

NOV 29 1972

Docket
50-269

R. C. DeYoung, Assistant Director for Pressurized Water Reactors
Directorate of Licensing

STATUS REPORT ON OCONEE 1, 2, AND 3 - FLOW INDUCED VIBRATION TO REACTOR
INTERNALS AND ACCEPTANCE OF TOPICAL REPORTS BAW-10050 AND BAW-10037

Plant Name: Oconee 1, 2, and 3
Licensing Stage: OL
Docket Nos.: 50-269/270/287
Responsible Branch and Project Manager: PWR Branch No. 4, I. A. Peltier
Review Status: BAW-10050 & BAW-10037 - Complete
BAW-10051 & BAW-10038 - Partial

The Mechanical Engineering Branch, Directorate of Licensing, has reviewed four topical reports (BAW-10037, 10038, 10050 and 10051) concerning the hot functional vibration failures submitted by Babcock & Wilcox (B&W). The MEB conclusions and comments on these topicals are as follows:

1. BAW-10050 - B&W conducted an investigation on the cause of the preoperational test failure. The metallographic examination of the failure surfaces concluded that the fatigue due to flow induced vibratory motion was the major failure mode. Component redesign was based upon (a) further separation of structural frequencies from vortex shedding frequencies, and (b) further reduction of the stresses to a level below the material endurance limit. We concur with B&W that such design modifications will improve the structural integrity of the reactor internals.
2. BAW-10037 - Reactor vessel flow testing was conducted on a one-sixth scale model to investigate flow distribution, pressure loss and the pattern of flow mixing from the various inlets. The flow characteristics inside the core and vent valve testing were emphasized. Both the original and the modified designs were tested. The tests results showed that the modified design provides more uniform flow distribution with acceptable pressure loss. However, B&W indicated that since the flow rate was slightly higher at certain portions of the core, further minor modifications in design will be required. We concur with B&W on the approach used to verify the core flow distribution.

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3. BAW-10051 - B&W has attempted to justify the reactor internals design modifications in BAW-10051 by computing responses of modified components to flow induced vibration. However, the actual flow forcing functions may not be verified until the new preoperational vibration test program for Oconee 1 has been completed. We concur that internals have been redesigned based upon a conservative application of the response and failure data from the Oconee 1 preoperational tests. However, due to a lack of valid flow forcing functions and complete response determination, we cannot complete our evaluation of this topical at this time. The applicant has stated that further efforts, including component testing of instrument guide tubes and incore nozzle assemblies will be performed to provide a better understanding of the vibration behavior. The thermal shield vibration response characteristics will be further defined by further evaluation of the Oconee 1 response and failure data.

4. BAW-10038 - The prototype preoperational vibration testing program including a subsequent inspection program for reactor internals is described in BAW-10038. The applicant cannot provide valid vibration predictions as required by Safety Guide 20 due to inconclusive dynamic analysis. Therefore, we cannot complete our evaluation of this report at this time.

We concur with B&W that the design modifications on the internals have been based on a conservative application of the response and failure data from Oconee 1. However, due to a lack of concrete analytical evidence to assure structural integrity of reactor internals under the transient loadings, satisfactory completion of the new preoperational vibration testing should be considered as a prerequisite for issuing an operating license.

BAW-10051 and BAW-10038 may be approved when the additional tests and evaluations indicated above are completed to provide the basis for vibration predictions. When the information is received and reviewed, Oconee 1 may then be qualified as a valid prototype plant. The information contained in BAW-10050 and BAW-10037 will be acceptable by reference in the Oconee 1, 2, and 3 applications. We are not preparing Topical Report Evaluations on these topicals since these topicals are practically unique to the Oconee application.

R. R. Maccary, Assistant Director
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cc: See Attached

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