Entergy

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72801
Tel 501-858-4888

Craig Anderson
Vice President
Operations ANO

2CAN100104

October 2, 2001

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station OP1-17
Washington, DC 20555

Subject: Arkansas Nuclear One – Unit 2
Docket No. 50-368
License No. NPF-6
Request to Relocate Technical Specification 3.9.3.b Associated with the 175 Hour Delay Requirement Prior to Moving a Full Core Offload

Gentlemen:

Attached for your review and approval please find the proposed change to relocate the Arkansas Nuclear One-Unit 2 (ANO-2) Technical Specification (TS) Limiting Condition for Operation (LCO) 3.9.3.b, TS 3.9.3.b Action Statement, Surveillance Requirements (SR) 4.9.3.b, and the associated bases to the Technical Requirements Manual (TRM). The LCO, Action Statement, and SR require that the reactor be subcritical for at least 175 hours prior to movement of the 71st fuel assembly from the reactor to the spent fuel pool (SFP). The basis for the specification is to ensure the cooling capacity of the SFP is not exceeded. The temperature of the SFP, which is cooled by the recirculation of its water via one or two pumps through a heat exchanger cooled by service water, varies throughout the year. The relocation of the TS will allow Entergy to assess cooling based on service water temperature and adjust the time at which core off load can be accomplished. The proposed change is consistent with NUREG-1432, Revision 2, *Standard Technical Specifications Combustion Engineering Plants*.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

Entergy Operations requests NRC approval of the proposed change by April 2, 2002 with an effective date for this TS change to be within 30 days of approval. Approval of the proposed change will allow flexibility in scheduling the upcoming and future refueling outages. Although this request is neither exigent nor emergency, your prompt review is requested. There are no new commitments proposed in this letter.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 2, 2001.

Very truly yours,

CGA/dm
Attachments

cc: Mr. Ellis W. Merschoff
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P. O. Box 310
London, AR 72847

Mr. Thomas W. Alexion
NRR Project Manager Region IV/ANO-2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 04-D-03
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. David D. Snellings
Director Division of Radiation
Control and Emergency Management
Arkansas Department of Health
4815 West Markham Street
Little Rock, AR 72205

ATTACHMENT 1

TO

2CAN100104

PROPOSED TECHNICAL SPECIFICATION

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

DESCRIPTION OF PROPOSED CHANGES

Arkansas Nuclear One, Unit 2 (ANO-2) proposes to relocate Technical Specification (TS) Limiting Condition for Operation (LCO) 3.9.3.b, the associated Action Statement, Surveillance Requirement (SR) 4.9.3.b, and the bases for TS 3.9.3.b to the ANO-2 Technical Requirements Manual (TRM). The proposed change is desired to provide flexibility in outage planning by allowing consideration of cycle specific analysis of the actual heat load which will be transferred to the spent fuel pool (SFP) and the actual SFP cooling capability which is dependent on service water temperature. This will also eliminate unnecessary burden on Entergy Operations, Inc, and the NRC associated with future revisions to the decay time and spent fuel storage specification by establishing consistency with the requirements of 10 CFR 50.36 (c) (2) (ii). Additionally, *Standard Technical Specifications Combustion Engineering Plants* (NUREG-1432, Revision 2) does not contain this specification and therefore, this change is consistent with NUREG-1432.

BACKGROUND

Technical Specification

The purpose of TS 3.9.3.b is to allow decay time between placing the reactor in a subcritical condition and moving the 71st fuel assembly to the spent fuel pool (SFP). The time specified ensures sufficient time has elapsed such that the heat generated will not exceed the cooling capacity of the SFP.

