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CP-200700022
Log # TXX-07149

Ref. # 10CFR50.90

November 29, 2007

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
DOCKET NOS. 50-445 AND 50-446
LICENSE AMENDMENT REQUEST (LAR) 2007-008,
TO TECHNICAL SPECIFICATION 3.6.7, "SPRAY ADDITIVE SYSTEM"

REFERENCE:

1. Letter logged TXX-05162, RESPONSE TO REQUESTED INFORMATION PART 2 OF NRC GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS," dated September 1, 2005, from M. Blevins to the NRC
2. Letter logged TXX-05199, LICENSE AMENDMENT REQUEST (LAR) 05-010 REVISION TO TECHNICAL SPECIFICATION 3.3.2, "ESFAS INSTRUMENTATION," 3.5.2, "ECCS—OPERATING," AND 3.6.7, "SPRAY ADDITIVE SYSTEM," dated December 16, 2005, from M. Blevins to the NRC
3. Letter logged TXX-06144, SUPPLEMENT TO LICENSE AMENDMENT REQUEST (LAR) 05-010 AND RESPONSE TO REQUEST FOR INFORMATION (TAC NOS. MC9494 AND MC9495), dated August 25, 2006, from M. Blevins to the NRC
4. CALLAWAY PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: REPLACING CONTAINMENT SUMP TRASH RACKS AND SCREENS WITH STRAINERS AND RELOCATE THE CONTAINMENT PH CONTROL SYSTEM FROM CURRENT LOCATION (TAC No. MD2363)
5. WCAP-16530-NP, REVISION 0, "EVALUATION OF POST-ACCIDENT CHEMICAL EFFECTS IN CONTAINMENT SUMP FLUIDS TO SUPPORT GSI-191," FEBRUARY 2006.

Dear Sir or Madam:

Pursuant to 10CFR50.90, Luminant Generation Company LLC (Luminant Power) hereby requests an amendment to the Comanche Peak Steam Electric Station (herein referred to as Comanche Peak Nuclear Power Plant (CPNPP)) Unit 1 Operating License (NPF-87) and Unit 2 Operating License (NPF-89) by incorporating the attached change into the Unit 1 and 2 Technical Specifications (TS). This change request applies to both Units.

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NRR

This change was previously submitted under Reference 2 and was, subsequently, withdrawn based on discussions with the Nuclear Regulatory Commission (NRC) staff determining that the licensee retain the existing TS Surveillance Requirements until chemical effects analyses can be completed (Reference 3). Subsequently, in February of 2007, the NRC approved a similar TS change for Callaway (Reference 4).

The proposed change will revise TS 3.6.7, "Spray Additive System," to allow modifications to the facility potentially required to comply with NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accident at Pressurized Water Reactors." This proposed change to TS 3.6.7 supports potential modifications to reduce the impact of chemical effects on emergency sump performance. This change is part of the integral resolution of Generic Safety Issue 191 for CPNPP. This request is being made pursuant to Generic Letter 2004-02 as described in Reference 1.

Attachment 1 provides a detailed description of the proposed changes, a technical analysis of the proposed changes, Luminant Power's determination that the proposed change does not involve a significant hazard consideration, a regulatory analysis of the proposed change and an environmental evaluation. Attachment 2 provides the affected Technical Specification (TS) pages marked-up to reflect the proposed change. Attachment 3 provides proposed changes to the Technical Specification Bases for information only. These changes will be processed per CPNPP site procedures. Attachment 4 provides retyped Technical Specification pages which incorporate the requested changes. Attachment 5 provides retyped Technical Specification Bases pages (for information only) which incorporate the proposed changes. Attachment 6 provides marked-up pages of the Technical Requirements Manual (for information only) to reflect the proposed changes.

Luminant Power has recently received the results of the evaluation of chemical effects on materials which are adverse to emergency sump performance and has determined that the TS 3.6.7 required volumes and concentration are not optimum for ECCS sump performance. The evaluation of chemical effects as described in Reference 5 demonstrate that the quantity of aluminum oxyhydroxide precipitate can be reduced by almost 80% by reducing the concentration of NaOH to assure a minimum pH of 7.1 versus 8.25. Therefore, Luminant Power respectively requests that the proposed change be approved based on the improved safety benefit of reducing the concentration of NaOH. Luminant Power requests approval of the proposed License Amendment by November 15, 2008. Luminant Power further requests that the proposed change to TS 3.6.7 be implemented within 120 days of approval of this License Amendment Request.

In accordance with 10CFR50.91(b), Luminant Power is providing the State of Texas with a copy of this proposed amendment.

This communication contains no new licensing basis commitments regarding CPNPP Units 1 and 2.

Should you have any questions, please contact Mr. J. D. Seawright at (254) 897-0140.

I state under penalty of perjury that the foregoing is true and correct.

Executed on November 29, 2007.

Sincerely,

Luminant Generation Company LLC

Mike Blevins

By: Fred W. Madden
Director, Oversight & Regulatory Affairs

Attachments
1. Description and Assessment
2. Proposed Technical Specifications Changes (Markup)
3. Proposed Technical Specifications Bases Changes (for information)
4. Retyped Technical Specification Pages
5. Retyped Technical Specification Bases Pages (for information)
6. Proposed Technical Requirements Manual Changes (for information)

c -
E. E. Collins, Region IV
B. K. Singal, NRR
Resident Inspectors, Comanche Peak

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ATTACHMENT 1 to TXX-07149

DESCRIPTION AND ASSESSMENT

LICENSEE'S EVALUATION

1.0 DESCRIPTION

By this letter, Luminant Generation Company LLC (Luminant Power) requests an amendment to the Comanche Peak Steam Electric Station, herein referred to as Comanche Peak Nuclear Power Plant (CPNPP), Unit 1 Operating License (NPF-87) and Unit 2 Operating License (NPF-89) by incorporating the attached change into the Unit 1 and 2 Technical Specifications. Proposed change LAR 07-008 is a request to revise Technical Specification (TS) 3.6.7 entitled "Spray Additive System," for CPNPP Units 1 and 2.

