

DUKE POWER COMPANY  
OCONEE UNIT 3

Report No.: RO-287/76-10

Report Date: August 5, 1976

Occurrence Date: July 21, 1976

Facility: Oconee Unit 3, Seneca, South Carolina

Identification of Occurrence: Primary to secondary system leakage in 3B  
once-through steam generator

Conditions Prior to Occurrence: Unit at 100 percent full power

Description of Occurrence:

On July 21, 1976, two radiation alarms on Oconee Unit 3 indicated a primary system to secondary system leak in the 3B once-through steam generator (OTSG). The two alarms were air ejector off-gas high radiation alarm and the 3B OTSG steam line high radiation alarm. Within approximately one hour following sampling to confirm the alarms, a reactor shutdown was initiated. Approximately 1½ hours later, reactor shutdown was completed and preparations were made to cool and drain the Reactor Coolant System. Samples from both steam generators were taken during this period indicating that the leakage was from the 3B OTSG.

Within three days following this occurrence, the Reactor Coolant System was cooled down and drained, and an internal inspection of 3B OTSG was initiated.

Apparent Cause of Occurrence:

Inspection revealed one leaking tube in the steam generator. By gradually filling the secondary side of the steam generator with feedwater and observing tube leakage from the primary side, a small rupture of approximately 0.04 inches in diameter was discovered in one of the tubes at a distance of about ten feet below the top of the upper tube sheet. The tube is located in the eleventh row of tubes from the outside. Eddy current inspections were made of nine selected tubes surrounding the damaged tube and no indications of failure, wall thinning or fretting were observed. Further investigation indicated no other tube leakage; however, two tubes were discovered to have damage at the upper tube sheet weld. The cause of this damage has not been determined and these tubes have been plugged. An inspection of the 3A OTSG has also been made and no evidence of tube sheet damage observed.

Analysis of Occurrence:

This occurrence resulted in a RCS leakage of approximately one gallon per minute (gpm) into the secondary system which was detected with installed

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radiation monitoring equipment. The leakage was well within the operational limits of Ocone Technical Specification 3.1.6.1, which permits unit operation to continue with identifiable reactor coolant leakage of 10 gpm. In this case, however, a reactor shutdown was initiated soon after identification of the leakage. The gaseous activity released to the environment via the air ejectors was 0.1956 curies. This quantity is considered insignificant when compared to the annual release limit of the station.

Additionally, monitoring of liquid environmental release points subsequent to this incident revealed no detectable activities above normal background readings.

Although the exact cause of the rupture of one of the tubes in 3B OTSG is undetermined, it is believed that this is an isolated occurrence and is not indicative of a generic problem associated with the steam generator design utilized at Ocone.

It is concluded, therefore, that this incident did not affect the health and safety of the public.

Corrective Action:

The leaking steam generator tube was plugged at both ends utilizing explosive plugs. Also, the two other tubes found defective but not leaking were plugged in the same manner. Subsequent leak testing was performed and no other leaks were discovered. Additionally, eddy current inspections of both steam generators will be conducted during the fall refueling outage.