Previous Changes to the Decay Time and Spent Fuel Storage in Amendment 43

The NRC approved Amendment 43 to the ANO-2 TS on April 15, 1983. TS 3.9.3.b was added at this time (i.e., this specification was not part of the original ANO-2 TS). The amendment was added as part of the effort to expand the spent fuel storage capability for ANO-2 from 485 spaces to 988 spaces. SFP cooling, which is designed to remove the decay heat generated by the stored spent fuel assemblies, was evaluated as part of this change. The SFP cooling system consists of two pumps and a single heat exchanger, which is cooled by service water. The 175-hour delay time was based on a service water temperature of 85°F which is the highest service water temperature that is anticipated during the cooler months of the year when refueling is typically scheduled.

System Description - Spent Fuel Pool Heat Removal

One of the design functions of the SFP cooling system is to maintain the pool temperature less than or equal to approximately 150°F assuming the maximum theoretical heat load associated with a full core discharge and a service water system inlet temperature of less than or equal to 85°F. Refueling operations are administratively

controlled in order to minimize the potential of exceeding a pool temperature of 150°F during a full core discharge. The fuel pool cooling system is described in the ANO-2 Safety Analysis Report (SAR) section 9.1.3.

SFP water level is maintained in accordance with TS 3.9.10. Makeup to the SFP to ensure this level can be maintained is provided via the Chemical and Volume Control System, the refueling water tank, the Boron Management System, or if required, the Service Water System. A control room alarm is provided to warn the control room operator that level is approaching the TS limit. Operator actions are required to restore pool level using the appropriate makeup system.

A thermal-hydraulic analysis has been performed to verify that natural circulation of the pool water provides adequate cooling of all fuel assemblies in the event of a failure of the SFP cooling system. Under postulated accident conditions, when no pool cooling systems are operational, the maximum temperature at the inlet to the cells is assumed to be equal to the saturation temperature at atmospheric pressure or 212°F (allowed to boil).

Chapter 15 Accident Analysis Review

The only Chapter 15 accident affected by the proposed change is the fuel handling accident. It assumes a dropped fuel assembly and considers the consequences of a radioactive release. TS 3.9.3.a restricts fuel handling operations until 100 hours after shutdown. This allows time for radioactive decay and ensures that if an accident were to occur any offsite release will remain well below the 10 CFR 100 limits. No change is proposed to this specification. The fuel handling accident is described in the ANO-2 SAR section 15.1.23.

BASIS FOR PROPOSED CHANGE

The proposed change will relocate TS LCO 3.9.3.b, the associated action, surveillance requirement, and the bases to the TRM.

The proposed change is consistent with NUREG-1432, Revision 2. 10 CFR 50.36, *Technical Specifications,* includes four criteria that require establishment of a Limiting Condition for Operation. The following provides comparison of these four criteria with the basis for the decay time and spent fuel storage specification.

Criterion 1 – Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

> Movement of fuel into the spent fuel pool does not involve a reactor coolant pressure boundary or control room instrumentation that is used to detect a significant degradation of the reactor coolant pressure boundary.

Criterion 2 - A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Movement of fuel into the SFP is considered a potential accident initiator. TS 3.9.3.a restricts movement of fuel until 100 hours of decay time has elapsed. The 100-hour decay time is consistent with the assumptions in the accident analysis for a spent fuel handling accident. The analysis does not assume any further delay in fuel movement following the initial 100-hour decay period.

Criterion 3 – A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

The purpose of TS 3.9.3.b is to allow decay time between placing the reactor in a subcritical condition and moving the 71st fuel assembly to the spent fuel pool (SFP). The time specified only ensures sufficient time has elapsed such that the heat generated will not exceed the cooling capacity of the SFP. The transfer of fuel to the SFP does not provide a primary success path in accident mitigation.

Criterion 4 – A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

TS 3.9.3.a continues to restrict fuel movement until 100 hours of decay time have elapsed from time of shutdown. This ensures if a fuel handling accident were to occur the resulting radiological doses would remain well within the limits of 10CFR100. Public health and safety is not affected by the timing of fuel movement after the 100-hour decay time has elapsed. The timing of the heat load associated with a full core offload, as reflected in TS 3.9.3.b, has not been shown to be significant to public health and safety. Therefore, TS 3.9.3.b is not required to meet this criterion.