This request is being made to further address Generic Letter 2004-02 (Reference 8.3) as described in TXX-05162 dated September 1, 2005 (Reference 8.1).

No changes to the CPNPP Final Safety Analysis Report are anticipated at this time as a direct result of this License Amendment Request.

2.0 PROPOSED CHANGE

The proposed change would revise Technical Specification 3.6.7 to remove the current surveillances for sodium hydroxide (NaOH) and insert a surveillance to ensure equilibrium sump pH is $\geq$ 7.1 using NaOH. Attachment 2 contains markups of the affected Technical Specifications (TS) pages for the above proposed changes. Attachment 3 contains markups of the affected TS Bases pages for information only.

Details for completion of the performance tests for NaOH injection will be included in the Technical Requirements Manual to ensure minimum pH is maintained. Attachment 6 provides a proposed markup of the Technical Requirements Manual (for information only) that will incorporate the changes supporting the proposed TS change.

In summary, the proposed change would relocate the specific NaOH surveillance requirements to required performance tests in the Technical Requirements Manual and provide a TS surveillance requirement specifying NaOH and the minimum pH for operability of the spray additive system.

3.0 BACKGROUND

Generic Safety Issue 191 (GSI-191), "Assessment of Debris Accumulation on PWR Sump Performance," deals with the possibility that debris could accumulate on the Emergency Core Cooling System (ECCS) sump screen resulting in a loss of net positive suction head (NPSH) margin. The loss of NPSH margin to ECCS pumps drawing suction from the sump may impede or prevent the flow of water needed to meet the criteria of Title 10, Section 50.46 of the Code of Federal Regulations (10CFR50.46), "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors." 10CFR50.46 requires that licensees design their ECCS systems to meet five criteria, one of which is to provide the capability for long-term cooling. Following a successful system initiation, the ECCS must be able to provide cooling for a sufficient duration that the core temperature is maintained at an acceptably low value. In addition, the ECCS must be able to continue decay heat removal for the extended period of time required by the long-lived radioactivity remaining in the core.

Bulletin 2003-01 (Reference 8.2) requested information to verify compliance with NRC regulations and to ensure that any interim risks associated with post-accident debris blockage are minimized while evaluations of the latest sump knowledge proceed. NRC Generic Letter 2004-02 (Reference 8.3) is the follow-on generic communication to Bulletin 2003-01 and requested information on the results of the evaluations referenced in the Bulletin.

Luminant Power has evaluated emergency recirculation sump performance without the effects of chemical precipitates. The results of that evaluation were provided to the NRC by Reference 8.1. That evaluation also concluded that a change to a less corrosive pH range is desirable because chemical effects on the sump strainers were sufficiently reduced. Subsequent evaluations support the original conclusion. This change is constrained by the current Technical Specifications. Consequently, this license amendment request is to change the CPNPP Technical Specifications to allow controlling the amount of Sodium Hydroxide (NaOH) to assure a pH is maintained greater than or equal to 7.1 and the specific amount of NaOH required in order to ensure the proposed Technical Specification required pH will be maintained in the Technical Requirements Manual and subject to the controls of 10CFR50.59.

The methodology for calculating the minimum required quantity of buffer to maintain a minimum sump pH (e.g. 7.1, 8.25, etc.) assumes the maximum volume of water in the RCS and Refueling Water Storage Tank at their respective maximum concentrations of boric acid (beginning of cycle/maximum allowed by Tech Spec). The buffer is assumed to be the minimum deliverable (e.g based on minimum chemical additive tank level and concentration). The effect of radiolysis on materials such as cables would be included as appropriate. This results in a conservative requirement for the minimum buffer quantity to provide satisfactory retention of iodine in the sump water, as well as provide adequate pH control to minimize the potential of chloride-induced stress corrosion cracking of austenitic stainless steel.

The scoping calculation for this request was performed to maintain a minimum sump pH of 7.3 using the above methodology. The effect of radiolysis would was not included; however, calculations done to evaluate TSP-C showed radiolysis is not significant for the purposes of scoping. The resulting concentration was 8.00 weight percent (w/o) NaOH. Any concentration of NaOH greater than 8.00 w/o would ensure the pH does not decrease below 7.3. Radiolysis would be included in the design analysis of record.

Once the minimum required quantity of buffer is established, the adverse impact on equipment qualification and emergency sump performance must be addressed. This calculation assumes the maximum deliverable quantity of buffer (e.g. maximum level and concentration). The minimum volume of water in the RCS and deliverable from the Refueling Water Storage Tank at their minimum concentrations of boric acid (end of cycle/minimum allowed by Tech Spec) is assumed to minimize the acid. The effect of radiolysis is not included. The end of life RCS boron concentration is normally assumed to be 0 ppm. This results in a conservative calculation of maximum pH which is then evaluated for the adverse impact on the plant.

