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Timothy G. Mitchell
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1CAN070801

July 30, 2008

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

SUBJECT: License Amendment Request
Technical Specification Change Request Associated with
Sodium Hydroxide Tank Concentration
Arkansas Nuclear One – Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations, Inc. (Entergy) hereby requests an amendment for Arkansas Nuclear One, Unit 1 (ANO-1) to modify the technical specifications (TS) to limits on the sodium hydroxide (NaOH) tank solution concentration. Specifically, this change revises TS 3.6.6.3 NaOH tank concentration from between 5.0% and 16.5% to between 6.0% and 8.5%.

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 the change involves no significant hazards consideration. The bases for these determinations are included in the attached submittal. The proposed change does not include any new commitments.

Although this request is neither exigent nor emergency, your prompt review is requested. If you have any questions or require additional information, please contact Dale James at 479-858-4619.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 30, 2008.

Sincerely,

Original signed by B. Berryman for T. G. Mitchell

TGM/nbm

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

cc: Mr. Elmo E. Collins
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Attachment 1

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Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating License No. DPR-51 for Arkansas Nuclear One, Unit 1 (ANO-1) by revising Technical Specification (TS) 3.6.6.3, "Spray Additive System Surveillance Requirements." TS 3.6.6.3 currently requires the sodium hydroxide (NaOH) tank solution concentration to be between 5.0% and 16.5%. Entergy proposes to change the concentration to be between 6.0% and 8.5%.

The purpose of this change is to incorporate the control of chemical effects on the reactor building sump strainer into the ANO-1 TSs. Reducing the NaOH concentration reduces the amount of chemical precipitates that form post-loss-of-coolant accident (LOCA) and their associated impact on sump strainer during the recirculation phase. The NaOH concentration reduction supports a lower maximum pH of the sump/spray water following a LOCA. The lower pH results in reduced aluminum corrosion which reduces the amount of chemical precipitates following a LOCA. This change to the NaOH tank solution concentration limits is within the current technical specification limits, thus imposing more restrictive requirements.

2.0 PROPOSED CHANGE

The proposed amendment changes the TS 3.6.6.3 NaOH tank solution concentration from between 5.0% and 16.5% to between 6.0% and 8.5%. A marked-up copy of the TS page is included in Attachment 2 of this letter. TS surveillance requirement (SR) 3.6.6.3 is changed as follows:

3.6.6.3 Verify sodium hydroxide tank solution concentration is > 6.0 wt% and < 8.5 wt% NaOH.

The frequency of the SR remains unchanged. The TS Bases will be revised accordingly upon implementation of this change in accordance with the TS Bases Control Program (TS 5.5.14). In addition, the two pages associated with TS 3.6.6.3 are reformatted into a single page. No revision bars are included for the reformatting since no technical change has been made. The reformatting is administrative in nature and is not discussed further in this submittal.

3.0 BACKGROUND

Under LOCA conditions, buffering agents are added to the emergency core cooling system (ECCS) to increase the coolant pH to greater than 7.0. The primary intent of the buffering agent addition is to reduce release of iodine fission products from the coolant to the reactor building atmosphere. Thus, pH control per ANO-1's original licensing basis was primarily an offsite dose control measure.

Sodium hydroxide is the post-LOCA buffering agent for ANO-1. Under LOCA conditions, corrosion of exposed aluminum surfaces occurs at elevated pH. Based on research that has been performed associated with the resolution of Generic Letter 2004-02, *Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (PWRs),*" aluminum released into the post-LOCA coolant results in the formation of aluminum precipitates, particularly when the sump water cools. These aluminum precipitates combine with other post-LOCA debris which accumulates on the reactor building sump strainer and cause increased strainer head loss. In order to reduce the

amount of precipitates formed and their associated detrimental impact on the sump strainer, more restrictive limits on the NaOH tank solution concentration are being applied.

The NaOH buffering agent is stored in a tank and injected with the reactor building spray water. The ANO-1 Safety Analysis Report (SAR) Section 6.2.1 states that the NaOH in the spray assists in removing the fission product iodine inventory from the reactor building atmosphere. SAR Section 6.2.2.1 also states that a tank containing NaOH is supplied for iodine removal and for pH adjustment of the borated water, and that the NaOH raises the pH of the borated water into the alkaline range. A pH greater than 7.0 assures that the iodine washed out of the reactor building atmosphere by the spraying action does not re-evolve from the liquid.

4.0 TECHNICAL ANALYSIS

The proposed change to TS 3.6.6.3 revises the NaOH tank solution concentration limits. The current limits are between 5.0% and 16.5%. These limits are being revised to be between 6.0% and 8.5%. This change is within the current TS limits, and therefore, imposes more restrictive limits.

NaOH Tank Solution Concentration Upper Limit:

The guidelines provided in WCAP-16530-NP "Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support Generic Safety Issue (GSI)-191," includes the effect of pH change on precipitate mass, with a significant increase in total precipitate mass occurring as pH exceeds 9.0. A NaOH tank concentration upper limit of 8.5% will ensure a pH upper limit below 9.0. Chemical effects analysis for ANO-1 to support resolution of GSI-191 has credited the reduction in sump pH to a maximum of 9.0. This upper limit on sump pH was analyzed with a bounding condition of minimal acids available to assure this limitation could not be exceeded.

