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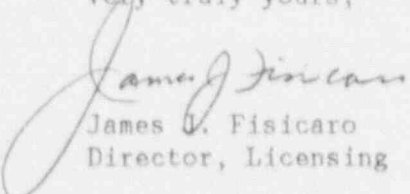
SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
10CFR50.46 Report on ECCS Analysis Change

Gentlemen:

Pursuant to 10CFR50.46(a)(3)(ii) the attached report provides the required information concerning a change to the ANO-2 ECCS analysis which resulted in an increase in the estimated peak fuel cladding temperature (PCT) of greater than 50 degrees Fahrenheit from the previous temperature calculated for the limiting plant transient. The resultant PCT remained below the limit of 2200 degrees Fahrenheit; therefore, compliance with 10CFR50.46 was maintained. The analysis change provides plant operators a broader range of containment operating conditions (pressure and temperature) than those assumed as initial conditions in the current analysis. Additionally, the report discusses actions taken following the reanalysis to reduce the allowable operating peak linear heat rate such that the final estimated PCT would remain below the value of 2078 degrees Fahrenheit in the current analysis of record.

Should you have further questions, please contact me at (501) 964-8601.

Very truly yours,


James V. Fisicaro
Director, Licensing

JJF/LAT/mmg
Attachment

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EFFECT OF ANO-2 ECCS REANALYSIS DUE TO CHANGES IN INITIAL
CONDITIONS FOR CONTAINMENT PRESSURE AND TEMPERATURE

Background

In February of 1991, during a review of the ANO-2 Large Break LOCA analysis input decks in preparation for reperforming the LBLOCA analysis using the 1985 ABB-CE approved evaluation model, a discrepancy was identified between the containment conditions (pressure and temperature) allowed by the Technical Specifications and the assumptions used for these parameters in the current ANO-2 ECCS analysis. ANO-2 Technical Specification 3.6.1.4 allows plant operation with containment temperature and pressure lower than the values used as input assumptions in the ECCS analysis.

The bases for Technical Specification 3.6.1.4 indicates that the limits for the initial containment pressure are to ensure: 1. The containment structure is prevented from exceeding its design negative pressure differential with respect to the outside atmosphere of 5.0 psi. 2. The containment peak pressure does not exceed the containment structure design pressure of 54 psig during LOCA conditions. The initial containment air temperature ensures that the containment liner plate temperature does not exceed the design temperature of 300°F during LOCA conditions. The ANO-2 Technical Specifications do not contain requirements to ensure the ECCS analysis assumptions for containment pressure and temperature are maintained.

The ANO-2 LBLOCA analysis assumes initial containment conditions which result in the lowest peak building pressure following a LOCA. This ensures conservative assumptions when calculating the peak clad temperatures (PCTs) due to delayed reflood rates from greater blowdown to containment. Lower initial containment pressure and temperature result in lower peak containment conditions. Therefore, higher PCTs are expected as a result of a decrease in the initial containment pressure. Initial conditions of containment temperature and humidity do not have a significant impact on PCTs.

The ANO-2 ECCS analysis of record (Cycle 1) used initial containment conditions of 90°F, 14.7 psia and 100% humidity. Technical Specification 3.6.1.4 allows for a range of initial containment conditions from 11.7 psia to 16.1 psia, 50°F to 140°F, and 0% to 100% humidity. Operating the plant with lower initial containment temperatures and pressures, and higher containment humidity will result in a greater reduction in the ECCS analysis containment peak pressure following a DBA.

Based on this information, it was determined that the current ANO-2 ECCS analysis only bounded plant operation with containment temperatures and pressures above 90°F and 14.7 psia (and at any humidity).

ECCS Reanalysis

An evaluation was initiated to determine acceptable lower bounds for allowable containment pressure and temperature with respect to the LBLOCA analysis. Past practice has been to operate the plant with a slight vacuum inside containment. To continue to allow this operating flexibility and to account for potential errors associated with instrumentation used to monitor containment parameters, initial containment conditions of 12.8 psia and 60°F were chosen to be evaluated.

ABB-Combustion Engineering evaluated the new containment initial conditions by reperforming a portion of the limiting LBLOCA analysis (the 1.0 Double Ended Guillotine rupture of the Pump Discharge leg) using the current ANO-2 evaluation model. The containment is modelled in the reflood code (COMPERC) which is run after the blowdown code (CEFLASH). Therefore, the blowdown is not affected by the containment conditions. The reflood code was rerun along with the steam cooling heat transfer coefficient code (PARCH) and the hot rod fuel heat-up code (STRIKIN) which uses inputs from the reflood code. A peak clad temperature (PCT) of 2170°F was calculated using the new values of 12.8 psia and 60°F. This PCT is 92°F greater than the current analysis of record value of 2078°F.

Actions Taken Following Reanalysis

To offset the increase in PCT, the hot rod calculation was modified by decreasing the allowed operating peak linear heat rate (PLHR) from 13.5 kW/ft to 12.8 kW/ft. The calculation was reformed and the results indicated that if plant operation was maintained in accordance with this assumption, the analysis of record PCT of 2078°F would remain bounding. To limit the PLHR to within the new value assumed in the reanalysis (12.8 kW/ft), uncertainty terms in the linear heat rate calculation programs of the Core Operating Limit Supervisory System (COLSS) and the Core Protection Calculator System (CPCS) were increased by approximately six percent. These changes effectively limit the maximum PLHR to 12.8 kW/ft during plant operation.

Summary and Conclusions

The ANO-2 ECCS analysis of record (Cycle 1) revision provides plant operators with containment pressures and temperatures lower than those used originally as input assumptions to the analysis. This change resulted in an estimated PCT from 2078°F to 2170°F. The hot rod calculation was then repeated with the PLHR reduced from 13.5 kW/ft to 12.8 kW/ft. This calculation confirmed that the PCT remained below the Cycle 1 value of 2078°F.

Appropriate administrative controls were implemented to ensure containment pressure and temperature are maintained within the values used as input assumptions in the new ECCS analysis. Additionally, by limiting the calculated PLHR to 12.8 kW/ft the Cycle 1 ECCS analysis PCT of 2078°F remains conservative. Based on these factors, there is no safety concern related to these changes to the ECCS analysis of record.

The change to the ECCS analysis input assumptions for containment pressure and temperature resulted in an estimated PCT of greater than 50°F from the temperature in the current analysis of record. In accordance with 10CFR50.46 this was determined to be a significant change and is being reported within 30 days from identification as required by 10CFR50.46(a)(3)(ii). Subsequent changes were made in the allowed PLHR limit to offset these effects resulting in a PCT still bounded by the current analysis of record.