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March 19, 1990

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Mr. A. Bert Davis
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Dresden Nuclear Power Station Unit 3
Recirculation Pump Inner Seal Cooler Leak
NRC Docket No. 50-237

Reference: Conference Call of February 16, 1990 between
CECo (J. Eenigenburg, J. Kotowski, J. Silady et al.),
Region III (W. Shafer, J. Hinds, S. DuPont et al.),
and NRR (P. Shemanski).

Mr Davis:

As previously discussed with your staff, a small leak from the 3B Recirculation Pump inner seal cooler was detected during the hydrostatic testing after the replacement of the pump's inboard seal. The failure of the 3B pump's inboard seal had necessitated a shutdown on February 11, 1990, shortly after the unit has been placed on-line to commence Cycle 12 operation following its eleventh refueling outage. Further background on these events is provided in Enclosure A.

After investigating and evaluating the inner cooler leak, an action plan was developed and then discussed with your Staff on the referenced conference call. The CECo plan involved alterations to allow operation with:

- a) the inner cooler bypassed,
- b) the small primary leak routed to the Drywell Equipment Drain Sump, and
- c) augmented monitoring capability to detect additional leakage promptly.

While the CECo plan was found acceptable by your staff, Mr. Shafer requested that CECo document this approach and summarize the safety evaluation in a follow-up letter.

Enclosure A discusses both the background and the action plan utilized to address the inner seal cooler leak. Enclosure B provides the safety evaluation prepared by General Electric to address Unit 3 operation with small primary system leakage until the refueling outage following Cycle 12. The evaluation also references a study performed earlier by Byron Jackson, the pump vendor. Copies of the Byron Jackson evaluation were supplied to your staff and NRR prior to the referenced conference call.

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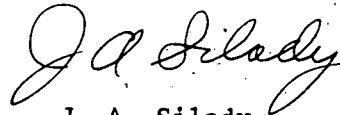
March 19, 1990

Enclosure B also addresses the potential safety impact of sudden leakage increases and other low probability events which could be postulated to occur during operation with the current configuration, i.e., as altered to vent and monitor the leakage path to the equipment drain sump. Based on Byron Jackson and GE evaluations and a review of Unit 3 Technical Specifications, CECO concluded that this problem and its associated action plan did not represent an unreviewed safety question and did not require Technical Specification changes. The associated 10 CFR 50.59 evaluation was reviewed by an augmented Onsite Review, which included corporate management input, on February 17, 1990 as documented in the Onsite Review package (DOSR 90-8).

Finally, it should be noted that subsequent operation of Unit 3 has exhibited little, if any, leakage from the 3B inner cooler leak-off line to the equipment drain. The Resident Inspectors will, however, be kept informed of the status of the pump inner cooler.

Please contact this office should further information be required.

Very truly yours,



J. A. Silady
Nuclear Licensing Administrator

cc: B.L. Siegel - Project Manager, NRR
W.D. Shafer - Projects Branch Chief, Region III
J.M. Hinds - Projects Section Chief, Region III
S.G. DuPont - Senior Resident Inspector, Dresden

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BACKGROUND

During the D3R11 Refuel Outage, the Unit 3 recirculation pump seals for both the 3A and 3B pumps were removed for normal preventative maintenance. No abnormalities were observed with the seals, and normal replacement of rotating elements (U-cups, springs, carbons, hardfaces, etc.) was accomplished. The rebuilt seals were installed and hydro tested on January 18, 1990 using the Control Rod Drive system for the hydro test medium. Flows and seal pressure indications were found to be within the expected tolerances. The 'B' recirculation pump was then secured in a partially isolated condition (discharge valve closed) until February 6, 1990, while the Electrical Maintenance Department completed MG-Set collector ring grinding.

The reactor vessel hydro began on January 29, 1990 and was completed on January 30, 1990. Seal Pressures were observed to be normal and a visual inspection of the pump bowl housing revealed no leaks.

On February 10, 1990, Unit 3 reactor was made critical after the completion of D3R11. On February 11, 1990, with Unit 3 operating at 8% of rated core thermal power and while performing normal unit startup, the Unit 3 Nuclear Station Operator (NSO) noted that the 3B Recirculation Pump inboard seal cavity pressure indicators were indicating the same pressure, 940 psig. The normal pressures for the inboard and outboard seal cavities are approximately 1000 psig and 500 psig, respectively.

