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Babcock & Wilcox Company
ATTN: Mr. James H. Taylor
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Gentlemen:

Significant wear has been found in control rod guide tubes at the Combustion Engineering (CE) NSSS facilities. The guide tube wear has been primarily located at the axial location where the control rod is "parked" in the fully withdrawn position during normal operation. CE postulates that the wear is caused by a flow induced vibration of the Inconel control rod against the softer Zircaloy guide tube. Corrective actions, including increased operability surveillance, step insertion of control rods and extensive sleeving of both new and irradiated guide tubes, have been taken at all affected CE facilities.

We realize that your NSSS design is different from the CE system, however, we believe that a similar wear problem could exist at facilities using your NSSS design. You are requested to provide the enclosed additional information for all B&W facilities with operating licenses within 60 days of the date of this letter.

Sincerely,

Brian Grimes

Brian K. Grimes, Assistant Director
for Engineering & Projects
Division of Operating Reactors

Enclosure:
Request for Additional
Informaton

REQUEST FOR ADDITIONAL INFORMATION

INTEGRITY OF CONTROL ROD GUIDE TUBE (CRGT)

BABCOCK & WILCOX FACILITIES

Answers to the following questions should be supported with data and drawings to the extent possible.

1. Describe the details of any routine surveillance of fuel assemblies performed at your facilities using your NSSS design.

2. Have examinations of the fuel assembly guide tubes to detect wear been completed at any facility using your NSSS design? If so, provide the following information:
   a. The method of examination (i.e. destructive testing, eddy-current testing, periscope, borescope, mechanical gage, TV, etc.)

   b. The areas of CRGT examined.

   c. Qualification of the examination procedure.

   d. The number of CRGT sampled at each facility and the applicable operational parameters including: the core location; EFPH; time in service; related control rod parameters; fluence; etc.

   e. Results of observations or measurements.

3. Were any CRGT destructively tested (e.g., by mechanical or metallographic means) and what observations or measurements were made?

4. What correlations were suggested between operating parameters and CRGT condition?

5. If specific examinations for CRGT wear have not been completed at any facility, either provide other evidence for the absence of wear or answer the following:

   a. Are examinations planned? If so, provide details as requested in 2 a-d.

   b. Have out-of-pile wear tests been completed? If so, provide details including qualification of the test procedure and answers to 2 a-d. Address vibration, fatique, flow visualization, etc.

6. Document any other observations of wear or degradation found in the examination of your fuel assemblies (i.e., grid wear, post wear, etc.). Provide the results of your assessment of the consequence of these observations. Describe any design changes effected to either mitigate the consequences of this wear or eliminate the wear.

7. If CRGT wear has been found at facilities using your NSSS design:

   a. What have been the attributive causes?

   b. Have correlations been made to characterize the phenomena with respect to operating procedures and plant specific core parameters?

c. Are specific locations within the core or particular CRGT within an assembly more susceptible?

8. If CRGT wear has been observed at any facility using your NSSS design:

   a. Describe your efforts to reassess the mechanical integrity of the core with worn CRGT to demonstrate that coolability and scramability exist for the normal, seismic and anticipated operational occurrence loading conditions. Describe the worst condition analyzed.

   b. Discuss your structural design bases. Indicate if provisions have been made to accommodate wear in the design. What amount of wear or related degradation would be cause for rejection for reload? Provide the allowable stresses used in the structural analysis. Discuss the effects of temperature strain rate, notch severity, irradiation and hydrogen content on mechanical properties used to establish the allowable stresses.

   c. Provide the results of your structural analysis summarizing the CRGT loads and the primary and secondary stress intensities for normal, fuel handling, and accident loading conditions.

   d. Discuss the effects of CRGT wear on the thermal-hydraulic performance of the reactor under normal and accident conditions.

9. Discuss any control rod scram testing that has been completed to demonstrate scramability in worn CRGT. Address the effects of worn CRGT on scramability for the worst expected guide tube geometry. Include the strain-deflection limits for control rod functionability.

10. If examinations for CRGT wear have not been or will not be made at representative facilities using your NSSS design, provide justification for continued operation of these facilities.

11. B&W has redesigned the guide tube lock nuts of later design fuel assemblies by making a change from zircaloy to stainless steel to mitigate the effects of observed wear in the upper region of the guide tube. Indicate which design is employed at each B&W designed facility and indicate any observations that have been made to detect wear in this area and/or verify the adequacy of the redesign.