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2CAN030701

March 15, 2007

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

SUBJECT: License Amendment Request
Proposed Technical Change Regarding Containment Spray Nozzle Test Requirements
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Pursuant to 10CFR50.90, Entergy Operations, Inc. (Entergy) hereby requests an amendment to the Arkansas Nuclear One, Unit 2 (ANO-2) Operating License regarding Surveillance Requirement (SR) 4.6.2.1.d for Containment Spray Nozzle Testing. The proposed change will revise the SR to require verification that containment spray nozzles are unobstructed following maintenance that could result in nozzle blockage in lieu of the current SR of performing the test every 5 years. Details of our proposed license amendment are contained in Attachment 1 to this letter. The technical specification (TS) mark-up pages, information only TS Bases pages, and the revised (clean) TS pages are contained in Attachments 2, 3 and 4, respectively.

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.

In support of the spring 2008 refueling outage, Entergy requests approval of the proposed license amendment by March 1, 2008 to be implemented within 60 days of the issuance of the amendment.

If you have any questions or require additional information, please contact Steve Bennett at 479-858-4626.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 15, 2007.

Sincerely,

for Tim Mitchell

TGM/sab

Attachments:
1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)
3. Proposed Technical Specification Bases Changes (mark-up)
4. Retyped Technical Specification Pages Reflecting Proposed Changes

cc: Dr. Bruce S. Mallett
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Attachment 1

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Analysis of Proposed Technical Specification Change

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

Entergy requests an amendment to the Arkansas Nuclear One, Unit 2 (ANO-2) Operating License (NPF-6) by incorporating the attached change into the ANO-2 Technical Specifications (TS). Specifically, the proposed change requests revision to the frequency for ANO-2 TS Surveillance Requirement (SR) 4.6.2.1.d to require verification that spray nozzles are unobstructed following maintenance that could result in nozzle blockage.

2.0 PROPOSED CHANGE

The proposed change revises SR 4.6.2.1.d to require verification that spray nozzles are unobstructed following maintenance that could result in nozzle blockage (loss of foreign material exclusion control) rather than every 5 years. This license amendment request has included proposed changes to the associated Technical Specification Bases for information only. Entergy will update the TS Bases in accordance with the ANO-2 TS Bases Control Program.

3.0 BACKGROUND

The Containment Spray System (CSS) is one of the subsystems of the ANO-2 Containment Heat Removal System (CHRS). The other subsystem of the CHRS is the Containment Cooling System (CCS). The CHRS is designed to rapidly reduce the containment pressure and temperature following a postulated loss of coolant accident (LOCA) or a main steam line break (MSLB) accident. It accomplishes this by removing thermal energy from the containment atmosphere. The CHRS also reduces the consequences of an offsite release of radioactive material by keeping the differential pressure across the containment building low enough to ensure containment integrity.

The CSS is designed to spray borated water into the containment building which suppresses any resultant increase in containment pressure and temperature. The water spray reduces fission products (mostly iodine) in the post LOCA containment atmosphere. Borated water spray is mixed with trisodium phosphate (TSP) prior to recirculation of the sump fluid to control sump fluid pH. Controlling the pH of the recirculated spray reduces the magnitude of offsite and control room personnel exposure should a release occur.

The Containment Spray system is comprised of two redundant trains with each train consisting of:

- A refueling water tank (RWT) outlet valve (MOV)
- A containment Spray pump
- A containment Spray pump recirculation isolation valve
- A shutdown cooling heat exchanger
- A containment Spray isolation valve
- A containment Spray header having 131 nozzles per header, and
- Two Containment sump isolation valves

The two containment spray pumps are vertical centrifugal pumps driven by direct coupled induction motors. Each pump is rated for 2,200 gpm flow at a head of 525 feet. Each pump will provide the flow necessary to remove in excess of 120 million Btu/hr from the containment following a LOCA.

