Commonwealth Edison
Quad-Cities Generating Station
Post Office Box 216
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Telephone 309/654-2241

NJK-74-363

November 4, 1974

Mr. John F. O'Leary, Director
Directorate of Licensing Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545

Reference: Quad-Cities Nuclear Power Station, Unit 2
Docket No. 50-265, DPR-30, Appendix A
Sections 1.0.A.1, 2.1.A.1, 6.6.B.1.0

Dear Mr. O'Leary:

Enclosed please find Abnormal Occurrence Report No. 50-265/74-26 for Quad-Cities Nuclear Power Station. This occurrence was previously reported to Region III, Directorate of Regulatory Operations by telephone on October 25, 1974, and to you and Region III, Directorate of Regulatory Operations by telecopy on October 25, 1974.

This report is submitted to you in accordance with the requirements of Technical Specification 6.6.B.1.a.

Very truly yours,

COMMONWEALTH EDISON COMPANY
QUAD-CITIES NUCLEAR POWER STATION

N. J. Kalivianakis
Station Superintendent

NJK/JAS/jeh

cc: Region III, Directorate of Regulatory Operations
J. S. Abel

50-265
incident

11402

DMB & DRA REGION III

REPORT NUMBER: AO 50-265/74-26

REPORT DATE: November 4, 1974

OCCURRENCE DATE: October 22, 1974

FACILITY: Quad-Cities Nuclear Power Station
Cordova, Illinois 61242

IDENTIFICATION OF OCCURRENCE:

Unit 2 APRM-RBM Flow Reference Drift.

CONDITIONS PRIOR TO OCCURRENCE:

Unit 2 in the RUN mode with a power level of 2153 MWT, a load of 670 MWE, and 79 Mlb/hr core flow.

DESCRIPTION OF OCCURRENCE:

On October 22, 1974, while performing Technical Staff Support Surveillance, the Unit 2 Nuclear Engineer found the APRM reference flows to be approximately 7% greater than the indicated per cent of rated core flow. The Jet Pump Operability Surveillance curves of recirc. pump speed vs. flow were checked immediately to confirm that present conditions were within the normal flow characteristics. A digital voltmeter was also used to verify proper operation of the drive flow square rooters. No discrepancies were found.

On October 23, 1974, a detailed total core flow calibration was performed which verified the accuracy of the core flow instrumentation (loop and total flows calculated by the single tap and double tap methods agreed within 1%). While obtaining data for the core flow calibration, the Nuclear Engineer noticed a slightly higher flow indicated through jet pump #8 compared to the other loop A pumps. A brush recorder was set up to monitor the signals from the single tap transmitters for jet pumps 6, 7, and 8. The resulting traces confirmed that the 5 or 6 Hz noise signal which is characteristic of forward flowing jet pumps was still present. In addition, it was noted that data from past core flow calibrations consistently exhibited similar loop A flow distributions with jet pump #8 slightly higher ($<$.5 Mlb/hr). This reinforced the conclusion that the jet pumps were not outside their normal flow characteristics.

On October 23, 1974, after concluding that the observed indication of higher than expected drive flow for the given core flow was not a real phenomenon, the reference flows were adjusted from readings of 94% (for APRM's 1, 2, 3, and RBM 7) and 96% (for APRM's 4, 5, 6, and RBM 8) to correspond to the indicated total core flow of 91%. This was accomplished by correcting the gains of the total drive flow proportional amplifiers 260-8A and 260-8B. The required conservatism was, therefore, returned to the flow biased trip settings (Technical Specification 2.1.A.1) until further investigation could determine the cause of the apparent instrument drift.

DESIGNATION OF APPARENT CAUSE OF OCCURRENCE:

Other - Instrument Drift:

The cause of this occurrence is presently attributed to instrument drift. Investigations to date have eliminated sources of error such as core flow calibration. Checks of the two flow converters and the individual drive flow transmitter calibrations (which require half-scrams) will be performed at the earliest opportunity.

ANALYSIS OF OCCURRENCE:

The Unit 2 scram and rod block settings are presently set for a total peaking factor of 3.29 (full flow scram intercept of 117% power). The actual total peaking factor at the time of the occurrence was 2.31. At this point in the fuel cycle, high power peaking factors have typically been less than 2.6. Consequently, the scram settings are 3% conservative to the maximum allowable by Section 2.1.A.1 of the Technical Specifications, which corresponds to a maximum peaking factor of 3.06 (full flow scram intercept of 120% power).

If a large power excursion had occurred on October 22, 1974, with the reference flows 6% and 7% high, the resultant flux scram would have occurred at approximately 2% higher neutron flux than that allowable by the 3.06 based flow-biased line (approximately 5% higher than the 3.29 scram settings). The resultant margin to the safety limit would still have been 9.5% power even if the actual power-flux lag due to the fuel time constant is neglected. The corresponding margin for no degradation of the drive flow accuracy is 11.5% at 79 Mlb/hr core flow.

In addition, all reactor parameters such as pressure, feedwater temperature, and steady state MCHFR were more conservative than those assumed in the establishment of the safety limit and the limiting safety system setpoints.

PARAMETER	VALUES ASSUMED IN SAR	ACTUAL VALUES ON 10/22/74
MCHFR	1.9	3.89
Pressure	1000 psig	990 psig
F. W. Temp.	348° F	325° F
Total Peaking	3.06	2.31
Water Level	0"	~30"

The bases for Section 2.1.A of the Technical Specifications states: "Analysis reported in the SAR demonstrates that, even with a fixed 120% scram trip setting, none of the postulated transients results in violation of the fuel safety limit and there is a substantial margin from fuel damage. Therefore, use of a flow-biased scram provides additional margin." Consequently, the relatively small degradation (2% power) of the trip setting caused by this occurrence in no way jeopardized the health and safety of the public.

CORRECTIVE ACTION:

The drive flow instrumentation will be recalibrated as required based on the results of the continuing investigation. The unit Nuclear Engineers will continue to record the reference flows on the Daily Nuclear Engineer Checklist (5 times/week) as part of the Technical Staff Support Surveillance Program. Increased emphasis, however, will be placed on comparison of the reference flows with the per cent core flow and maintaining conservatism at all times.

FAILURE DATA:

Although past data indicate that reference flow (per cent drive flow) to core flow mismatch has occurred previously, it has largely taken place at low flow when the ratio of required drive flow to developed core flow is naturally less due to the decreased hydraulic resistance of the core. In some cases the reference flows have been greater (non-conservative) than the per cent core flow but generally by less than 3% which would not degrade the trip settings in excess of the Technical Specification.