



DUKE POWER

June 15, 1992

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414
Amendment Request for Technical Specification 4.4.5
Reply to Request For Additional Information

In a letter dated June 2, 1992, the NRC requested that additional information be provided for items related to the subject amendment request which was submitted by M. S. Tuckman's letter dated May 19, 1992.

The questions and responses are as follows:

1. The supporting information states that 20 sleeves are equivalent in primary flow reduction effects to the effects of plugging one tube. Does this correlation apply for more than one sleeve per tube? Also, 48 tube sheet sleeves are said to be equivalent in heat transfer reduction effects as plugging one tube. Please clarify these values with respect to different values found in the subject BAW report.

Topical report BAW 2045P, Revision 1 states that sleeving eighteen (18) tubes results in the same primary flow reduction as plugging one tube. The flow reduction in percent of the flow reduction provided by a plug for one or more sleeves per tube up to a maximum of four sleeves is as follows:

1 sleeve	5.4%
2 sleeves	9.6%
3 sleeves	13.9%
4 sleeves	17.3%

Topical report BAW 2045P, Revision 1 further states that installing forth-three (43) tubesheet sleeves reduces heat transfer the same as plugging one tube. The equivalents of 20 tubes sleeved per each tube plugged for primary flow reduction and 48 tubes sleeved in the tubesheet per each tube plugged for heat transfer were published in topical report BAW 1045P, Revision 0. These values were incorrectly reported in our submittal dated May 19, 1992 as the current values for BAW 2045P, Revision 1.

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2. **Provide a description of how the tubes plugged and sleeved are to be recorded and communicated with respect to ensuring that the tube plugging effects are always fully accounted for in the licensing basis accident and transient analyses.**

The Component and Nuclear Services engineers calculate the number of tubes plugged and the equivalent number of tubes plugged due to sleeving. The total equivalent number of tubes plugged is compared to a maximum number of tubes allowed to be plugged without exceeding the 10% criteria with respect to the no significant hazards and safety analysis. The maximum number of tubes allowed to be plugged is provided to the component engineer by the systems engineer through the Nuclear Station Modification (NSM) Work Request. (The NSM is generated in response to a Station Problem Report (SPR) initiated by the component engineer prior to the beginning of the outage.) The component engineer is responsible for maintaining the plugging limit within that allowed by the safety analysis.

After plugging has been done in an outage, an "Exempt Change", part of the NSM process, initiates updating the plant drawings. A 10CFR 50.59 safety evaluation is performed to verify that plugging and sleeving are within the required limits.

3. **With respect to the no significant hazards (NSH) analysis, the discussion of changes in the margin of safety should be augmented to clarify what the margins in thermal, hydraulic, physics or other applicable parameters in the licensing basis accident and transient analyses would be before the proposed change and after the proposed change. This should include a showing that the effects of sleeving on the steam generator's performance described in the generic BAW report are applicable to and are accounted for in the Catawba licensing basis analyses.**

The Westinghouse FSAR Chapter 15 analysis methodology, which covers the current fuel cycle of Catawba Unit 2 except for the Steam Generator Tube Rupture (FSAR Section 15.6.3) event, concludes that most FSAR Chapter 15 accidents are insensitive to additional steam generator tube plugging which is limited enough to allow the Technical Specification limit on minimum measured RCS flow to continue to be met. The specific exceptions to this are:

- Loss of Offsite Power (FSAR Section 15.2.6)
- Loss of Normal Feedwater (FSAR Section 15.2.7)
- Feedwater Line Break (FSAR Section 15.2.8)
- Loss of Coolant Accident (FSAR Section 15.6.5)

The Westinghouse analysis of these four events, as presented in the Catawba FSAR,

includes ten percent assumed steam generator tube plugging.

The Babcock & Wilcox FSAR Chapter 15 analysis methodology, which covers the current fuel cycle of Catawba Unit 1 except for Steam Generator Tube Rupture, concludes that the three non-LOCA events listed in the previous paragraph, along with small LOCAs, are not affected by a change from Westinghouse OFA fuel to Babcock & Wilcox Mark-BW fuel. For any such unaffected events, the existing Westinghouse analyses in the FSAR apply. The Babcock & Wilcox large LOCA analysis, as presented in the Catawba FSAR, includes ten percent assumed steam generator tube plugging.

The Duke Power FSAR Chapter 15 analysis methodology now covers Steam Generator Tube Rupture and will cover, for future cycles on each unit, (1) all non-fuel-related non-LOCA events as they are reanalyzed and (2) all fuel-related non-LOCA events. This methodology lists, in Table 8-1, the non-LOCA events which are sensitive to increases in steam generator tube plugging. In addition to the three non-LOCA events listed in the first paragraph, they are:

Turbine Trip (FSAR Section 15.2.3, RCS pressure response)

Uncontrolled RCCA Bank Withdrawal from Zero Power (FSAR Section 15.4.1, RCS pressure response)

Uncontrolled RCCA Bank Withdrawal at Power (FSAR Section 15.4.1, RCS pressure response)

Uncontrolled RCCA Bank Withdrawal at Power (FSAR Section 15.4.1, core cooling capability)

Single RCCA Withdrawal (FSAR Section 15.4.3d)

Steam Generator Tube Rupture

All of these events have been analyzed assuming ten percent steam generator tube plugging.


4. Note that the sleeving of tubes would not reduce the potential for leakage in the NSH margin of safety analysis unless tubes with imperfections less than the plugging limit were sleeved. Please clarify the criteria for sleeving as compared to plugging and discuss the resulting change in margin.

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The criteria which requires repair is the same for either plugging or sleeving. Sleeving can be used to repair defects located in the tubesheet roll transition and defects located at the tube support plates. The material from which the sleeve is manufactured is more resistant to OD IGA/SCC than the original type material. Therefore, a properly installed sleeve over an existing defect reduces the potential for leakage by providing an additional barrier against primary to secondary leakage through that defect. Tubes containing defects at tube support plates obstructed by an existing sleeve will be plugged. Tubes containing defects at locations other than the tubesheet and tube support plates will be plugged. The ability to sleeve steam generator tubes in lieu of plugging results in a larger number of tubes remaining in service and maintains a larger margin with respect to the safety analysis.

If there are any questions, please call Mary Hazeltine at 803-831-3080.

Very truly yours,



M. S. Tuckman

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