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BBS-73-15

February 9, 1973

Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D.C. 20545

Reference: Quad-Cities Nuclear Power Station, Unit 2
Docket No. 50-265, License DPR-30, Appendix A
Section 6.6.C.

Dear Mr. Giambusso:

The purpose of this letter is to inform you of the details concerning the failure of an electromatic relief valve following an isolation and scram on Unit 2. This occurrence was reported to Mr. John Fishbaugher of Region III Compliance on January 20, 1973.

DESCRIPTION OF INCIDENT

At 2:53 AM on January 20, 1973, routine partial closure testing of the Main Steam Isolation Valves was being performed in accordance with Technical Specification 4.7.1.d. During testing, MSIV 2-203-1A ("A" steam line inboard valve) was found to have faulty position indication; all other MSIV's proved to operate satisfactorily. Upon subsequent retesting of MSIV 1A, the test switch was held to the "TEST" position for a long enough time to cause the valve to continue to close beyond the 10 per cent closed position. This action led to high steam flow (> 120%) in the other three steam lines followed by a Group I isolation and reactor scram from MSIV closure. The resulting pressure transient caused several electromatic relief valves to operate automatically and at least two safety valves to leak or partially open. One additional relief valve was also manually operated. The reactor was subsequently brought to the cold shutdown condition.

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IMMEDIATE ACTIONS

Upon receipt of the isolation and scram, the reactor was verified to be properly shutdown. Electromatic relief valve 2-203-3E was operated manually to control the pressure. Prior to this operation relief valve 2-203-3A was observed to be oscillating open and closed during the pressure transient. Later an "Auto Blowdown System Power Failure" alarm was received and the 3A relief valve was found to have blown its control circuit fuses.

Station management personnel were notified of the incident and an Operating Engineer was called out to evaluate the plant condition. Electrical maintenance personnel were subsequently called in to investigate and repair the faulty position indication of the 1A MSIV, and the control circuit problem of the 3A relief valve.

INVESTIGATION

Inspection of the position indicating limit switches on the 1A MSIV revealed that one of the two banks of limit switches on that valve had its actuating arm loosened so that the "normally Closed" contacts were in the open position. Additionally, the contacts on both banks of limit switches were found to be corroded. This condition caused one relay (2-590-102A) in Reactor Protection System Channel "A" Trip Auxilliary circuit to be de-energized when it should normally be energized. Although this failure was in the safe direction, the operator was unable to detect valve travel by actuation of this relay and he did not realize the valve was closing. The switches were cleaned, repaired, and tested during the shutdown period.

Inspections of the "A" Electromatic relief valve solenoid and control circuit revealed that the operating coil was burned and that one set of control relay contacts had welded shut. The rapid oscillations of this valve may have caused the operating coil to overheat since during initial opening the circuit draws a much higher current than when it is holding the valve open. Also, this valve had been operated numerous times in the past during the special testing to investigate premature opening of safety valves and torus pressure transients. These operations may have deteriorated the coil windings to the extent that a complete failure occurred when the coil was operated several times rapidly. This possibility is currently being investigated with the vendor. The need for special testing and a thorough study of the coil performance is being evaluated.

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The coil failure caused the circuit to continuously draw high current and ultimately welded shut the control relay contacts. The circuit was then interrupted by the control fuses blowing. This failure did not affect the operability of the other four relief valves and as stated above the reactor was brought to cold shutdown thereby complying with Limiting Condition for Operation 3.5.D.4.

During the shutdown, the rupture discs on the main steam line safety valves were inspected. It was found that one of these was blown out and that six others were broken. Upon inspection of the multi-point control room temperature recorder it was concluded that two of these discs were probably ruptured during this incident. The other five may have been broken by a safety valve leaking during this incident or they may have broken during the previously mentioned special relief and safety valve testing.

No signs of damage or significant steam release from the safety valves were detected in the drywell. The conclusion that a minimum amount of steam was released to the drywell is also supported by several other facts. Activity levels never exceeded 10,000 cpm on the Continuous Air Monitor sampling drywell air throughout the incident. This is typical of previous experience following any scram from high power.

Drywell pressure increased from zero to .3 psig during the first 10 minutes of the transient and then spiked to .4 psig for about 1 minute. This increase was primarily due to relief valve operation. Experience obtained during the torus pressure transient tests on October 20, 1972 substantiates this. When the 3A relief valve was opened for 25 minutes during this test, the drywell pressure increased by .4 psig due to noncondensable gases discharged to the torus and temperature increase. The torus to drywell vacuum breakers relieved the pressure to the drywell during the transient. The valves were then tested satisfactorily prior to startup in accordance with surveillance requirement 4.7.A.4.a.

This incident has been reviewed with our Mechanical and Structural Engineering Department. Investigations into the reasons and causes of the premature opening and leakage of safety valves is continuing by that department. A report, "Dresden Safety Valve Analysis", will be submitted by Commonwealth Edison in the near future.

Very truly yours,

COMMONWEALTH EDISON COMPANY
QUAD-CITIES NUCLEAR POWER STATION

B. B. Stephenson
B. B. Stephenson
Station Superintendent

*How come so much current
passed, it welded contacts? Is
it properly fused?*