SSINS No.: 6835
IN 86-80

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

September 12, 1986

IE INFORMATION NOTICE NO. 86-80: UNIT STARTUP WITH DEGRADED HIGH PRESSURE SAFETY INJECTION SYSTEM

Addressees:

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

Purpose:

The purpose of this notice is to inform recipients of an event where unit startup involved improper interpretation of the terms "OPERABLE" and "OPERABILITY" in the technical specifications. It is expected that recipients will review the information for applicability to their facilities and consider actions, 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.

Description of Circumstances:

At the McGuire Station on November 2, 1985, a single failure in a shared instrument air system caused a trip of both units from 100% power and a safety injection in Unit-1. A detailed sequence of events is provided for information in attachment 1. The isolation valves between the volume control tank (VCT) and the charging pumps closed as designed when the SI signal initiated a transfer of the charging pump suction to the refueling water storage tank from the VCT. Later, when the SI was reset, it was discovered that the VCT isolation valve motor operators had burned-up due to overload.

Although work requests were written to repair both of the valves, operations personnel made the erroneous decision to start-up based on the determination that these VCT isolation valves are not in the direct ECCS flow path required by technical specifications. They believed that the HPSI system was still capable of performing its design requirement. The unit entered the start-up mode (mode 2) at about 6:15 a.m. the following day, (November 3, 1985), but only stayed in this mode until 12:55 p.m. when mode 3 was re-entered to repair a severed instrument fitting on the secondary side of a steam generator.

Discussion:

The safety significance of this event is that the VCT isolation valves would not have automatically closed if an SI signal were received. The charging pumps

would then be taking suction from both the VCT and the RWST with the following possible consequences: (1) the VCT could be drained allowing hydrogen gas to be entrained in the charging pump suction, possibly leading to gas binding of the charging pumps and (2) the water injected into the reactor vessel would have a lower boron concentration than it would in the required line-up.

Duke Power personnel made their decision to start-up the unit on the basis that neither of the two valves in question is specifically identified in Technical Specification 3.5.2 as being a part of the required ECCS flow path. The technical specification requires "an OPERABLE flow path capable of taking suction from the RWST on an SI signal and automatically transferring suction to the containment sump during the recirculation phase of operation." However, the standard definition of OPERABLE requires that all necessary attendant instrumentation, controls, normal and emergency power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s). A generic letter was issued by the NRC Office of Nuclear Reactor Regulation on April 10, 1980 to clarify the meaning of the term OPERABLE and to request licensees to take specific actions to assure that the term is appropriately applied at their facilities. This definition of operability was also part of the McGuire technical specifications at the time of the event.

IE Information Notice (IN) 86-38, entitled "Deficient Operator Actions Following Dual Function Valve Failures" also addresses operator actions with regard to valves that serve more than one function. The valves addressed in IN 86-38 not only accommodate emergency core cooling flow, but also provide a containment isolation function. The information notice also refers to the generic letter dated April 10, 1980 that requests licensees to adopt the standard definition of OPERABLE in their technical specifications.

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

Technical Contacts: Joe Giitter, IE
(301) 492-9001

William T. Orders, RII
(704) 875-1681

Attachments:
1. Detailed Sequence of Events
2. List of Recently Issued IE Information Notices

11/2/85 ~0640 A fatigue-induced failure of the discharge line from one of three instrument air compressors, which comprise a shared instrument air system, resulted in the loss of instrument air pressure to all loads on both units. The main feedwater flow control valves on both units closed as designed as a result of the loss of instrument air. Due to low-low steam generator levels, both units tripped from 100% power. The auxiliary feedwater systems auto-started and provided feedwater to the team generators.

A safety injection (SI) signal was received on Unit 1 when the reactor coolant system pressure dropped below the SI set point of 1845 psig. Injection occurred for about 10 minutes. The pressure decrease was caused by several factors: (1) post-trip steam loads were higher than normal because the main steam drains opened on loss of instrument air; (2) three steam generator power operated relief valves and code safeties opened to relieve the initial pressure transient; (3) pressurizer heaters failed to energize as required; and (4) steam generators were overfed because flow control valves in the auxiliary feedwater system went open as a result of the loss of instrument air; and (5) Unit 1 was providing house load auxiliary steam.

When the SI signal was received, the high-pressure safety injection (HPSI) charging pump suction transferred from the volume control tank (VCT) to the refueling water storage tank (RWST) as designed. This requires that the valves between the RWST and the charging pumps open and the two motor operated isolation valves between the VCT and the charging pumps closed. The isolation valves between the VCT and the charging pumps closed (i.e., the required safe position).

SI was reset, the isolation valves could not be opened from the control room. An equipment operator was dispatched to manually open the valves. The valves were subsequently determined to be electrically inoperable because the valve motors had burned-up due to overload. Work requests were written to repair both of the valves. Operations personnel made the erroneous decision to start-up based on the determination that these VCT isolation valves are not in the direct ECCS flow path required by technical specifications. They believed that the HPSI system was still capable of performing its design requirement.

11/3/85 ~0615 Unit entered the start-up mode (mode 2) with the VCT isolation valves open and electrically inoperable. The unit did not exceed 2% reactor power while in mode 2.

11/3/85 ~1255 Mode 3 was re-entered to repair a severed instrument fitting on the secondary side of a steam generator.

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-79	Degradation Or Loss Of Charging Systems At PWR Nuclear Power Plants Using Swing-Pump Designs	9/2/86	All power reactor facilities holding an OL or CP
86-78	Scram Solenoid Pilot Valve (SSPV) Rebuild Kit Problems	9/2/86	All BWR facilities holding an OL or CP
86-77	Computer Program Error Report Handling	8/28/86	All power reactor facilities holding an OL or CP and nuclear fuel manufacturing facilities
86-76	Problems Noted In Control Room Emergency Ventilation Systems	8/28/86	All power reactor facilities holding an OL or CP
86-75	Incorrect Maintenance Procedure On Traversing Incore Probe Lines	8/21/86	All power reactor facilities holding an OL or CP
86-74	Reduction Of Reactor Coolant Inventory Because Of Misalignment Of RHR Valves	8/20/86	All BWR facilities holding an OL or CP
86-73	Recent Emergency Diesel Generator Problems	8/20/86	All power reactor facilities holding an OL or CP
86-72	Failure 17-7 PH Stainless Steel Springs In Valcor Valves Due to Hydrogen Embrittlement	8/19/86	All power reactor facilities holding an OL or CP
86-71	Recent Identified Problems With Limitorque Motor Operators	8/19/86	All power reactor facilities holding an OL or CP
86-70	Spurious System Isolation Caused By The Panalarm Model 86 Thermocouple Monitor	8/18/86	All GE BWR facilities holding an OL or CP

OL = Operating License
CP = Construction Permit

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

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

FIRST CLASS MAIL
POSTAGE & FEES PAID
USNRC
WASH D C
PERMIT No G-67