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2CAN080701

August 30, 2007

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

SUBJECT: License Amendment Request to Revise
Technical Specification 3.1.3.4, CEA Drop Time
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCE: Entergy letter to NRC dated July 31, 2007, *License Amendment Request to Revise Technical Specification 6.6.5, Core Operating Limits Report* (2CAN070701)

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests an amendment to Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification (TS) 3.1.3.4, Control Element Assembly (CEA) Drop Time. The proposed change will revise the limit on the drop time for an individual CEA. The arithmetic average drop time or the associated delay times are not impacted by the proposed change. This change is necessary to support the implementation of Next Generation Fuel (NGF) in the next operating cycle, as described in Entergy letter dated July 31, 2007 (Reference 1).

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that this change involves no significant hazards consideration. The bases for these determinations are included in the attached submittal.

There are no new commitments contained in this letter.

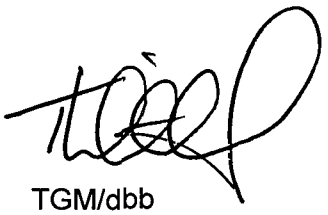
Entergy requests approval of the proposed amendment by February 14, 2008 in order to support the spring 2008 refueling outage. Once approved, the amendment shall be implemented prior to startup following the spring 2008 refueling outage. Although this request is neither exigent nor emergency, your prompt review is requested.

A001 NRR

If you have any questions or require additional information, please contact David Bice at 479-858-5338.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 30, 2007.

Sincerely,



TGM/dbb

Attachments:
1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)

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Attachment 1

2CAN080701

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating License NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2).

The proposed change will revise the Limiting Condition of Operations (LCOs) in ANO-2 Technical Specification (TS) 3.1.3.4, CEA Drop Time, by revising the amount of time for an individual Control Element Assembly (CEA) to travel from a fully withdrawn position until it reaches the 90% insertion position. The current limit is ≤ 3.5 seconds. The proposed limit is ≤ 3.7 seconds. The arithmetic average of the drop times for all the CEAs is unaffected by this change.

2.0 PROPOSED CHANGE

The proposed change will modify the LCO presented in TS 3.1.3.4 by changing the drop time limit for individual CEAs:

> The individual CEA drop time, from a fully withdrawn position, shall be ≤ 3.7 seconds and the arithmetic average of the CEA drop times of all CEAs, from a fully withdrawn position, shall be ≤ 3.2 seconds from when the electrical power is interrupted to the CEA drive mechanisms until the CEAs reach their 90 percent insertion positions with:
>
> a. T_{avg} ≥ 525 °F, and
>
> b. All reactor coolant pumps operating.

The revised drop time limit is associated with the implementation of Combustion Engineering (CE) 16 x 16 Next Generation Fuel (NGF) as defined in "CE 16 x 16 Next Generation Fuel Core Reference Report," WCAP-16500-P (Reference 2). The applicable TS Bases will be revised and implemented in conjunction with this amendment requests in accordance with the ANO-2 TS Bases Control Program, TS 6.5.14.

3.0 BACKGROUND

CE 16 x 16 NGF as defined in WCAP-16500-P (Reference 2) will be implemented at ANO-2 beginning in Cycle 20 following the spring 2008 refueling outage. The ANO-2 specific application of NGF is described in Entergy letter to the NRC dated July 31, 2007 (Reference 1). The fuel design is intended to provide improved fuel reliability by reducing grid-to-rod fretting issues, improved fuel performance for high duty operation, and enhanced operating margin.

The current time limits provided in the LCO for TS 3.1.3.4 were approved by the NRC in Amendment 100 to the ANO-2 Operating License. Prior to this amendment the assumption used in the safety analyses was that all CEAs drop into the core at the same time and at the same rate following a reactor trip. This amendment approved the concept that the negative reactivity insertion for any reasonable distribution of CEAs is more directly correlated to, and can be represented by, the average CEA insertion rather than by the slowest CEA.

Based on measured CEA drop patterns at ANO-2, the CEAs do not fall at the same time and at the same rate during a reactor trip. This change associated with Amendment 100 was primarily due to the distribution of CEA extension shaft weights in ANO-2. The longer heavier extension shafts located at the core interior cause faster CEA drop times, which become progressively slower towards the core periphery where the CEA extension shafts are shorter and less heavy.