The scoping calculation for this request also determined the maximum pH transient and long term sump pH using the above methodology and 8.00 weight percent (w/o) NaOH. The maximum final sump pH was found to be 7.8 (versus the current pH of 9.2). The maximum pH transient was less than 8.4 (versus the current pH of 12.5). The impact on chemical precipitates was then evaluated using WCAP-16530-NP. The effect of the pH range changes on solubility of the aluminum precipitates was evaluated and found to be insignificant. The scoping calculations demonstrate that the quantity of aluminum oxyhydroxide precipitate can be reduced by almost 80% by reducing the concentration of NaOH.

The final NaOH concentration range and chemical additive tank level range would be determined using the same methodology as described above.

4.0 TECHNICAL ANALYSIS

Comanche Peak Nuclear Power Plant (CPNPP) is performing analyses to determine the susceptibility of the Emergency Core Cooling System (ECCS) and Containment Spray System (CSS) recirculation functions to the adverse effects of post-accident blockage and operation due to chemical effects. These analyses are substantially complete. Testing of the strainer with chemical effects is planned to be completed by the end of the year (2007).

The CPNPP design utilizes the CSS to reduce radioiodine concentrations in the containment atmosphere following a design basis large break loss of coolant accident (LOCA). The current design includes a sodium hydroxide (NaOH) solution additive. This could raise the pH of the spray droplets to high levels during the NaOH injection phase (e.g., to 12.5). At the time this system was designed it was believed that a high pH level, maintained in the spray through the use of the NaOH additive, was required to effectively remove elemental iodine from the containment atmosphere and retain it in the sumps. However, studies have demonstrated that long-term iodine retention in the sumps is assured as long as the equilibrium sump pH level is maintained above 7.0. The current Technical Specification (TS) 3.6.7 requirements result in a long term sump pH range from 8.25 to 9.2. This range is not optimum for materials.

Since the initial pH of the refueling water storage tank (RWST) spray fluid is greater than or equal to 4.0 but less than 7.0, a buffering agent is needed to raise the pH. The impact of that buffering agent on emergency sump performance has been evaluated by the nuclear industry.

LA-UR-05-0124, "Integrated Chemical Effects Test Project: Test #1 Data Report" (Reference 8.7) demonstrated that the highly corrosive pH range of standard NaOH could chemically generate debris and sediment which poses a concern for sump performance. LA-UR-05-6146, "Integrated Chemical Effects Test Project: Test #2 Data Report" (Reference 8.8) demonstrated that a lower pH is much less likely to produce chemical products detrimental to sump performance for plants like CPNPP which utilize reflective metal and fiberglass insulation.

WCAP-16530-NP [Reference 8.10] confirmed the effect of pH on debris generation for the commonly used buffers. A CPNPP evaluation of chemical in accordance with WCAP-16530-NP shows that the quantity of aluminum oxyhydroxide precipitate can be reduced by approximately 80% by reducing the concentration of NaOH to assure a minimum pH of 7.1 in lieu of 8.25.

This warrants the reduction of the amount of the current NaOH added to the containment during post LOCA conditions by the Spray Additive System and associated spray additive tank, controls, and instrumentation.

The Standard Review Plan (SRP) 6.5.2, Revision 2 [Reference 8.4], indicates that all iodine removal coefficients and decontamination factors (DFs) remain unaffected, provided the ECCS sump pH is maintained greater than or equal to 7.0 at the onset of and during spray recirculation. ECCS systems enter the recirculation mode prior to containment spray entering the recirculation mode. In the event of a large break LOCA, there would be 10 to 20 minutes of mixing in the Containment flood plane by ECCS recirculation and break/spray flow into the pool. Therefore, the ECCS sump would be well mixed at the onset of containment spray recirculation. Conservative limits on the elemental iodine DF and removal coefficient are prescribed in the analyses methodology to, in part, offset transient situations (e.g., ECCS sump pH becomes greater than 7.0 soon after, rather than prior to, the onset of the containment spray recirculation mode). Furthermore, it can be shown that the current calculation methodology in the CPNPP Final Safety Analysis Report (FSAR) 6.5.2 is conservative with respect to the methods provided in SRP 6.5.2, Revision 2. Specifically, the method for calculating the elemental removal coefficients currently used in FSAR 6.5.2 result in smaller values than if the method given in SRP 6.5.2, Revision 2, were to be used. The method for calculating the particulate coefficient given in SRP 6.5.2, Revision 2, is the same as the current method used in FSAR 6.5.2. The iodine removal coefficients and DFs currently employed in the CPNPP radiological analyses remain conservative and do not require revision. Therefore, all offsite, control room, and equipment doses remain unchanged.

In all cases, the equilibrium pH of the containment recirculation sump water would still be maintained above 7.0 in order to retain iodine in the sump solution and to minimize chloride induced stress corrosion cracking of austenitic stainless steels in the ECCS.

Criteria for pH level of post-accident emergency core cooling and Containment Spray water established in Branch Technical Position MTEB 6-1 [Reference 8.6] are implemented in the design of the CSS. The minimum pH to reduce the probability of stress-corrosion cracking of austenitic stainless steel components, nonsensitized or sensitized, nonstressed or stressed, is also 7.0.

Luminant Power is proposing to relocate the specific performance tests for NaOH injection to allow reductions in the chemical effects by decreasing the concentration of NaOH to achieve an equilibrium pH closer to 7.1.