The proposed change allows the relocation of this specification and associated surveillance requirement to the TRM. Future changes to these requirements will be controlled under the ANO-2 50.59 program. System design and function of the associated components will continue to be maintained.

Once approved, it is Entergy's intent to evaluate the time limit based on actual service water temperature and the decay heat generated from the fuel using the ANO 10 CFR 50.59 process. The cooling capability of the SFP is dependent on service water temperature, which varies throughout the year. Higher decay heat loads can be moved into the SFP when the service water temperatures are lower. Therefore, when it is desired to transfer more than 70 fuel assemblies to the SFP, an analysis of the ANO-2 fuel's decay heat will be performed. Additionally, the cooling capability of the SFP will be assessed to ascertain the appropriate time allowance for a complete core offload to

assure the SFP temperature is maintained less than 150°F. The thermal hydraulic capability of the fuel storage racks will also be evaluated. Assuming the possibility of a loss of cooling, the makeup capacity will also be assessed. Relocating this LCO, Action, SR, and bases to the TRM will allow this assessment to be performed each cycle without placing undue administrative burden on the NRC or the licensee.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Entergy Operations, Inc. is proposing that the Arkansas Nuclear One, Unit 2 (ANO-2) Operating License be amended to relocate Technical Specification (TS) 3.9.3.b, the associated action, Surveillance Requirement (SR) 4.9.3.b, and the bases to the Technical Requirements Manual (TRM). The change is consistent with NUREG 1432, Revision 2, *Standard Technical Specifications Combustion Engineering Plants.*

TS 3.9.3.b restricts the movement of the 71st fuel assembly into the spent fuel pool (SFP) until 175 hours have elapsed from the time of shutdown. This restriction is associated with SFP cooling capability and considers the decay heat generated by a full core offload. SFP cooling is provided through two pumps and a single heat exchanger, which is cooled by service water. The time restriction was conservatively based on the highest service water temperature, which is anticipated during the cooler months when fuel movement is typically performed. The relocation of the TS will allow Entergy to adjust the time restriction based on the actual service water temperature, which varies throughout the year, and actual heat load associated with a complete core offload.

An evaluation of the proposed change has been performed in accordance with 10 CFR50.91 (a)(1) regarding no significant hazards considerations using the standards in 10 CFR 50.92(c). A discussion of these standards as they relate to this amendment request follows:

1. **Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The accident of concern related to the proposed change is the fuel handling accident. This accident assumes a dropped fuel assembly. One of the assumptions made in the analysis is that fuel movement is delayed at least 100 hours after shutdown to allow for radioactive decay of the fission product inventory. TS 3.9.3.a provides this restriction. The analysis does not assume any further delay in fuel movement following the initial 100-hour decay period. The relocation of TS 3.9.3.b will not impact this assumption.

   Therefore, this change does <u>not</u> involve a significant increase in the probability or consequences of any accident previously evaluated.

2. **Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change relocates TS 3.9.3.b to the TRM. There are no changes to the design or operation of the facility proposed. Thus, there are no new or different kinds of accidents created. SFP cooling capability and the heat load generated by the movement of fuel into the SFP will continue to be evaluated under 10 CFR 50.59. The SFP cooling system includes two cooling pumps and one heat exchanger. In addition, several systems are available for makeup when needed. Under postulated accident conditions, when no pool cooling systems are operational, the maximum temperature at the inlet to the cells is assumed to be equal to the saturation temperature at atmospheric pressure or 212F (allowed to boil). The proposed change does not increase the possibility of a complete loss of pool cooling.

   Therefore, this change does <u>not</u> create the possibility of a new or different kind of accident from any previously evaluated.