In addition, the radial flux for the ANO-2 core is relatively flat or unchanging with time except near the core periphery. On the periphery the flux is significantly lower than the average since ANO-2 employs low-leakage fuel management. As noted previously, the few CEAs along the periphery have shorter extension shafts, thus slower drop times.

In the Safety Evaluation (SE) for Amendment 100, the NRC noted that the negative reactivity added by CEAs falling in a reasonable distribution about an average position is essentially the same as the reactivity added by all CEAs falling at the same average position. The NRC also noted that this should hold true for any reasonable family of CEA distributions similar to those measured at ANO-2. However, if the distance between the fastest and slowest CEAs becomes too large or the distribution of CEAs deviates significantly from that modeled by CE in the study, then the average CEA position may not be representative of the time dependent reactivity insertion. Therefore, a limit was placed on the CEA drop time distribution. This is expressed as a maximum drop time limit on the slowest CEA. This is to ensure that the safety analyses remain valid for the average CEA drop time.

In the Safety Evaluation Report for Amendment 100, the NRC listed two conditions to their approval. These conditions were:

1. Any fuel management change that significantly affects the core wide axial or radial power profiles, such as axial blankets or ultra-low leakage fuel management, may necessitate reverification of the average CEA drop time analysis.

2. Changes that would significantly affect the CEA drop time distribution, such as changes to the CEDM circuits, large increases in the core flow pressure drop, changes in the total drop weight of the CEAs or changes in the location of the CEAs, may also require reverification of the average CEA drop time concept.

The NRC noted in their final SE for WCAP-16500-P (Reference 3) that the ability to insert control rods within the time requirements assumed within the safety analysis is crucial. While the NGF design maintains the same interface configuration with the CEAs as the standard 16 x 16 CE assembly design, the NGF's design increased pressure drop has the potential to lengthen the time for the CEAs to insert.

The location and weight of the CEAs and their associated extension shafts are not changing due to the implementation of NGF for Cycle 20. There are no changes to the CEDM circuits planned for the next refueling outage. In addition there are no fuel management changes that will significantly affect the power profiles being made for Cycle 20.

4.0 TECHNICAL ANALYSIS

Approximately half of the ANO-2 Cycle 20 reload core will be NGF and Cycle 21 will be essentially a full core of NGF. The impact on the CEA drop time due to a full core of NGF has been evaluated since it is the limiting case. This evaluation accounted for uncertainties on the increase in core pressure drop and the weight of the CEAs. The evaluation showed a maximum increase of approximately 0.2 seconds for an individual CEA with the shortest extension shaft due to the implementation of NGF.

An evaluation was performed to assess the time limit for the average of the drop times. The difference in the calculated insertion time to 90% inserted for a standard 16 x 16 CE fuel core and a NGF core was added to the worst average CEA drop time measured at ANO-2 over the last four cycles of standard 16 x 16 CE fuel and compared to the limit of 3.2 seconds. The results show there is sufficient margin to this limit with a full core of NGF. Top and bottom peaked power shapes were evaluated as well. It was determined that the fission power versus time of CEA insertions assuming a distribution of CEA drop times is the same or produced less fission power than CEA insertions assuming all CEAs dropping at the average of the distribution.

The distribution of CEA drop times is predominately a result of the different extension shaft weights and as such will continue to have the same general type of variations from location to location. Therefore, the general shape of the distribution of drop times should not change as a result of the introduction of NGF fuel. To quantify the magnitude of any change in the drop time distribution, the range in predicted drop times in standard and NGF cores was compared to the average drop times. The range in standard drop times represents 7.9% of the standard average drop time. The range in NGF drop times represents 8.6% of the NGF average drop time. Since the general shape of the drop time distribution is expected to be the same and the differences in the range as a percentage of the average are minimal between the standard 16 x 16 CE fuel and NGF cores, it is concluded that the implementation of NGF will not have a significant effect on the CEA drop time distribution.

Based on the above information, the only change due to NGF is to the amount of time required for the slowest CEA to drop into the core on a reactor trip. Since the average time is not changing, the safety analyses do not require a revision.