Consequently, a drywell entry was made to investigate this abnormality. Upon investigation of the 3B recirculation pump, no abnormal pump seal valve lineups were discovered nor were there any other obvious equipment problems. Station Management decided to continue with the Unit 3 startup and startup testing program, and the Unit was subsequently placed on line.

A second drywell entry was made to further investigate the 3B recirculation pump seal problem. The second drywell entry revealed excessive water in the normal controlled leakoff sightglass, which was an indication that the inboard seal had failed. The failure was verified by confirming that the pump inboard seal cavity high flow alarm relay contacts were closed. There was no leakage detected past the pump outboard seal. As a result of the apparent pump inboard seal failure, Unit 3 was taken off line and a unit shutdown was commenced.

The Mechanical Maintenance Department removed the failed seal assembly. The removed seal assembly was tested in a test fixture and was observed to have excessive flow and the #1 (lower) and #2 (upper) seal pressures were equal. During disassembly of the failed seal, no physical problems or discrepancies to the internal components were observed.

The seal assembly was built with new U-cups, springs, carbons, hardfaces, and a shaft sleeve. The seal was hydro tested in the test fixture on February 13, 1990 prior to reinstallation into the pump and the measured seal assembly pressure and flow were acceptable. The seal assembly was then installed on the pump. The seal was successfully tested following installation.

Earlier in the startup, operations personnel noted frequent Reactor Building Closed Cooling Water (RBCCW) Head Tank high alarms. As part of their trouble shooting following the unit shutdown, RBCCW was isolated from the drywell. When isolated, the RBCCW Head Tank high alarms ended. The inner and outer Recirculation Pump Seal Coolers were leak checked. It was determined that the 3B Inner Seal Cooler was leaking. As inner seal cooler cracking is a known problem and is the subject of General Electric Service Information Letter (SIL) 459, it is postulated that the seal cooler is leaking as a result of cracking induced by thermal stresses.

Subsequent testing of the 3B recirc pump seal cooler to attempt to quantify the extent of leakage resulted in inability to duplicate the leak although it was recognized that the initial leak was very slight. The source of the RBCCW Head Tank high alarms was subsequently identified as the 2A Fuel Pool Cooling Heat Exchanger which has now been isolated.

ACTION PLAN

Although a replacement seal cooler was available, it was expected to take six to eight weeks to accomplish its replacement. As a result, an alteration was developed to enhance the existing capability to detect and monitor seal cooler leakage so that operation could resume.

The alteration isolated the Recirculation Pump inner seal cooler from the RBCCW cooling water. The outlet from the seal cooler was hard piped to a header leading to the Drywell Equipment Drain Sump, a monitored leakage sump. Pressure switches and temperature sensors were installed in this line to provide the Operator with a redundant warning system should the inner cooler leakage increase. The pressure switches provided an alarm at a setpoint of 75 psig which is equivalent to a flow of 15 to 17 gpm. The temperature sensors provide a redundant means of detecting leakage. Operator actions were presented in a temporary change request for the appropriate annunciator procedure. General Electric and Byron Jackson have reviewed this alteration and a safety evaluation was performed (Enclosure B) prior to restart. This review concludes that no unreviewed safety questions exist and that the recirculation pump may be safely operated with this alteration.

To address plant operation with a leaking inner seal cooler, the following actions have been implemented:

- I. Pertinent pump parameters are tracked to determine potential pump degradation.
- II. If five gallons per minute of drywell sump pump leakage are identified, then:
 - a) Commence an investigation as to possible sources of the input.
 - b) Increase the frequency of sump pumping to two hours between pumpings.
 - c) Increase the frequency of parameter trending (identified in I) unless this leakage is from something other than the 3B leak-off line.

III. If thirteen gallons per minute of leakage occurs and leak-off line thermocouple temperature reaches 280°F or both leak-off line pressure switch annunciation and thermocouple upwards trend are identified, then:

- a) Isolate 3B recirculation pump.
- b) Begin an orderly shutdown to be in cold shutdown within 24 hours.

If the seal cavity continues to leak, inputs to the Radwaste system will increase; and, the demand for makeup water to the hotwell will also increase. Both of these demands are well within the capabilities of the associated systems.