



ENTERGY

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January 31, 1995

OCCAN019505

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Use of Westinghouse Alloy 600 Steam Generator Mechanical Plugs

Gentlemen:

The following status is provided in response to recent field experience with Westinghouse Alloy 600 Thermally Treated (TT) mechanical plugs. This letter serves to provide our planned actions in response to this latest field data.

In December 1994, Westinghouse notified Entergy Operations of recent field experience with Alloy 600 mechanical plugs that necessitated a revision to the corrosion algorithm presented in Addendum 2 to WCAP-12245, Rev. 3. This revision in the corrosion algorithm affects Arkansas Nuclear One's (ANO's) previously developed schedule and action plan for addressing all remaining Westinghouse Alloy 600 TT mechanical plugs in service in the ANO-1 and ANO-2 steam generators (SGs). Westinghouse issued Addendum 3 to WCAP-12245, Rev. 3 on January 26, 1995. Based upon review of Addendum 3, as well as the original basis for the Justification for Continued Operation (JCO) provided to ANO by Westinghouse, we have determined that the JCO continues to apply until appropriate actions can be taken.

At present, ANO-1 has a total of 142 Westinghouse Alloy 600 TT mechanical plugs in service which have not been repaired in the SGs. Of the total population, there are 71 hot leg plugs and 71 cold leg plugs. Table 1 (attached) provides the current plant configuration with the installed mechanical plugs. It should be noted that the tubes in the ANO-1 SGs are partially-depth-roll-expanded in the tubesheet which in Westinghouse SGs, per WCAP-12245, Rev. 3, precludes a failed plug from becoming a high energy missile within the tube. Westinghouse has completed additional analysis and testing to confirm this for the Westinghouse plugs installed in the ANO-1 SGs manufactured by Babcock and Wilcox and has determined that for those plugs installed such that the plug expander has passed two contact lands (see Figure 1),

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plug top release is precluded. The Westinghouse analysis indicates that there is a possibility, using worst case tolerances and material strengths, that plug top release could occur for those plugs in which the expander has passed only one contact land and which have been in service longer than the repair date determined by the revised algorithm. However, due to the fact that the ANO-1 SG tubes contain no U-bends, the results of a plug top release would not lead to tube perforation or cause leakage greater than that associated with a plug end separation. The worst case primary-to-secondary leakage due to plug end separation has been estimated to be limited by the expander orifice to less than 40 gpm. This amount of leakage is within the capability of the normal primary coolant makeup system.

ANO-1 is scheduled to begin its next refueling outage (1R12) on February 14, 1995. Due to the short time period between identification of the new field experience necessitating a revised action plan and the start of 1R12, an interim action plan has been developed to address these plugs within the current time constraints imposed by the planned outage.

The algorithm used in Addendum 3 to WCAP-12245, Rev. 3 indicates a revised repair date of 1990 for 40 of the ANO-1 hot leg plugs, with a repair date of 1991 for the remaining 31 plugs. Based upon the estimated repair time per plug (3½ hours) combined with the current outage time constraints and the low probability of plug top release, it is Entergy Operations' intent to repair approximately ½ of the hot leg plugs in the "A" SG and all 7 hot leg plugs in the "B" SG in ANO-1 during 1R12. The prioritization criteria for the plugs to be repaired in 1R12 are:

- 1) Plugs for which the measured distance between the plug end and the expander is indicative of expansion of less than two lands,
- 2) Plugs for tubes where the defect was located below the upper tubesheet,
- 3) Plugs in areas of higher crossflows,
- 4) Plugs for tubes with the greatest tube degradation at the time of plugging.

The remainder of the hot leg plugs will be repaired by 1997, in accordance with our previous commitment made in response to NRC Bulletin 89-01, Supplement 2. NRC Bulletin 89-01, Requested Action 3, permitted remedial actions at plants where the steam generator tubes are partially-depth-roll-expanded within the tubesheet to be deferred on a one time basis to the next scheduled outage, if the outage that followed the receipt of the bulletin ended within 4½ months of the bulletin's issuance. This is similar to the current circumstances at ANO-1.

The revised replacement dates for the ANO-1 cold leg plugs, based upon Addendum 3 to WCAP-12245, Rev. 3, are 2038 for 40 of the plugs and 2040 for the remaining 31 plugs. These cold leg plugs will be repaired prior to the end of their service life, as calculated by the algorithm.

Emergency Operations believes that the low probability of plug top release and the lack of tube perforation during such a release, in conjunction with early leakage detection capabilities and proper operational response to excessive leakage and/or tube rupture, ensures an ability to safely operate the unit during the period from the end of 1R12 until shutdown for the subsequent refueling outage (1R13). Primary-to-secondary leakage detection capabilities include N-16 monitors, condenser offgas monitors, and main steam line radiation monitors which have the capability to detect leakage as low as 0.01 gpm. An administrative shutdown limit of 0.1 gpm is also in effect. Emergency procedures are in place for excessive reactor coolant system leakage and steam generator tube rupture.

ANO-2 has a total of 6 Westinghouse Alloy 600 TT mechanical plugs in service in the SGs which have not been repaired. All 6 are cold leg plugs present in tubes where plug top release may lead to perforation. Table 1 also provides the current plant configuration with the installed mechanical plugs in ANO-2.

For ANO-2, the revised replacement dates for the 6 cold leg plugs based upon Addendum 3 to WCAP-12245, Rev. 3, is 2002. These plugs will also be repaired prior to the end of their service life, as calculated by the algorithm.

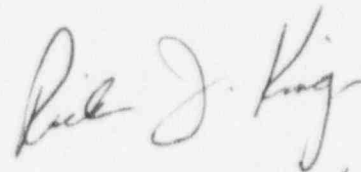
During the interim period until all the affected ANO-1 hot leg plugs can be repaired, continued safe operation is assured for ANO-1. The basis for acceptability of continued operation is the validation of the previously developed JCO presented in Section 3.0 of WCAP-12245, Rev. 3 and the additional ANO-specific analysis conducted by Westinghouse. If you have any questions regarding this submittal, please contact me.

Very truly yours,

Dwight C. Mims
Director, Licensing

DCM/jjd

attachments



for DCM

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Table 1

Westinghouse Alloy 600 TT Mechanical Plugs in Use at ANO

	<u>Quantity</u>	<u>Heat No.</u>	<u>Location</u>
ANO-1	64	NX-2387	"A" SG Hot Leg
	64	NX-2387	"A" SG Cold Leg
	7	NX-2387	"B" SG Hot Leg
	7	NX-2387	"B" SG Cold Leg
ANO-2			
	6	NX-5222	"B" SG Cold Leg

FIGURE 1

Schematic of ANO-1 Tubesheet Joint with Mechanical Plug