The CSS in conjunction with the CCS provides sufficient redundancy so that any of the following combinations will provide adequate heat removal to attenuate the post accident pressure and temperature conditions imposed upon the containment following a LOCA or MSLB:

- all four containment cooling units; or
- both loops of the CSS; or
- two of the four containment cooling units and one CSS loop

Since the Containment Cooling System does not provide iodine removal from the containment atmosphere, at least one CSS loop must operate following a LOCA. The heat removal capacity of the flow from the two containment spray pumps is adequate to keep the containment pressure and temperature below design conditions for any size break in the RCS piping. Details of the Containment Spray System are contained in Section 6.2.2 of the ANO-2 Safety Analysis Report.

Spray Nozzles

The ANO-2 containment spray nozzles are Sprayco model 1713A which have a swirl chamber (ramp bottom) design. Each CSS header contains 131 hollow cone nozzles, where each nozzle is capable of a design flow of 15.2 gpm during recirculation phase (approximately 2000 gpm per train) with a 40 psi differential pressure. These nozzles have a 3/8-inch spray orifice that will not be susceptible to clogging by particles less than 1/4-inch in size. The nozzles produce a mass equivalent drop size of approximately 880 microns at rated system conditions. During the injection mode, the flow rate is reduced to 14.3 gpm per nozzle (1875 gpm per train) which produces a slightly larger mass equivalent drop size of 925 microns. The spray solution is completely stable and soluble at all temperatures of interest in the containment and therefore will not precipitate or otherwise interfere with nozzle performance. Each nozzle header is independently oriented to ensure full coverage of the containment volume outside the reactor cavity.

Nozzle Testing

The CSS nozzles are currently air flow tested at five-year intervals in accordance with the SR 4.6.2.1.d. The results of these tests, which have been performed several times since construction, have confirmed that the nozzles are free of obstructions that could have occurred following startup, operation and maintenance of the system. However, an acceptable method for prevention of obstructions due to foreign material is by assuring positive foreign materials exclusion controls.

4.0 TECHNICAL ANALYSIS

Corrosion Products

The ANO-2 spray ring headers are maintained dry even though the spray pipe headers are maintained to a minimum elevation of 505 feet. The containment spray system header and nozzles are passive devices that are not normally exposed to fluids or debris. The system piping and nozzles are fabricated of Schedule 10, 304 stainless steel, which is highly resistant to corrosion products. Therefore, formation of any significant corrosion products is unlikely due to the resistance of the metal to rust or flaking.

Foreign Material Exclusion

At Entergy, the Foreign Material Exclusion (FME) Program is implemented by procedure EN-MA-118, *Foreign Material Exclusion*. This procedure describes the measures to be taken to ensure foreign material is not introduced into a component or system and measures to be taken if material or tool accountability is lost. This procedure applies to all station activities having the potential to introduce foreign material into systems or components which could impact plant safety. The requirements of the procedure apply when maintenance, modifications, repairs, inspections and operating activities are being conducted on open piping and equipment. The procedure establishes various levels for preventing the generation of debris when breaching a system and the removal of debris from the system if materials have entered a system. Pre-job briefs for FME are conducted prior to opening systems where foreign materials can be introduced. The procedure also requires personnel who are working on open components/systems receive FME training as part of their job qualifications.

The procedure requires that when closing a system or component, an inspection be performed to ensure that all foreign material is removed. If foreign material exclusion is not maintained, the condition is entered in the Entergy Corrective Action Program, requiring assessment of the circumstances and implementation of appropriate corrective actions. This will ensure the containment spray nozzles remain operable after maintenance.

Fluid system/component breaches are to be covered when access for maintenance or inspection is not required. Due to their locations in the containment, introduction of foreign material into the spray headers is highly unlikely. Foreign material introduced as a result of maintenance is the most likely cause for obstruction; therefore, verification during and following such maintenance would suffice to assure no material is introduced that could cause nozzle blockage. Consequently, the potential for an unidentified nozzle obstruction is very low. Routine maintenance activities with effective application of foreign material exclusion controls should not require subsequent inspection or testing of the spray nozzles.

Normal Maintenance

A review of the maintenance and modification history indicates that several work orders have been performed on the Containment Spray System since the last air flow test in 2002, which involved minor activities such as opening systems to perform IST exams and for seal replacements. Repairs of the CSS piping has been performed under strict FME controls. There has been no maintenance or modification to the system that would have potentially impacted blockage of the nozzles. Cleanliness control and foreign material exclusion practices, including post-work inspections, have ensured that system cleanliness requirements are met.

