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Docket No. 50-346

License No. NPF-3

Serial No. 503

May 18, 1979

Director of Nuclear Reactor Regulation
Attention: Mr. Robert N. Reid, Chief
Operating Reactors Branch No. 4
Division of Operating Reactors
United States Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Reid:

In accordance with Toledo Edison's letter of May 4, 1979 (Serial No. 500), a review of the September 24, 1977 event at the Davis-Besse Nuclear Power Station Unit 1 is attached.

Yours very truly,

LER:TJM

Attachment

cc:

J. Zwatzig
Operating Reactors Branch No. 4
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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September 24, 1977 Event Review

A transient with some similarities to the Three Mile Island (TMI) incident of March 28, 1979 occurred at DB-1 during the early phases of the testing program. A complete description of the September 24, 1977 event concerning the depressurization of the primary system was presented in the supplement to Reportable Occurrence NP-32-77-16 dated November 14, 1977.

This event was similar to the TMI incident in that the event was initiated by a loss of feedwater resulting in a reactor coolant system (RCS) pressure surge which opened the power operated relief valve (PORV). The PORV failed open, causing loss of coolant and coolant pressure with some voiding in the RCS, and a subsequent increase in indicated pressurizer level (characteristic of a leak in the top of the pressurizer). As at TMI, the operators initially failed to recognize the open PORV and when pressurizer level started increasing as voids developed in the RCS, the operators shut off the high pressure injection pumps.

Unlike Three Mile Island, however, the Davis-Besse 1 operators recognized the open PORV in a relatively short time (approximately by 21 minutes) and responded properly by closing the block valve and subsequently restored high pressure injection flow. In the DB-1 incident, two reactor coolant pumps were tripped to reduce the system heat input and one reactor coolant pump per loop was maintained in operation throughout the incident.

The loss of feedwater was caused by a spurious trip of the steam and feedwater rupture control system (SFRCS) resulting in a loss of feed to one steam generator with a subsequent full SFRCS trip on low steam generator level. The full SFRCS trip stopped normal feed to both generators and initiated the auxiliary feedwater (AFW) system. Both trains of the AFW started, but only one fed its associated steam generator. The other experienced a malfunction of the governor which kept the auxiliary feedwater pump turbine at a speed insufficient to pump water to its associated steam generator.

As a result of the incident at DB-1, all licensed operators and the station engineering staff were given detailed training on the event with special attention to the hazards of relying on pressurizer level instrumentation as indication of primary system inventory when a leak in the top of the pressurizer exists. The error in securing high pressure injection because of increasing pressurizer level indication was also discussed. Modifications to the emergency procedures were developed. These required the operator to verify that no leak exists at the top of the pressurizer before the pressurizer level is relied upon, and high pressure injection flow is secured.

As a direct result of the incident, several system modifications were made. The auxiliary feed pump turbine governors were modified to prevent any further binding malfunctions. The control room annunciation of SFRCS trip status was modified to provide additional information to the operators. These modifications are described in the supplement to Reportable Occurrence NP-32-77-16 dated November 14, 1977.

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Further modifications were made to improve the reliability of the SFRCS and AFW as a result of experience gained during the test program; these changes included the following: the high pressure taps of the SFRCS pressure differential switches were moved to reduce spurious trips of the SFRCS caused by perturbations in main feedwater line pressure (see Monthly Report of October, 1978, summary of completed Facility Change Requests, 77-424). A spring was installed in each auxiliary feedwater governor to prevent the closing of the governor valves due to vibration during plant operation (see Annual Report for 1977, summary of completed Facility Change Requests, 77-450). The relays used in the auxiliary feed pump turbine speed control circuitry were replaced with better relays because of repeated failures of the original relays (see Monthly Report of March, 1978, summary of completed Facility Change Requests, 77-221). Indication on the mechanical linkage of the pilot valve for the PORV was added to provide the operator better status of the position of the PORV (Facility Change Request 77-351).

The September 24, 1977 event has again been reviewed to determine if any additional concerns exist which would not be covered by the changes currently being prepared to satisfy the requirements of NRC Bulletins 79-05, 79-05A, and 79-05B. No additional items of concern were identified. Along with the procedural and equipment modifications already made as a result of the Davis-Besse Nuclear Power Station, Unit 1 transient; the additional guidelines, including instructions for maintaining proper RCS pressure/temperature conditions and for stopping high pressure injection, provided all the procedural guidance necessary for coping with the conditions of the September 24, 1977 event.

ADDITIONAL PROCEDURAL
CHANGES MADE

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