

DUKE POWER COMPANY  
COCONEE UNIT 2

Report No.: RO-270/76-16

Report Date: January 26, 1977

Occurrence Date: December 27, 1976

Facility: Oconee Unit 2, Seneca, South Carolina

Identification of Occurrence: Reactor operation exceeded the error adjusted power imbalance limit

Conditions Prior to Occurrence: Unit at 100 percent full power

Description of Occurrence:

On December 27, 1976 at approximately 0600 hours, the computer program which calculates the reactor power imbalance was discovered inoperable. The reactor power imbalance is measured both by the incore and out-of-core detector systems and is normally calculated and displayed by the plant computer. Because of the better accuracy of the incore system, the incore system is preferred for imbalance measurement when the plant computer is available. When the computer imbalance program became inoperable, it became necessary to perform a hand calculation of the reactor imbalance from the out-of-core detector indication. Although the imbalance was within the error adjusted incore system limits at the time the computer program became inoperable, subsequent hand calculations utilizing the out-of-core detector readings indicated that the imbalance was outside the error-adjusted out-of-core system limits, mainly due to larger error-adjustment factors for the out-of-core system. Action was taken to reduce the imbalance to within the error-adjusted out-of-core system limits; however, as required by Technical Specification 3.5.2.6, a power reduction was initiated approximately two hours after the loss of the incore imbalance indication. The imbalance was returned within the out-of-core error-adjusted imbalance limits at 0812 hours on December 27, 1976.

Apparent Cause of Occurrence:

This occurrence resulted from a software lockup on the Unit 2 computer which caused the loss of the computer program for calculating reactor power imbalance.

Analysis of Occurrence:

Technical Specification Figure 3.5.2.3B1 provides a limit for reactor power imbalance versus reactor power level to prevent the maximum linear heat rate from exceeding the values used in the LOCA analysis. The existence of statistical and instrument errors associated with the measurement of reactor power imbalance makes it necessary to operate within an error-adjusted power imbalance envelope in order to assure that the Technical Specification limit is not actually being exceeded. In this incident, the reactor was operated for two hours outside the error-adjusted out-of-core power imbalance limits, and, therefore, it is possible that the limits specified in Technical Specification Figure 3.5.2.3B1 were exceeded.

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However, the Bases for Technical Specification 3.5.2 state that all of the power distribution parameters (quadrant tilt, rod position limits and imbalance) must be at their limits while simultaneously all other engineering and uncertainty factors are also at their limits to produce the maximum allowable heat rate. In this incident, the maximum occurring quadrant tilt was 0.3% as compared with the operating limit of 3.4% permitted by Technical Specification 3.5.2.4a. Also, the control rods were maintained well within the normal maneuvering band. For these reasons, it is concluded that the health and safety of the public was not affected by this incident.

Corrective Action:

Reactor power was reduced in a timely manner to a level where the measured imbalance was within specified limits. The computer imbalance calculational program was restored to an operable status and was verified to be functioning correctly.