Risk Assessment

Accident analyses are based on one of the two Containment Spray trains operating. One operable containment spray train assures that the pressure across the upper spray ring nozzles is adequate to provide the design flow rate. The calculated spray coverage inside the containment assures that after a design-basis accident, the offsite dose is within Part 100 limits and the 30-day control room dose is within GDC 19 guidelines. The ANO-2 Probabilistic Safety Assessment does not address the reduction of containment spray capability as a result of partial nozzle blockage or reduced spray flow. However, a plugged nozzle would have negligible impact on the capability of the Containment Spray System to respond to a LOCA or MSLB.

Summary

Due to the passive design of the containment spray nozzles, confirmation of operability following maintenance activities that can result in obstruction of spray nozzle flow is considered adequate to detect obstruction of the nozzles. Confirmation that the spray nozzles are unobstructed may be obtained by such means as foreign materials exclusion (FME) controls during maintenance, a visual inspection of the affected portions of the system, by an air or smoke flow test following maintenance involving opening portions of the system downstream of the containment isolation valves, or by draining/flushing the filled portions of the system inside containment, as appropriate. Reduced spray nozzle testing is justified where operating experience has shown that routinely passing a surveillance test performed at a specified interval has no apparent connection to overall component reliability. In this case, routine surveillance testing at the specified frequency is not connected to any activity that may initiate reduced component reliability, and therefore is of limited value in ensuring component reliability. The currently required 5 year nozzle surveillance impacts refueling activities with little to no commensurate safety benefit unless there has been an activity that could result in nozzle blockage due to foreign material.

5.0 REGULATORY SAFETY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

Compliance with ANO-2 Safety Analysis Report - No changes to the ANO-2 Safety Analysis Report are required as a result of this license amendment request.

Compliance with 10CFR50, Appendix A, General Design Criteria –

Criterion 39, *Inspection of Containment Heat Removal Systems*, requires that the containment heat removal system be designed to permit appropriate periodic inspection of important components, such as the torus, sumps, spray nozzles, and piping to assure the integrity and capability of the system.

Evaluation - Provisions have been made to facilitate periodic inspections of active components and other important equipment in the CHRS.

Criterion 40, *Testing of Containment Heat Removal Systems*, requires that the containment heat removal system be designed to permit appropriate periodic pressure and functional testing to assure (1) The structural and leaktight integrity of its components, (2) The operability and

performance of the active components of the system, and (3) The operability of the system as a whole, and under conditions as close to the design as practical performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of the associated cooling water system.

Evaluation - The CHRS is provided with sufficient test connections and isolation valves to permit periodic pressure testing. System piping, valves, pumps, heat exchangers, and other components of the CHRS are arranged so that each component can be tested periodically for operability, including transfer to the standby power system. The delivery capability of the CSS has been tested to the extent practicable and Section XI testing is periodically performed to verify pump capacity. The delivery capability of the spray nozzles has been tested periodically by blowing low-pressure air/smoke through the nozzles and verifying the flow.

5.2 No Significant Hazards Consideration

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

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

   Response: No

   The Containment Spray System (CSS) is not an initiator of any analyzed event. The proposed change does not have a detrimental impact on the integrity of any plant structure, system, or component that may initiate an analyzed event. The proposed change will not alter the operation or otherwise increase the failure probability of any plant equipment that can initiate an analyzed accident. This change does not affect the plant design. There is no increase in the likelihood of formation of significant corrosion products. Due to their location at the top of the containment, introduction of foreign material into the spray headers is unlikely. Foreign materials exclusion controls during and following maintenance provides assurance that the nozzles remain unobstructed. Consequently, there is no significant increase in the probability of an accident previously evaluated.

   The CSS is designed to address the consequences of a Loss of Coolant Accident (LOCA) or a Main Steam Line Break (MSLB). The Containment Spray System is capable of performing its function effectively with the single failure of any active component in the system, any of its subsystems, or any of its support systems. Therefore, the consequences of an accident previously evaluated are not significantly affected by the proposed change.

