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RECIP.NAME RECIPIENT AFFILIATION
RUSSELL,W.T. Region 1, Ofc of the Director

SUBJECT: Special rept:on 880120,scram experienced due to actual low Level 3 water level condition.

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NMP29898

NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

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THOMAS E. LEMPGES
VICE PRESIDENT—NUCLEAR GENERATION

March 10, 1988

Mr. William T. Russell
Regional Administrator
United States Nuclear Regulatory Commission
Region 1
631 Park Avenue
King of Prussia, PA 19406

RE: Docket No. 50-410
SPECIAL REPORT

Dear Sir:

In accordance with Nine Mile Point Unit 2 (NMP2) Technical Specification 3.5.1(f), we hereby submit the following Special Report concerning an Emergency Core Cooling System injection.

EVENT DESCRIPTION

On January 20, 1988 at 0944 hours with the reactor operating at approximately 41% power in the natural circulation mode per startup and test procedures, Nine Mile Point Unit 2 (NMP2) experienced a scram due to an actual low (Level 3) water level condition. The low water level was caused by a loss of feedwater flow to the reactor.

A Niagara Mohawk operator, while placing a markup (tag out), valved Instrument Air System (IAS) prefilter 2A out of service without ensuring that the redundant prefilter 2B was in service. Instrument air pressure throughout the plant began to decay due to this valving error. The licensed operators first noticed the "CRD Scram Valve Pilot Air Header Pressure Low" annunciator and immediately began to investigate. As air pressure decayed, the air operated minimum flow valves for the condensate, condensate booster, and feedwater pumps failed open (Figure 1). These minimum flow valves failed open since they are air-operated valves and are designed to fail open on loss of instrument air. As a result, feedwater flow recirculated back to the condenser subsequently reducing feedwater flow to the vessel.

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Operating feedwater pumps (P1B & P1C) and condensate booster pump (P2A) tripped on low suction pressure. Condensate pumps P1A, P1B and P1C and condensate booster pump P2B remained running throughout the event. An Operator placed the master feedwater controller in manual in an attempt to restore water level. He soon realized that the feedwater regulation valves (LV10B & C) were fully open and that no flow was going to the reactor. The reactor scrammed on low (Level 3) water level, 159.3 inches. Reactor level continued to decrease until level reached 112 inches. At which time, the High Pressure Core Spray (HPCS) and Reactor Core Isolation Cooling (RCIC) system actuated and restored level.

Instrument air was returned to normal approximately one minute after the scram.

HPCS, the HPCS Diesel Generator, and RCIC systems initiated on low-low water level (Level 2) instrumentation. The Main Turbine-Generator tripped due to RCIC injection. Reactor water level was restored and HPCS injection was terminated by the operators, when level reached 195 inches. RCIC secured automatically at Level 8 (202.3 inches), as designed. The reactor pressure was reduced during this time, due to the injection of cool water from the HPCS and RCIC systems, and the relatively small amount of decay heat in the new core.

Approximately 5 minutes after the scram, the feedwater minimum flow valves closed from a normal control circuit signal. Feedwater system pressure increased to the point of exceeding reactor pressure due to the operating condensate and condensate booster pumps. With the master feedwater controller in manual and the feedwater regulation valves fully open, feedwater flow resumed to the vessel. Operators later noticed that reactor water level was starting to increase without HPCS or RCIC injecting. An operator manipulated the Manual/Auto feedwater controllers to the full closed position in an attempt to prevent excessive overfilling of the reactor. The feedwater regulation valves (FWS-LV10B, C) locked up at approximately 80% open, when an apparent loss of control signal was sensed by the valves' hydraulic actuator control card. This caused the vessel to overfill and flood the main steam lines. The operators determined that feedwater was still injecting into the vessel and closed the feedwater containment isolation valves (MOV21A & B). This terminated the feedwater injection and water level peaked at 333 inches.

The main steam lines were flooded up to the turbine stop valves. Normal water level was established by the steam line drains and reactor water cleanup systems. A turbine bypass valve was later opened manually to control reactor pressure and to initiate a plant cooldown.

The remainder of the scram recovery was routine.

CAUSE OF EVENT

A root cause analysis for this event has been completed per Site Supervisory Procedure S-SUP-1, "Root Cause Evaluation Program". The root cause has been determined to be personnel error. The operator visually verified that the isolation valves for prefilter 2B were open by observing the length of the valve stems. However, he should have physically verified the valves' position open. These valves were in fact closed. Thus, when the operator isolated prefilter 2A for maintenance, the instrument air compressors were isolated from the rest of the system.

The root cause of the feedwater regulation valves locking up was design deficiency. An existing ground loop in the control circuitry biased the setpoint upward for the loss of control signal, causing lock-up of the feedwater regulation valves.

ANALYSIS OF EVENT

The isolation of the air compressors posed no adverse safety consequences to plant personnel or public safety as a result of this event. This portion of the IAS is not required to affect or support the safe shutdown of the reactor or to perform any safety-related functions associated with its operation. The loss of instrument air caused the minimum flow valves for the condensate, condensate booster, and feedwater pumps to fail open allowing flow to recirculate back to the condenser as designed (FSAR, Section 15.0.5, "Loss of Instrument Air").

The reactor scram which occurred as a result of the Level 3 trip was a conservative action. This poses no adverse safety consequences at any power level. This action did not in any way adversely affect any other safety system nor the operators' ability to achieve safe shutdown.

