-37	Degradation Of Station Batteries	5/16/86	All power reactor facilities holding an OL or CP
86-36	Change In NRC Practice Regarding Issuance Of Confirming Letters To Principal Contractors	5/16/86	All power reactor facilities holding an OL or CP
86-35	Fire In Compressible Material At Dresden Unit 3	5/15/86	All power reactor facilities holding an OL or CP
86-34	Improper Assembly, Material Selection, And Test Of Valves And Their Actuators	5/13/86	All power reactor facilities holding an OL or CP
86-33	Information For Licensee Regarding The Chernobyl Nuclear Plant Accident	5/6/86	Fuel cycle licensees and Priority 1 material licensees
86-32	Request For Collection Of Licensee Radioactivity Measurements Attributed To The Chernobyl Nuclear Plant Accident	5/2/86	All power reactor facilities holding an OL or CP
86-31	Unauthorized Transfer and Loss of Control of Industrial Nuclear Gauges	5/6/86	All power reactor facilities holding an OL or a CP
86-30	Design Limitations of Gaseous Effluent Monitoring Systems	4/29/86	All power reactor facilities holding an OL or a CP
86-29	Effects of Changing Valve Motor-Operator Switch Settings	4/25/86	All power reactor facilities holding an OL or a CP

OL = Operating License
CP = Construction Permit