Specifying the criteria for the buffering agent that ensures an equilibrium pH $\geq$ 7.1 in the TS Surveillance and referring to the Technical Requirements Manual (TRM) for specific details on how performance tests are completed allows the specific requirement of an equilibrium pH in the TS Surveillance to ensure OPERABILITY of the Spray Additive System. Luminant Power would then be able to optimize the concentration of NaOH specifically for CPNPP and maintain the details of complying with a pH of $\geq$ 7.1 in the TRM. The current TS Surveillances for NaOH and frequencies would be moved to the TRM until changes in concentrations were implemented.

In summary, Luminant Power has completed major physical modifications to each facility (sump screen replacement and valve modifications) for each unit (refueling outage 9 for Unit 2 and refueling outage 12 for Unit 1, fall 2006 and spring 2007, respectively). This proposed license amendment revises Technical Specification 3.6.7, "Spray Additive System," to allow optimization of the amount of NaOH for pH control inside containment during an accident. The Bases for 3.6.7 will be revised accordingly.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Luminant Power 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 10CFR50.92, "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 proposed change does not impact the initiation or probability of occurrence of any accident.

   The accidents evaluated in the Final Safety Analysis report (FSAR) that could be affected by this proposed change are those involving the pressurization of the containment and those involving recirculation of fluid within the Emergency Core Cooling System (ECCS) or the Containment Spray System (e.g., loss of coolant accidents (LOCAs)).

   The change to a minimum pH of 7.1 will not result in a significant increase in the radiological consequences of a LOCA as described below.

   The equilibrium spray pH during the recirculation phase resulting from this change will be greater than or equal to 7.1. The pH range for the spray will be bounded by the water spray solution which is borated water with a maximum of 2600 parts per million (ppm) boron buffered to a final spray solution pH much less than the 10.5 as described in the current FSAR Section 3.11(B) for the postulated spray solution environment. The maximum pH is the limiting parameter for equipment qualification. Since the resulting pH level will be closer to neutral using the lower limit of 7.1, post-LOCA corrosion of containment components will not be increased. Post-LOCA hydrogen generation will be reduced. There will not be an adverse radiation dose effect on any safety-related equipment. Thus, the potential for failures of the ECCS or safety-related equipment following a LOCA will not be increased as a result of the proposed change.

   This modification affects the Containment Spray System which is intended to respond to and mitigate the effects of a LOCA. The Containment Spray System will continue to function in a manner consistent with the plant design basis. There will be no degradation in the performance of nor an increase in the number of challenges to equipment assumed to function during an accident situation.

Therefore, these Technical Specification (TS) revisions do not affect the probability of any event initiators. There will be no adverse changes to normal plant operating parameters, Engineered Safety Features (ESF) actuation setpoints, or accident mitigation capabilities.

The proposed change allows the Spray Additive System currently used to mitigate the consequences of an accident to maintain the equilibrium sump pH at greater than or equal to 7.1 to minimize chloride-induced stress corrosion cracking in austenitic stainless components important to safety located inside containment. Therefore, the proposed changes will not increase the probability of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

The offsite and control room doses will continue to meet the requirements of 10CFR100, 10CFR50 Appendix A GDC 19, SRP 15.6.5.11, and SRP 6.4.11. The proposed new pH limit will provide satisfactory retention of iodine in the sump water, as well as provide adequate pH control to minimize the potential of chloride-induced stress corrosion cracking of austenitic stainless steel components.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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 to the revised Surveillance for the Containment Spray Additive System provides for a required minimum equilibrium pH in containment post accident. There are no electrical or mechanical components being added whose failure could prevent the system from functioning.

No new accident scenarios, transient precursors, or limiting single failures are introduced as a result of the proposed changes. There will be no adverse effect or challenges imposed on any safety-related system as a result of this proposed change. The amount of sodium hydroxide (NaOH) will provide a minimum equilibrium sump pH of 7.1 following mixing. Therefore, the possibility of a new or different type of accident is not created.

There are no changes which would cause the malfunction of safety-related equipment, assumed to be operable in the accident analyses, as a result of the proposed Technical Specification changes. The possibility of a malfunction of safety-related equipment with a different result is not created.

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 only function of the chemical additive system is to provide pH control of the post-accident containment recirculation sump water, since the borated water from the Refueling Water Storage Tank (RWST) used as the containment spray pump suction source during injection is sufficient to remove iodine from the containment atmosphere following a LOCA. The net effect on the pH control function of reducing the amount of buffer is that the equilibrium sump pH will be lowered to a minimum of 7.1. There will be no change to the current Technical Specification acceptance limits on RWST volume and boron concentration. The resulting equilibrium sump pH level from this change will be closer to neutral; therefore, the post-LOCA corrosion of containment components will not be increased (i.e., would be reduced).

Because the long term pH will be maintained greater than or equal to 7.1, margin to minimize the potential for stress corrosion cracking is maintained.

The radiological analysis, as discussed in the technical analysis above, is shown not to be impacted. There will be no change to the DNBR Correlation Limit, the design DNBR limits, or the safety analysis DNBR limits discussed in Bases Section 2.1.1. There will be no effect on the manner in which Safety Limits or Limiting Safety System Settings are determined nor will there be any effect on those plant systems necessary to assure the accomplishment of protection functions. There will be no adverse impact on Departure of Nucleate Boiling Ratio limits, F_Q, F-delta-H, LOCA peak cladding temperature, peak local power density, or any other margin of safety.

Therefore the proposed change does not involve a reduction in a margin of safety.