Water level never fell below 112 inches during the transient. HPCS and RCIC initiated well above (conservative direction) the 108.8 inch Technical Specification (TS) required setpoint. Because water level never reached 108.8, some Level 2 system actuations and isolations did not occur. An investigation was performed to ensure the setpoints of all Level 2 instruments were correct. This investigation found that the guide value setpoint for Primary Containment Isolation Actuation Level switches had been calculated incorrectly. Details can be found in LER 88-04.

The automatic actuation of RCIC and HPCS with coolant injection was a conservative response with minimal plant impact and no resultant impact on public safety. The systems operated as designed and restored reactor water level to Level 8, 202.3 inches.

In accordance with the requirements of TS Sections 3.5.1(f) and 6.9.2 Emergency Core Cooling System (ECCS) Injections, the following special data is provided:

For the HPCS nozzle,

- Total accumulated initiation cycles (as of January 20, 1988) = 1
- Current usage factor value (as of January 20, 1988) remains well below 0.70

The current usage factor for plant life used fluid temperatures calculated by a Contractor Engineering group for this event. Additional information is provided in LER 88-01.

CORRECTIVE ACTIONS

Niagara Mohawk has implemented numerous corrective actions to minimize the potential of a recurrence. A list of these corrective actions can be found in LER 88-01 and in NMP2's response dated March 3, 1988 (File Code NMP29897) to Confirmatory Action Letter 88-02.

Sincerely,

Thomas E. Lempges

Thomas E. Lempges
Vice President
Nuclear Generation

TEL/SCN/mjd

xc: Document Control Desk

This Drawing Has Been Simplified For Clarity

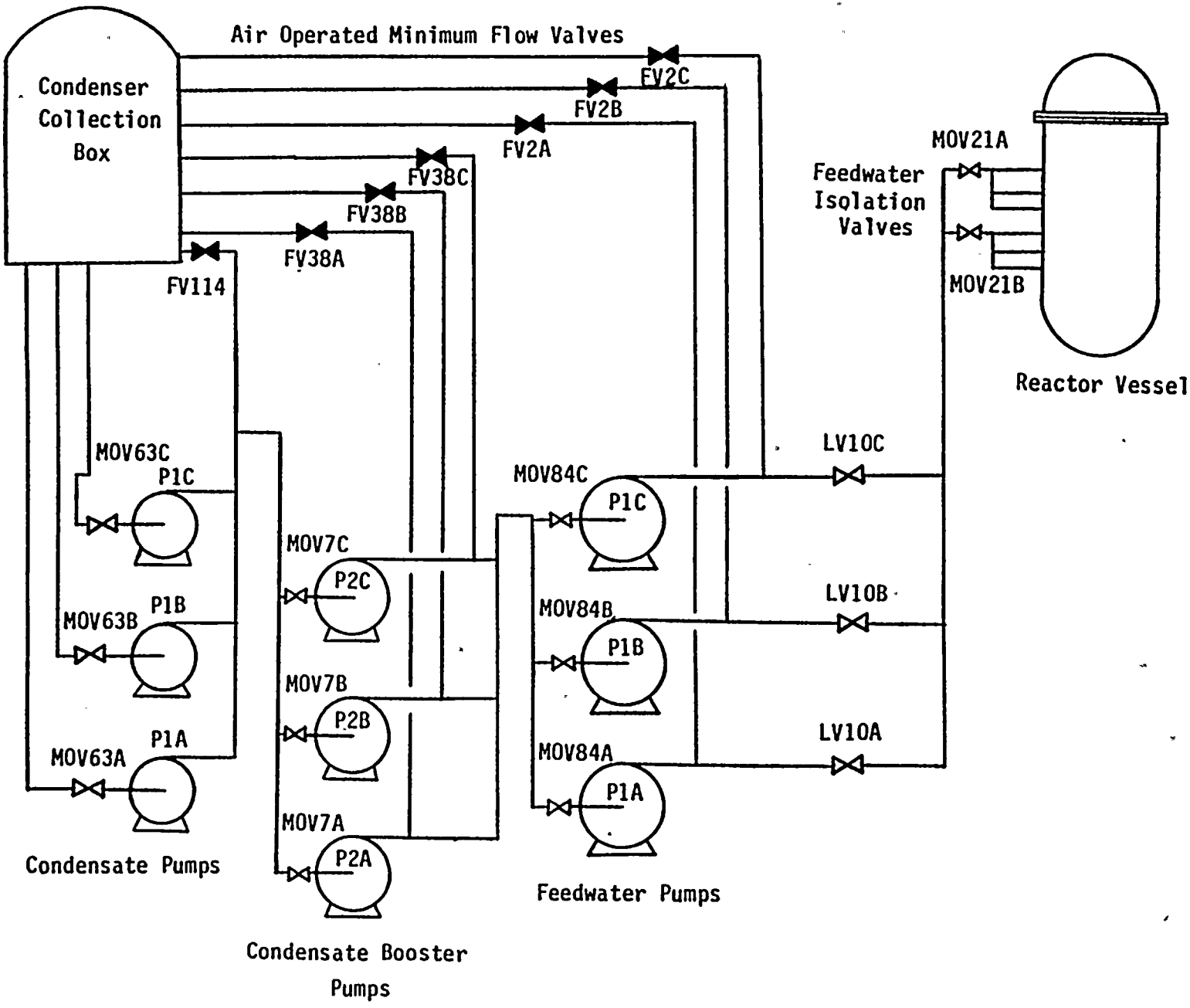

FIGURE 1