AEOD TECHNICAL REVIEW REPORT*

UNITS: Davis Besse/Rancho Seco/Oconee 3
DOCKET NOS.: 50-346/50-312/50-287
LICENSEES: Toledo Edison/SMUD/Duke Power
NSSS: Babcock and Wilcox

TR REPORT NO: AEOD/T327
DATE: August 11, 1983
EVALUATOR: H.L. Ornstein

SUBJECT: AUXILIARY FEEDWATER HEADER PROBLEMS AT B&W PLANTS

In April 1982 the NRC was made aware of auxiliary feedwater (AFW) degradation at the Davis-Besse plant. The degradation was discovered during an In-Service-Inspection. Subsequent to the discovery of the degradation at Davis-Besse the other B&W plants having similar internally mounted AFW headers were inspected. The two other operating B&W plants having the internally mounted AFW headers, Oconee 3 and Rancho Seco were both found to have similar AFW header degradation.

The NRC held several meetings with the B&W owners to discuss the extent of the degradation, the causes of the degradation, and the plan of action for repairing the damaged equipment.

Of the three affected plants, Davis-Besse appeared to have undergone the most severe damage. i.e., in one steam generator the header was distorted to the point where there was separation of the header from the AFW inlet piping, and the piping was offset from its entrance hole into the header. The headers of both steam generators were distorted to the point where they made contact with 24 steam generator tubes. Seven of those steam generator tubes were extensively damaged. Numerous dowel pins and brackets were dislodged or distorted.

Oconee 3 appeared to have the least header distortion among the three plants. i.e., The AFW inlet pipes (on both steam generators) were still engaged in the headers. There was no contact between the AFW header and the steam generator tubes. There was dowel pin and bracket distortion and dislodging also. One Oconee 3 AFW header did have cracks on the top and bottom surfaces, but they were attributed to corrosion and faulty welding.

The licensee concluded that the AFW header damage was caused by water hammer. The water hammer resulted from the rapid introduction of cold water into the AFW headers which were initially filled with saturated or superheated steam.

The licensee proposed a design modification that emulated an earlier AFW header design (External headers similar to those which have been used successfully at the ANO-1, CR-3, Oconee 1, 2 and TMI-1 plants). The damaged headers were repaired and were retained in their original position to act as a steam side baffle (The AFW will not flow through them). With the new design AFW enters each steam generator through the new externally mounted headers (one per steam generator).

*This document supports on-going AEOD and NRC activities and does not represent the position or requirements of the responsible NRC program office.

The AFW header design modifications were completed and the headers were tested by the fall of 1982.

AEOD (Ornstein/Brown) attended several meetings, and monitored the licensees' progress. The actions taken by NRR, IE, the licensees and B&W appeared to be appropriate. The corrective actions were taken expeditiously to minimize plant down time. However, as noted by B&W in a June 17, 1983 letter to NRC (J.H. Taylor to R.C. DeYoung), a problem arose with regard to quality assurance and traceability associated with the materials used for the AFW header repair and modifications at the Davis Besse and Oconee 3 plants. The after the fact QA review alluded to in that letter is not desireable however it appears that this problem has been handled in an acceptable manner.

In summary the problem of water hammer in internally mounted AFW headers at B&W plants appears to have been resolved satisfactorily. LER #50-346/82-019, #50-312/82-010 and 50-287/82-006 are considered to be closed out, and no further AEOD action is necessary.