Based on the above evaluations, Luminant Power concludes that the proposed amendment(s) present no significant hazards under the standards set forth in 10CFR50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The Containment Spray system is designed to meet the requirements of 10CFR50, Appendix A, GDC 38, "Containment Heat Removal," GDC 39, "Inspection of Containment Heat Removal Systems," GDC 40, "Testing of Containment Heat Removal Systems," GDC 41, "Containment Atmosphere Cleanup," GDC 42, "Inspection of Containment Atmosphere Cleanup Systems," and GDC 43, "Testing of Containment Atmosphere Cleanup Systems."

NRC regulations in Title 10, of the Code of Federal Regulations Section 50.46, 10CFR50.46, require that the ECCS have the capability to provide long-term cooling of the reactor core following a LOCA. That is, the ECCS must be able to remove decay heat, so that the core temperature is maintained at an acceptably low value for the extended period of time required by the long-lived radioactivity remaining in the core.

Comanche Peak Nuclear Power Plant (CPNPP) credits, in part, a Containment Spray System with performing the safety functions to satisfy the above requirements. In addition, CPNPP also credits the Containment Spray System with reducing the accident source term to meet the limits of 10CFR Part 100 or 10CFR50.67. The changes described herein to the Containment Spray system continue to provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. Reduction of containment pressure and the iodine removal capability of the spray reduce the release of fission product radioactivity from containment to the environment, in the event of a Design Basis Accident (DBA), to within limits.

In conclusion, based on the considerations discussed above, (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.

6.0 ENVIRONMENTAL CONSIDERATION

Luminant Power has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, or would change an inspection or surveillance requirement. Luminant Power has evaluated the proposed changes and has determined that the changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), an environmental assessment of the proposed change is not required.

7.0 PRECEDENTS

The Nuclear Regulatory Commission (NRC) has approved a similar License Amendment (Reference 8.11) for the Union Electric Company's Callaway Plant Unit 1 on February 21, 2007 (ML063420047). In the Callaway license amendment, the NRC approved the relocation of the specific buffering agent details to a licensee controlled document and replaced it with the requirement to verify the Chemical Additive System ensures an equilibrium sump pH $\geq$ 7.1. The NRC issued the License Amendment to Callaway with the license condition that NRC approval is required to change the buffering agent used. Luminant Power proposes to include the specific buffering agent (Sodium Hydroxide) in the Technical Specifications in lieu of a license condition.

8.0 REFERENCES

8.1 TXX-05162, Response to Requested Information Part 2 of NRC Generic Letter 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS," from Mike Blevins to the USNRC dated September 1, 2005

8.2 NRC Bulletin 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER-REACTORS"

8.3 Generic Letter 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS"

8.4 Standard Review Plan 6.5.2, "Containment Spray as a Fission Product Cleanup System," Revision 2

8.5 NUREG/CR-4697, "Chemistry and Transport of iodine in Containment," 1986

8.6 Branch Technical Position MTEB 6-1, "pH for Emergency Cooling Water for PWRs," Revision 2, 1981

8.7 LA-UR-05-0124, "Integrated Chemical Effects Test Project: Test #1 Data Report," June 2005

8.8 LA-UR-05-6146, "Integrated Chemical Effects Test Project: Test #2 Data Report," September 2005

8.9 TXX-04049, "License Amendment Request (LAR) [04-002], Revision to Technical Specification (TS) 3.3.2, Engineered Safety Actuation System (ESFAS) Instrumentation," from Mike Blevins to the USNRC dated April 13, 2004

8.10 WCAP-16530-NP, Revision 0, "Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191," February 2006

8.11 License Amendment for the Union Electric Company's Callaway Plant Unit 1, Amendment No. 180 to Facility Operating License No. NPF-30, dated February 21, 2007 (ML063420047).

ATTACHMENT 2 to TXX-07149

PROPOSED TECHNICAL SPECIFICATIONS CHANGES (MARKUP)

Page 3.6-21

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.7.1	Verify the spray additive system ensures an equilibrium sump pH $\geq$ 7.1 using NaOH. ~~Verify each spray additive 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.~~	In accordance with the Technical Requirements Manual ~~31 days~~
~~SR 3.6.7.2~~	~~Verify spray additive tank solution level is □ 91% and □ 94%.~~	~~184 days~~
~~SR 3.6.7.3~~	~~Verify spray additive tank NaOH solution concentration is □ 28% and □ 30% by weight.~~	~~184 days~~
~~SR 3.6.7.4~~	~~Verify each spray additive automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.~~	~~18 months~~
~~SR 3.6.7.5~~	~~Verify spray additive flow from each solution's flow path.~~	~~5 years~~

ATTACHMENT 3 to TXX-07149

PROPOSED TECHNICAL SPECIFICATIONS BASES CHANGES
(Markup For Information Only)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.7 Spray Additive System

BASES

BACKGROUND

The Spray Additive System is a subsystem of the Containment Spray System that assists in reducing the iodine fission product inventory in the containment atmosphere resulting from a Design Basis Accident (DBA).

Radioiodine in its various forms is the fission product of primary concern in the evaluation of a DBA. It is absorbed by the spray from the containment atmosphere. To enhance the iodine absorption capacity of the spray, the spray solution is adjusted to an alkaline pH that promotes iodine hydrolysis, in which iodine is converted to nonvolatile forms. Because of its stability when exposed to radiation and elevated temperature, sodium hydroxide (NaOH) is the preferred spray additive. When NaOH is added to the spray, ~~The NaOH added to the spray also ensures~~ a pH value of greater than or equal to 7.1 ~~between 8.25 and 10.5~~ of the solution recirculated ~~from the containment~~ sump is ensured. This pH band minimizes the evolution of iodine as well as the ~~occurrence~~ of chloride and caustic stress corrosion on mechanical systems and components.