While the slowest individual CEA is expected to fall up to 0.2 seconds slower and the distance between the fastest and slowest CEAs is increasing, the average CEA drop time concept has been reverified for a NGF core as required by an NRC condition listed in their SE for Amendment 100.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. Negative reactivity insertion rates relate to requirements of 10 CFR 50.36, Appendix A, General Design Criterion (GDC) 10, *Reactor Design*, GDC 26, *Reactivity Limits*, and 10 CFR 50.46, *Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors*. Entergy has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the TS, and do not affect conformance with any GDC differently than described in the Safety Analysis Report (SAR). The proposed change is similar to that approved in ANO-2 TS Amendment 100, dated October 12, 1989.

5.2 No Significant Hazards Consideration

The proposed change will modify Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification (TS) 3.1.3.4 related to the drop time limit for an individual Control Element Assembly (CEA). The change in individual CEA drop time is required due to application of New Generation Fuel (NGF), as described in Entergy Operations, Inc. (Entergy) letter to NRC dated July 31, 2007, *License Amendment Request to Revise Technical Specification 6.6.5, Core Operating Limits Report* (2CAN070701).

Entergy has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change to the CEA drop time requirements have been evaluated for impact on the ANO-2 accident analyses. The change involves only an acceptance criterion for equipment performance and not physical changes. The CEA drop time acceptance criteria are used to develop trip reactivity insertion rates which are in turn used as inputs to the accident analyses.

   Previous analyses demonstrated that the calculated trip reactivity for a realistic distributed CEA drop pattern is the same as the trip reactivity calculated for the non-distributed pattern. The current evaluations reverified this approach. The only difference is the maximum time limit for an individual CEA. Since the trip reactivity assumed in the accident analyses is not adversely impacted by consideration of a distributed CEA drop pattern with a larger distribution around the same average position, the proposed limits will not increase the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change does not involve any new or modified structures, systems, or components; rather, it affects only an acceptance criterion for confirming the required performance of the existing CEA hardware. Therefore, the proposed change would not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The margins of safety related to CEA insertion are defined by the analyzed events in the Safety Analysis Report which credit the insertion. As demonstrated above, the proposed limits on the CEA drop time have no adverse impact on the accident analyses. Therefore, the margins of safety reflected in the accident analysis conclusions are not reduced.

Based on the above, Entergy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.3 Environmental Considerations

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Entergy letter to NRC dated July 31, 2007, "License Amendment Request to Revise Technical Specification 6.6.5, Core Operating Limits Report" (2CAN070701)

2. Westinghouse Topical Report WCP-16500-P, "CE 16 x 16 Next Generation Fuel Core Reference Report," Revision 0

3. NRC Letter to Westinghouse dated July 30, 2007, "Final Safety Evaluation for Westinghouse Electric Company (Westinghouse) Topical Report (TR) WCAP-16500-P, Revision 0, "CE [Combustion Engineering] 16 x 16 Next Generation Fuel [(NGF)] Core Reference Report"

Attachment 2

2CAN080701

Proposed Technical Specification Changes (mark-up)

CEA DROP TIME

LIMITING CONDITION FOR OPERATION

3.1.3.4 The individual CEA drop time, from a fully withdrawn position, shall be ≤ ~~3.5~~3.7 seconds and the arithmetic average of the CEA drop times of all CEAs, from a fully withdrawn position, shall be ≤ 3.2 seconds from when the electrical power is interrupted to the CEA drive mechanisms until the CEAs reach their 90 percent insertion positions with:

a. $T_{avg} \geq 525°F$, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With the CEA drop times determined to exceed either of the above limits, restore the CEA drop times to within the above limits prior to proceeding to MODE 1 or 2.

b. With the CEA drop times within limits but determined at less than full reactor coolant flow, operation may proceed provided THERMAL POWER is restricted to less than or equal to the maximum THERMAL POWER level allowable for the reactor coolant pump combination operating at the time of CEA drop time determination.

SURVEILLANCE REQUIREMENTS

4.1.3.4 The CEA drop time of all CEAs shall be demonstrated through measurement prior to reactor criticality:

a. For all CEAs following each removal of the reactor vessel head,

b. For specifically affected individuals CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs, and

c. At least once per 18 months.