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

   Response: No

   The proposed change will not physically alter the plant (no new or different type of equipment will be installed) or change the methods governing normal plant operation.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

Response: No

The system is not susceptible to corrosion-induced obstruction or obstruction from sources external to the system. Strict controls are established to ensure the foreign material is not introduced into the CSS during maintenance or repairs. Maintenance activities that could introduce significant foreign material into the system require subsequent system cleanliness verification which would prevent nozzle blockage. The spray header nozzles are expected to remain unblocked and available in the event that the safety function is required. The capacity of the system would remain unaffected.

Therefore, the proposed change does not involve a reduction in a margin of safety. Based on the above evaluations, Entergy concludes that the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10CFR50.92(c).

5.3 Environmental Consideration

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 PRECEDENCE

Similar NRC license amendment requests were sought by Texas Utilities Power for the Comanche Peak Station on September 9, 2004 and approved by the NRC on October 14, 2005 and by South Texas Project Nuclear Operating Company for the South Texas Project Electric Generating Station on May 14, 2003 and approved by the NRC on August 20, 2003.

Attachment 2

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Proposed Technical Specification Changes

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months, during shutdown, by:

1. Verifying that each automatic valve in the flow path actuates to its correct position on CSAS and RAS test signals.

2. Verifying that upon a RAS test signal, the containment sump isolation valves open and that a recirculation mode flow path via an OPERABLE shutdown cooling heat exchanger is established.

3. Verifying that each spray pump starts automatically on a CSAS test signal.

d. Verify each spray nozzle is unobstructed following maintenance which could result in nozzle blockage~~At least once per 5 years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed~~.

Attachment 3

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Proposed Technical Specification Bases Changes

For Information Only

6. Plans should be established for returning the affected CSS train to functional service and, if possible, OPERABLE status should the need arise.

7. Repair or testing of CSS train components (particularly valves) should be placed in the appropriate position (open/closed) that provides the greater level of safety during repair, where practical.

8. The extended CSS AOT shall NOT be entered if any of the following conditions exist:

   a. Seismic event (earthquake) as indicated by the earthquake trigger or noticeable abnormal vibrations in major structures.

   b. Tornado watch or warning for Pope, Yell, Logan, or Johnson counties is in effect.

   c. Tornado is sighted locally.

   d. Loss of Dardanelle Reservoir is forecast[ed].

   e. Flooding or forecasted flooding of Lake Dardanelle.

9. The ignition source probability shall be maintained as low as possible in the turbine building to maintain the availability of off-site power by posting an hourly roving fire watch in the vicinity of turbine building switchgear (2A1/2A2/2A9). A roving fire watch shall also be established in other significant areas outside containment which include: the operable CSS train, the CCS, HPSI, and EFW trains, and the AFW system.

SR 4.6.2.1.d ensures that each spray nozzle is unobstructed and provides assurance that spray coverage of the containment during an accident is not degraded. Confirmation that the spray nozzles are unobstructed may be obtained by such means as foreign materials exclusion (FME) controls during maintenance, a visual inspection of the affected portions of the system by an air or smoke flow test following maintenance involving opening portions of the system downstream of the containment isolation valves, or by draining/flushing the filled portions of the system inside containment, as appropriate. Maintenance that could result in nozzle blockage is generally a result of a loss of FME control. If loss of FME control occurs, an inspection or flush of the affected portions of the system should be adequate to confirm that the spray nozzles are unobstructed since water flow would be required to transport any debris to the spray nozzles.

Attachment 4

2CAN030701

Retyped Technical Specification Pages Reflecting Proposed Changes

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months, during shutdown, by:

1. Verifying that each automatic valve in the flow path actuates to its correct position on CSAS and RAS test signals.

2. Verifying that upon a RAS test signal, the containment sump isolation valves open and that a recirculation mode flow path via an OPERABLE shutdown cooling heat exchanger is established.

3. Verifying that each spray pump starts automatically on a CSAS test signal.

d. Verify each spray nozzle is unobstructed following maintenance which could result in nozzle blockage.