The Spray Additive System consists of one spray additive tank that is shared by the two trains of spray additive equipment. Each train of equipment provides a flow path from the spray additive tank to two containment spray pumps and consists of an eductor for each containment spray pump, valves, instrumentation, and connecting piping. Each eductor draws the NaOH spray solution from the common tank using a portion of the borated water discharged by the containment spray pump as the motive flow. The eductor mixes the NaOH solution and the borated water and discharges the mixture into the spray pump suction line. The spray additive system, including the eductors, is designed to ensure the contents of the Chemical Additive Tank is injected into containment given any single active failure. Consequently, in the short term, the pH of a train of spray can vary from acidic (pH of approximately 4.5) to strong basic (pH of approximately 12.5). The low spray pH can only occur during injection prior to switchover to recirculation. The equilibrium sump solution pH, after mixing and dilution with the primary coolant and ECCS injection, is above 7 and adequate spray pH for long term iodine retention is achieved with the onset of the spray recirculation mode. The high spray pH can only occur after switchover to recirculation from the sump when spray additive is added to recirculated sump water. The high pH condition transient is bounded by the hydrogen generation analysis.

The Containment Spray System actuation signal opens the valves from the spray additive tank to the spray pump suctions. The 28% to 30% NaOH solution is drawn into the spray pump suctions. The spray additive tank

(continued)

BASES

BACKGROUND (continued)

capacity provides for the addition of NaOH solution to the water sprayed from the RWST into containment. The percent solution and volume of solution sprayed into containment ensures the appropriate long term containment sump pH. This ensures the continued iodine retention effectiveness of the sump water during the recirculation phase of spray operation and also minimizes the occurrence of chloride induced stress corrosion cracking of the stainless steel recirculation piping.

APPLICABLE SAFETY ANALYSES

The Spray Additive System is essential to the removal of airborne iodine within containment following a DBA.

Following the assumed release of radioactive materials into containment, the containment is assumed to leak at its design value volume following the accident. The analysis assumes that 56.3% of the containment free volume is covered by the spray (Ref. 1).

volume of pH buffering agent subsystem must be sufficient to raise the average long term containment sump solution pH to a level conducive to iodine removal and retention, namely, to greater than or equal to 7.1. This pH level maximizes the effectiveness of the iodine removal and retention mechanisms without introducing conditions that may induce caustic stress corrosion cracking of mechanical system components.

...sumed for the Spray Additive System is the same ...ay System and is discussed in the Bases for LCO ... System." The DBA analyses assume that one ...pray System/Spray Additive System is inoperable ...dditive tank volume is added to the remaining ...n flow path.

The Spray Additive System satisfies Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

The Spray Additive System is necessary to reduce the release of radioactive material to the environment in the event of a DBA. To be considered OPERABLE, the ~~volume and concentration of the spray additive solution must be sufficient to provide NaOH injection into the spray flow to raise the average long term containment sump solution pH to a level conducive to iodine removal, namely, to between 8.25 and 10.5. This pH range maximizes the effectiveness of the iodine removal mechanism without introducing conditions that may induce caustic stress corrosion cracking of mechanical system components. In addition, it is essential that valves in the Spray Additive System flow paths are properly positioned, that automatic valves are capable of activating to their correct positions, and that the eductors are capable of adding the NaOH solution to the CSS flow.~~

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment requiring the operation of the Spray Additive System. The Spray Additive System assists in reducing the iodine fission product inventory thus reducing potential releases to the environment.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. Thus, the Spray Additive System is not required to be OPERABLE in MODE 5 or 6.

ACTIONS

A.1

If the Spray Additive System is inoperable, it must be restored to OPERABLE within 72 hours. The pH adjustment of the Containment Spray System flow for corrosion protection and iodine removal enhancement is reduced in this condition. The Containment Spray System would still be available and would remove some iodine from the containment atmosphere in the event of a DBA. The 72 hour Completion Time takes into account the redundant flow path capabilities and the low probability of the worst case DBA occurring during this period.

B.1 and B.2

If the Spray Additive System cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 84 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems. The extended interval to reach MODE 5 allows 48 hours for restoration of the Spray Additive System in MODE 3 and 36 hours to reach MODE 5. This is reasonable when considering the reduced pressure and temperature conditions in MODE 3 for the release of radioactive material from the Reactor Coolant System.

SURVEILLANCE REQUIREMENTS

SR 3.6.7.1

This surveillance verifies that the available buffering agent is sufficient to ensure that the equilibrium containment sump pH is greater than or equal to 7.1. Details of the bases for performance test requirements that ensure sump pH requirements are met are included in the bases of the Technical Requirements Manual.

~~Verifying the correct alignment of Spray Additive System manual, power operated, and automatic valves in the spray additive flow path provides assurance that the system is able to provide additive to the Containment Spray System in the event of a DBA. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.7.1 (continued)

verified to be in the correct position prior to locking, sealing, or securing. This SR does not require any testing or valve manipulation. Rather, it involves verification through a system walkdown (which may include the use of local or remote indicators), that those valves outside containment and capable of potentially being mispositioned are in the correct position.