3. **Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?**

   The proposed change relocates TS 3.9.3.b to the TRM. Following relocation, any future changes to TRM 3.9.3.b will be assessed under the guidance of 10 CFR 50.59. The ANO 50.59 process will provide an evaluation to ensure heat loads transferred will be within the cooling capacity of the service water system. Analyses will continue to demonstrate that even in the event of a loss of SFP cooling, the maximum temperature in the pool is such that design limits associated with assuring the integrity of the fuel cladding are satisfied.

   Therefore, this change does <u>not</u> involve a significant reduction in the margin of safety.

Therefore, based on the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does not involve a significant hazards consideration.

<u>ENVIRONMENTAL IMPACT EVALUATION</u>

An evaluation of the proposed amendment has been performed pursuant to 10CFR51.22(b), which determined that the criteria for categorical exclusion set forth in 10CFR 51.22 (c) (9) of the regulations are met. The basis for this determination is as follows:

1. The proposed license amendment does not involve a significant hazards consideration as described previously in the evaluation.

2. This change does not result in a significant change or significant increase in the radiological doses for any Design Basis Accident. The proposed license amendment does not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released off-site.

3. The proposed license amendment does not result in a significant increase to the individual or cumulative occupational radiation exposure. No changes are proposed to the SFP level, which ensures sufficient water depth is available to remove 99% of the assumed 12% iodine gap activity released from the rupture of an irradiated fuel assembly.

ATTACHMENT 2

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS

DECAY TIME AND SPENT FUEL STORAGE

LIMITING CONDITION FOR OPERATION

3.9.3.a The reactor shall be subcritical for at least 100 hours.

~~3.9.3.b In the event of a complete core offload, a full core to be discharged shall be subcritical a minimum of 175 hours prior to discharge of more than 70 assemblies to the spent fuel pool.~~

APPLICABILITY: During movement of irradiated fuel in the reactor pressure vessel.

ACTION:

With the reactor subcritical for less than 100 hours, suspend all operations involving movement of irradiated fuel in the reactor pressure vessel. ~~With the reactor subcritical for less than 175 hours, suspend all operations involving movement of more than 70 fuel assemblies from the reactor pressure vessel to the spent fuel pool.~~ The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.3.a The reactor shall be determined to have been subcritical for at least 100 hours by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor pressure vessel.

~~4.9.3.b The reactor shall be determined to have been subcritical for at least 175 hours by verification of the date and time of subcriticality prior to movement of the 71st irradiated fuel assembly from the reactor pressure vessel to the spent fuel pool.~~

ATTACHMENT 3

MARKUP OF TECHNICAL SPECIFICATION BASES

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: 1) the reactor will remain subcritical during CORE ALTERATIONS, and 2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the accident analyses.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the source range neutron flux monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor pressure vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

~~The minimum requirement for reactor subcriticality prior to movement of more than 70 irradiated fuel assemblies to the spent fuel pool ensures that sufficient time has elapsed to allow radioactive decay of the short-lived fission products such that the heat generated will not exceed the cooling capacity of the spent fuel pool cooling system. This decay time and total assembly limitation is conservatively within the assumptions used in the accident analyses.~~

3/4.9.4 CONTAINMENT PENETRATIONS

The requirements on containment penetration closure ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

Containment penetrations, the personnel airlock doors, and/or the equipment door may be open during movement of irradiated fuel in the containment and during CORE ALTERATIONS provided a minimum of one closure method (manual or automatic valve, blind flange, or equivalent) in each penetration, one door in each airlock, and the equipment door are capable of being closed in the event of a fuel handling accident. This allowance assumes that 23 feet of water is maintained above the fuel seated within the reactor vessel to ensure any offsite dose consequence remains within 10 CFR 100 limits in the event of a fuel handling accident. Equivalent isolation methods must be approved and may include use of a material that can provide a temporary atmospheric pressure ventilation barrier. For closure, the equipment door will be held in place by a minimum of four bolts.