



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO.156 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.,

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated February 24, 1993, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2) Technical Specifications (TSs). The requested changes would revise the containment internal pressure lower limit of TS Figure 3.6-1 from 12.8 to 13.2 psia.

2.0 BACKGROUND

In each of the past operational cycles, the licensee has re-evaluated the postulated large-break loss-of-coolant accident (LBLOCA) to incorporate the changes made in fuel design and core physics parameters. The results of each LBLOCA reanalysis confirmed that the acceptance criteria are met. However, operating margin to the linear heat rate limit assumed in the LBLOCA analysis has been used to offset any changes that cause peak clad temperature (PCT) to increase. The latest LBLOCA analysis is based on a peak linear heat rate of 12.1 kW/ft (the current TS value). This was reduced from the 14.5 kW/ft assumed in the original safety analysis report (SAR) LBLOCA analysis.

By letter dated February 24, 1993, the licensee submitted its updated LBLOCA analysis. The CENPD-132 Supplement 3-P-A methodology was used in this updated analysis, as required. This LBLOCA reanalysis consolidated all of the changes and discrepancies that were identified over the years and restored operating margin to the linear heat rate limit (the new limit is 13.5 kW/ft). Also, the input parameters were reviewed and adjusted accordingly to accommodate potential future changes. A steam generator tube plugging limiting of 10% is one of the potential changes that has been incorporated into the new LBLOCA analysis. The new LBLOCA analysis assumes an initial containment pressure of 13.2 psia, that is higher than the present TS limit of 12.8 psia. Therefore, the licensee requested a change to TS Figure 3.6-1 to reflect a higher minimum containment pressure of 13.2 psia, consistent with the assumption used in the new LBLOCA analysis.

### 3.0 DISCUSSION

The ANO-2 LBLOCA analysis has been reevaluated utilizing the latest approved Combustion Engineering evaluation model, CENPD-132 Supplement 3-P-A. Changes to input parameters were made in the following areas: 1) latest evaluation model updates, 2) past cycle changes, 3) present plant data, and 4) anticipated plant changes. Changes to the evaluation model which impact the input parameters are the limiting single failure, analytical nodalization modifications and axial power distribution.

A new limiting failure of "no single failure" is referenced in CENPD-132 Supplement 3-P-A. This new assumption allows all High Pressure Safety Injection (HPSI) and Low Pressure Safety Injection (LPSI) pumps to operate, increasing the injection flow out the break and reducing containment pressure. This encourages more flow out the break, promoting a less rapid core reflood and resulting in higher PCTs. The nodalization changes in the reactor vessel lower plenum region and broken pump discharge leg are also incorporated into the input parameters. All of the changes which have been made over the past 10 cycles (as documented in cycle-specific reload reports, such as, difference in fuel pin conditions, fuel batches with HID-1 spacer grids, removal of hot rod augmentation penalty, reduction of the linear heat rate, reduction in the initial containment temperature and pressure) are incorporated into the new LBLOCA analysis.

As discussed in Standard Review Plan Section 6.2.1, an increase in the initial containment pressure assumed in a loss-of-coolant accident (LOCA) analysis also affects the calculated value of the resulting fuel PCT. The increased initial containment pressure (and therefore, a greater mass of non-condensable gases in the containment) results in a higher containment pressure profile throughout the accident. This higher containment pressure discourages flow out the break and promotes a more rapid core reflood, reducing the fuel PCT calculated by the LOCA evaluation model. A higher initial containment pressure thus has a conservative or beneficial effect on fuel performance during a LOCA.

### 4.0 EVALUATION

#### 4.1 LBLOCA Analysis

Although the effect of the initial containment pressure increase (by itself) is to lower PCT, the net effect of all the changes in this LOCA reanalysis is as follows. A 0.6 square feet Double Ended Guillotine break in the Pump Discharge (DEG/PD) has been determined as the limiting break in the new LBLOCA analysis. The results of this new analysis show an increase in PCT from 2086°F (cycle 10 reload analysis) to 2142°F, which is below the 2200°F limit defined in 10 CFR 50.46. The maximum clad oxidation was calculated as 8.9 percent and maximum core wide oxidation is less than 0.843 percent. These values are also within the acceptance criteria for a LBLOCA accident. The staff has reviewed the licensee's submittal and finds that the input parameters used in the new analysis are reasonable and the results of the licensee's new LBLOCA analysis meet the acceptance criteria defined in 10 CFR 50.46 and are acceptable.

#### 4.2 Containment Analysis

Although increased containment pressure has a beneficial effect on PCT, it has an adverse effect on the containment pressure vessel response. An increase in initial air mass results in a greater peak containment pressure in the event of a pipe rupture. For this reason, the TSs also establish an upper bound or maximum containment operating pressure. The proposed new lower limit assumed in the LOCA analysis remains less than the upper limit assumed in the containment analysis. Thus, the staff finds that no TS changes relating to the containment analysis are required, nor is a containment reanalysis required.

#### 5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

#### 6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (58 FR 16858). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

#### 7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: C. Liang, SRXB  
W. Long, SCSB  
T. Alexion, PD IV-1

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