SR 3.6.7.2

To provide effective iodine removal, the containment spray must be an alkaline solution. Since the RWST contents are normally acidic, the volume of the spray additive tank must provide a sufficient volume of spray additive to adjust pH for all water injected. This SR is performed to verify the availability of sufficient NaOH solution in the Spray Additive System. The required volume may be surveilled using an indicated level band of 91% to 94% for the Spray Additive Tank which corresponds to an analytical limit band of 4900 gallons to 5314 gallons, respectively, and includes a 3.36% measurement uncertainty. The 184 day Frequency was developed based on the low probability of an undetected change in tank volume occurring during the SR interval (the tank is isolated during normal unit operations). Tank level is also indicated and alarmed in the control room, so that there is high confidence that a substantial change in level would be detected.

SR 3.6.7.3

This SR provides verification of the NaOH concentration in the spray additive tank and is sufficient to ensure that the spray solution being injected into containment is at the correct pH level. The 184 day Frequency is sufficient to ensure that the concentration level of NaOH in the spray additive tank remains within the established limits. This is based on the low likelihood of an uncontrolled change in concentration (the tank is normally isolated) and the probability that any substantial variance in tank volume will be detected.

SR 3.6.7.4

This SR provides verification that each automatic valve in the Spray Additive System flow path actuates to its correct position on a Containment Spray Actuation signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~SR 3.6.7.5~~

~~To ensure correct operation of the Spray Additive System, flow through the Spray Additive System eductors is verified once every 5 years. Flow of between 50 and 100 gpm through the eductor test loops (supplied from the RWST) simulates flow from the Chemical Additive Tank. Due to the passive nature of the spray additive flow controls, the 5 year Frequency is sufficient to identify component degradation that may affect flow.~~

REFERENCES 1. FSAR, Chapter 6.5.

ATTACHMENT 4 to TXX-07149

RETYPED TECHNICAL SPECIFICATIONS PAGE

Page 3.6-21

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.7.1	Verify the spray additive system ensures an equilibrium sump pH ≥ 7.1 using NaOH.	In accordance with the Technical Requirements Manual

ATTACHMENT 5 to TXX-07149

RETYPED TECHNICAL SPECIFICATION BASES PAGES
(For Information Only)

Pages	B 3.6-40
	B 3.6-41
	B 3.6-42
	B 3.6-43

B 3.6 CONTAINMENT SYSTEMS

B 3.6.7 Spray Additive System

BASES

BACKGROUND

The Spray Additive System is a subsystem of the Containment Spray System that assists in reducing the iodine fission product inventory in the containment atmosphere resulting from a Design Basis Accident (DBA).

Radioiodine in its various forms is the fission product of primary concern in the evaluation of a DBA. It is absorbed by the spray from the containment atmosphere. To enhance the iodine absorption capacity of the spray, the spray solution is adjusted to an alkaline pH that promotes iodine hydrolysis, in which iodine is converted to nonvolatile forms. Because of its stability when exposed to radiation and elevated temperature, sodium hydroxide (NaOH) is the preferred spray additive. When NaOH is added to the spray a pH value of greater than or equal to 7.1 of the solution recirculated from the containment sump is ensured. This pH band minimizes the evolution of iodine as well as the occurrence of chloride and caustic stress corrosion on mechanical systems and components.

The Spray Additive System consists of one spray additive tank that is shared by the two trains of spray additive equipment. Each train of equipment provides a flow path from the spray additive tank to two containment spray pumps and consists of an eductor for each containment spray pump, valves, instrumentation, and connecting piping. Each eductor draws the NaOH spray solution from the common tank using a portion of the borated water discharged by the containment spray pump as the motive flow. The eductor mixes the NaOH solution and the borated water and discharges the mixture into the spray pump suction line. The spray additive system, including the eductors, is designed to ensure the contents of the Chemical Additive Tank is injected into containment given any single active failure. Consequently, in the short term, the pH of a train of spray can vary from acidic (pH of approximately 4.5) to strong basic (pH of approximately 12.5). The low spray pH can only occur during injection prior to switchover to recirculation. The equilibrium sump solution pH, after mixing and dilution with the primary coolant and ECCS injection, is above 7 and adequate spray pH for long term iodine retention is achieved with the onset of the spray recirculation mode. The high spray pH can only occur after switchover to recirculation from the sump when spray additive is added to recirculated sump water. The high pH condition transient is bounded by the hydrogen generation analysis.

The Containment Spray System actuation signal opens the valves from the spray additive tank to the spray pump suctions. The 28% to 30% NaOH solution is drawn into the spray pump suctions. The spray additive tank

(continued)

BASES

BACKGROUND (continued)

capacity provides for the addition of NaOH solution to the water sprayed from the RWST into containment. The percent solution and volume of solution sprayed into containment ensures the appropriate long term containment sump pH. This ensures the continued iodine retention effectiveness of the sump water during the recirculation phase of spray operation and also minimizes the occurrence of chloride induced stress corrosion cracking of the stainless steel recirculation piping.

APPLICABLE SAFETY ANALYSES

The Spray Additive System is essential to the removal of airborne iodine within containment following a DBA.

Following the assumed release of radioactive materials into containment, the containment is assumed to leak at its design value volume following the accident. The analysis assumes that 56.3% of the containment free volume is covered by the spray (Ref. 1).

The DBA response time assumed for the Spray Additive System is the same as for the Containment Spray System and is discussed in the Bases for LCO 3.6.6, "Containment Spray System." The DBA analyses assume that one train of the Containment Spray System/Spray Additive System is inoperable and that the entire spray additive tank volume is added to the remaining Containment Spray System flow path.

The Spray Additive System satisfies Criterion 3 of 10CFR50.36(c)(2)(ii).