NaOH Tank Solution Concentration Lower Limit:

The two sources of strong acid generation are the chloride-bearing cable jacketing exposed to the reactor building atmosphere and the irradiation of the sump water. In calculating the amount of cable in the reactor building, scheduled cables were included whether in a tray, conduit, embed, or other enclosure. This is considered conservative due to the shielding effect of the enclosures. Also, the weight of chloride-bearing cable jacketing was assumed to be equal to the weight of the non-conducting cable material. This is conservative since it includes the filler material which does not include chlorine. Therefore, the total mass of chlorine-bearing cable jacketing used to calculate the amount of acid formed as a result of containment irradiation is considered conservative.

The minimum sump pH transient was determined using a combination of the maximum volume of the borated water storage tank, core flood tanks, and reactor coolant system water sources with the NaOH tank input volume conservatively minimized. The evaluation was performed for worst-case equilibrium conditions considering strong acid generation thereby bounding a 30-day post-accident reactor building environment.

Accounting for strong acid generation in the minimum sump pH calculation was not considered a part of the original ANO-1 licensing basis. A NaOH tank concentration lower limit of 6.0% ensures a pH of greater than 7.0. A change to the ANO-1 licensing basis will be made to incorporate the basis for the new lower NaOH tank concentration limit to account for strong acid generation. This lower limit on sump pH was analyzed with a bounding condition of maximum acids available to assure this limitation could not be reduced.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The changes to ANO-1 Technical Specification (TS) 3.6.6.3 are consistent with the applicable regulatory guidance contained in NUREG 0800, Section 6.5.2, "Containment Spray as a Fission Product Cleanup System." Subsection II.1.g specifies that the pH of solutions in the containment sump and additives for reactivity control, fission product removal, or other purposes (boric acid) should be maintained at a level high enough to assure that significant long-term iodine re-evolution does not occur. Long-term iodine retention may be assumed only when the equilibrium sump solution pH, after mixing and dilution with primary coolant and emergency core cooling system (ECCS) injection, is above 7.0.

10 CFR 50.49(e)(3) requires the composition of chemicals used to be at least as severe as that resulting from the most limiting mode of plant operation (e.g., containment spray, emergency core cooling, or recirculation from containment sump). 10 CFR 50, Appendix A, General Design Criteria (GDC) 41 requires systems to control fission products which may be released into the reactor containment to reduce the concentration and quality of fission products released to the environment following postulated accidents. Entergy has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the TS, and does not affect conformance with any GDC differently than described in the Safety Analysis Report.

5.2 No Significant Safety Hazards Consideration

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.

   There are no changes to the design or operation of the plant that could affect system, component, or accident functions as a result of changing the sodium hydroxide (NaOH) tank solution concentration limits. In addition, the dose reduction provided by maintaining the sump pH above 7.0 is retained, and therefore, dose consequences resulting from iodine dissolution remain unchanged. The proposed change simply imposes more restrictive operating conditions than are within the current TS limits. Therefore, the proposed change does not involve a significant increase in 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.

   No new accident scenarios, failure mechanisms, or single failures are introduced as a result of the proposed change. Structures, systems, and components previously required for mitigation of an accident remain capable of fulfilling their intended design function with this change to the TS. The proposed change has no new adverse effects on safety-related systems or components and does not challenge the performance or integrity of safety-related systems. The proposed change simply imposes more restrictive operating conditions that are within the current TS limits. Therefore, the proposed change does 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 proposed change imposes more restrictive operating conditions that are within the current TS limits. Revising the NaOH tank solution concentration limits reduces the amount of chemical precipitates formed under post-loss-of-coolant accident conditions. The margin of safety related to ensuring that the sump pH remains above 7.0 is not reduced. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment to change the TS 3.6.6.3 NaOH tank solution concentration from between 5.0% and 16.5% to between 6.0% and 8.5% 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 assessment need be prepared in connection with the proposed amendment.

Attachment 2

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Proposed Technical Specification Changes (mark-up)

3.6 REACTOR BUILDING SYSTEMS

3.6.6 Spray Additive System

LCO 3.6.6 The Spray Additive System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Spray Additive System inoperable.	A.1 Restore Spray Additive System to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.6.1	Verify each Spray Additive System manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position.	31 days
SR 3.6.6.2	Verify sodium hydroxide tank solution volume is $\geq$ 9000 gallons.	184 days
SR 3.6.6.3	Verify sodium hydroxide tank solution concentration is > 6~~5~~.0 wt% and < 8~~16~~.5 wt.% NaOH.	184 days

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SURVEILLANCE		FREQUENCY
SR 3.6.6.4	Verify each Spray Additive System automatic valve in the flow path actuates to the correct position on an actual or simulated actuation signal.	18 months

Attachment 3

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Revised Technical Specification Page

3.6 REACTOR BUILDING SYSTEMS

3.6.6 Spray Additive System

LCO 3.6.6 The Spray Additive System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Spray Additive System inoperable.	A.1 Restore Spray Additive System to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.6.1	Verify each Spray Additive System manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position.	31 days
SR 3.6.6.2	Verify sodium hydroxide tank solution volume is $\geq$ 9000 gallons.	184 days
SR 3.6.6.3	Verify sodium hydroxide tank solution concentration is > 6.0 wt% and < 8.5 wt.% NaOH.	184 days
SR 3.6.6.4	Verify each Spray Additive System automatic valve in the flow path actuates to the correct position on an actual or simulated actuation signal.	18 months