LCO

The Spray Additive System is necessary to reduce the release of radioactive material to the environment in the event of a DBA. To be considered OPERABLE, the volume of pH buffering agent subsystem must be sufficient to raise the average long term containment sump solution pH to a level conductive to iodine removal and retention, namely, to greater than or equal to 7.1. This pH level maximizes the effectiveness of the iodine removal and retention mechanisms without introducing conditions that may induce caustic stress corrosion cracking of mechanical system components.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment requiring the operation of the Spray Additive System. The Spray Additive System assists in reducing the iodine fission product inventory thus reducing potential releases to the environment.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. Thus, the Spray Additive System is not required to be OPERABLE in MODE 5 or 6.

ACTIONS

A.1

If the Spray Additive System is inoperable, it must be restored to OPERABLE within 72 hours. The pH adjustment of the Containment Spray System flow for corrosion protection and iodine removal enhancement is reduced in this condition. The Containment Spray System would still be available and would remove some iodine from the containment atmosphere in the event of a DBA. The 72 hour Completion Time takes into account the redundant flow path capabilities and the low probability of the worst case DBA occurring during this period.

B.1 and B.2

If the Spray Additive System cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 84 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems. The extended interval to reach MODE 5 allows 48 hours for restoration of the Spray Additive System in MODE 3 and 36 hours to reach MODE 5. This is reasonable when considering the reduced pressure and temperature conditions in MODE 3 for the release of radioactive material from the Reactor Coolant System.

SURVEILLANCE REQUIREMENTS

SR 3.6.7.1

This surveillance verifies that the available buffering agent is sufficient to ensure that the equilibrium containment sump pH is greater than or equal to 7.1. Details of the bases for performance test requirements that ensure sump pH requirements are met are included in the bases of the Technical Requirements Manual.

(continued)

BASES (continued)

REFERENCES	1.	FSAR, Chapter 6.5.

ATTACHMENT 6 to TXX-07149

PROPOSED TECHNICAL REQUIREMENTS MANUAL CHANGES
(For Information Only)

13.6 CONTAINMENT SYSTEMS

This Technical Requirement contains the detailed technical requirements for verifying equilibrium Containment emergency sump pH commensurate with Technical Specification (TS) Surveillance Requirement SR 3.6.7.1. ACTIONS for not verifying equilibrium Containment emergency sump pH is contained in Technical Specification 3.6.7. The performance test requirements for the Spray Additive System subject to TS SR 3.6.7.1 are as follows:

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TRS 13.6.7.1 Verify each spray additive 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
TRS 13.6.7.2 Verify spray additive tank solution level is ≥ 91% and ≤ 94%.	184 days
TRS 13.6.7.3 Verify spray additive tank NaOH solution concentration is ≥ 28% and ≤ 30% by weight.	184 days
TRS 13.6.7.4 Verify each spray additive automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
TRS 13.6.7.5 Verify spray additive flow from each solution's flow path.	5 years

B 13.6 CONTAINMENT SYSTEMS

TRB 13.6.7 Spray Additive System

BASES

The performance test requirements for the Spray Additive System subject to SR 3.6.7.1 ensures that the available buffering agent is sufficient to ensure that the equilibrium containment sump pH is greater than or equal to 7.1.

TRS 13.6.7.1

This entails verifying the correct alignment of Spray Additive System manual, power operated, and automatic valves in the spray additive flow path provides assurance that the system is able to provide additive to the Containment Spray System in the event of a DBA. This performance test requirement does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing.

This performance test requirement does not require any testing or valve manipulation. Rather, it involves verification through a system walkdown (which may include the use of local or remote indicators), that those valves outside containment and capable of potentially being mispositioned are in the correct position.

TRS 13.6.7.2

To provide effective iodine removal, the containment spray must be an alkaline solution. Since the RWST contents are normally acidic, the volume of the spray additive tank must provide a sufficient volume of spray additive to adjust pH for all water injected. This performance test requirement is performed to verify the availability of sufficient NaOH solution in the Spray Additive System. The required volume may be verified using an indicated level band of 91% to 94% for the Spray Additive Tank which corresponds to an analytical limit band of 4900 gallons to 5314 gallons, respectively, and includes a 3.36% measurement uncertainty. The 184 day Frequency was developed based on the low probability of an undetected change in tank volume occurring during the performance test requirement interval (the tank is isolated during normal unit operations). Tank level is also indicated and alarmed in the control room, so that there is high confidence that a substantial change in level would be detected.

TRS 13.6.7.3

This performance test requirement provides verification of the NaOH concentration in the spray additive tank and is sufficient to ensure that the spray solution being injected into containment is at the correct pH level. The 184 day Frequency is sufficient to ensure that the concentration level of NaOH in the spray additive tank remains within the established limits. This is based on the low likelihood of an uncontrolled change in concentration (the tank is normally isolated) and the probability that any substantial variance in tank volume will be detected.

TRS 13.6.7.4

This performance test requirement provides verification that each automatic valve in the Spray Additive System flow path actuates to its correct position on a Containment Spray Actuation signal. This performance test is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month Frequency is based on the need to perform this test under the conditions that apply during a plant outage and the potential for an unplanned transient if the performance test were performed with the reactor at power. Operating experience has shown that these components usually pass the performance test when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

TRS 13.6.7.5

To ensure correct operation of the Spray Additive System, flow through the Spray Additive System eductors is verified once every 5 years. Flow of between 50 and 100 gpm through the eductor test loops (supplied from the RWST) simulates flow from the Chemical Additive Tank. Due to the passive nature of the spray additive flow controls, the 5 year Frequency is sufficient to identify component degradation that may affect flow.