FENOC

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September 24, 2008
L-08-236

10 CFR 50.90

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:
Beaver Valley Power Station, Unit Nos. 1 and 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
License Amendment Request No. 08-006
Replacement of Beaver Valley Power Station Unit No. 2 Spray Additive System by Containment Sump pH Control System

Pursuant to 10 CFR 50.90, FirstEnergy Nuclear Operating Company (FENOC) hereby requests an amendment to the operating licenses for Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2. The proposed amendments would modify Technical Specifications (TS) to allow the BVPS-2 containment spray additive (sodium hydroxide) to be replaced by sodium tetraborate. An administrative change to the BVPS-1 license is requested because a common TS for both units must be modified to reflect the BVPS-2 changes. The FENOC evaluation of the proposed changes is enclosed.

FENOC requests approval of the proposed amendments on or before September 14, 2009. Implementation is planned to occur prior to achieving Mode 4 during startup from the BVPS Unit 2 refueling outage in the fall of 2009 (2R14).

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – FENOC Fleet Licensing, at 330-761-6071.

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 24, 2008.

Sincerely,

Peter P. Sena III

Enclosure:
FENOC Evaluation of the Proposed Change

cc: Mr. S. J. Collins, NRC Region I Administrator
Mr. D. L. Werkheiser, NRC Senior Resident Inspector
Ms. N. S. Morgan, NRR Project Manager
Mr. D. J. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

FENOC Evaluation of Proposed Changes

Subject: License Amendment Request 08-006, Replacement of Beaver Valley Power Station Unit No. 2 Spray Additive System by Containment Sump pH Control System.

Attachments

Number	Title
A	Proposed Technical Specification Changes
B	Proposed Technical Specification Bases Changes
C	Final Typed Pages

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Operating Licenses DPR-66 for Beaver Valley Power Station Unit No.1 (BVPS-1) and NPF-73 for Beaver Valley Power Station Unit No. 2 (BVPS-2).

The requested amendment involves changes to the Technical Specifications (TS) that would allow the use of sodium tetraborate (NaTB) to replace sodium hydroxide (NaOH) as a chemical additive for containment sump pH control following a loss of coolant accident (LOCA) at BVPS-2 alone. Because NaOH is currently in use at both BVPS-1 and BVPS-2, TS 3.6.8 which is common to both units would be revised to remove the requirements for BVPS-2 (rendering TS 3.6.8 applicable to BVPS-1 only) and a new TS 3.6.9 would be created for BVPS-2. Changes to the BVPS-1 license are only associated with the removal of the BVPS-2 TS requirements for pH control from the current TS which is common to both units. Therefore, the BVPS-1 amendment would be administrative in nature.

This change is being proposed as an enhancement to the plant because replacement of the liquid NaOH with granular NaTB in baskets located in the containment building would eliminate active components of the spray additive system and reduce testing and maintenance. The new system would not have potential for inadvertent discharge and the possibility for injury from chemicals would be reduced.

2.0 DETAILED DESCRIPTION

The proposed TS changes and TS Bases changes are provided in Attachments A and B, respectively. The TS Bases changes are provided for information only and do not require NRC approval as permitted by TS 5.5.10, "Technical Specifications (TS) Bases Control Program." Deletions are shown in Attachments A and B with a strike-through and insertions are shown double-underlined. This presentation allows the reviewer to readily identify the information that would be deleted or added. To meet format requirements, index, TSs and Bases pages would be revised and repaginated as necessary to reflect the changes being proposed by this License Amendment Request (LAR). Retyped TS pages are provided in Attachment C.

The following TS changes are proposed:

- TS 3.6.8 would be modified to be applicable to BVPS-1 only by changing the title from "Spray Additive System" to "Unit 1 Spray Additive System" and by modifying the Surveillance Requirements (SRs) to remove all BVPS-2 requirements.
- TS 3.6.9 would be added to address requirements for the new BVPS-2 containment sump pH control system. The proposed TS 3.6.9 would specify a Limiting Condition for Operation, Applicability and Actions that are consistent with

TS 3.6.8. Two SRs would also be included. SR 3.6.9.1 would require performance of a visual inspection of the six NaTB storage baskets to verify that each storage basket is in place and intact, and, that the baskets collectively contain greater than or equal to 292 cubic feet of NaTB. SR 3.6.9.2 would require verification based upon sampling that the NaTB would provide adequate pH adjustment of borated water.

3.0 TECHNICAL EVALUATION

3.1 Background

In accordance with the current BVPS-2 design basis, the acceptance criterion for sump water pH is a range from 7.0 to 10.5 to provide for continued iodine retention effectiveness and to minimize the occurrence of chloride induced stress corrosion cracking of systems and components exposed to the fluid.

The Pressurized Water Reactor Owners Group (PWROG) investigated the ability to reduce chemical precipitant formation by replacing NaOH with another chemical that is less reactive with the materials in containment. The program tested alternative buffering agents to determine the efficacy of these materials as replacements for NaOH. Based on this testing NaTB has been selected to replace NaOH at BVPS-2. The results of the PWROG activity were reported in WCAP-16596-NP (Reference 1).

BVPS-2 currently uses NaOH as the buffering agent for the post-LOCA recirculation fluid. The NaOH is stored in one spray additive tank which contains a minimum of 8500 gallons of a NaOH solution with a concentration of 23 to 25 percent by weight. Upon receipt of a containment isolation Phase B signal, two positive displacement chemical injection pumps deliver the NaOH to the Quench Spray System (QSS) pump suctions. This chemical addition is intended to facilitate the removal of radioactive iodine from the containment atmosphere by achieving a spray pH of between 8.5 and 10.5. Upon depletion of the water source for the QSS (refueling water storage tank extreme low-low level signal) NaOH remaining in the spray additive tank is diverted from the quench spray pump suctions to the containment sump. The resulting sump fluid has a calculated minimum pH of 8.14 and a maximum of 9.03.

Plant modifications have already been performed to accommodate future use of NaTB. Six (6) seismically designed and mounted baskets have been installed on the lowest floor of the containment building. The baskets and anchor bolts are made out of stainless steel Type 304 or 316 materials. The design is in compliance with the Manual of Steel Construction, 9th Edition (Reference 2). Structural qualification considered the effects of deadweight and seismic loading including anticipated basket contents. Since the structure is bolted, thermal effects are negligible and consequently, were not analyzed. The seismic loading requirements are consistent with the current licensing basis description of seismic design provided in the BVPS-2 Updated Final Safety Analysis Report (UFSAR), Section 3.7.

Each NaTB basket has been designed to contain approximately 75 cubic feet of NaTB and is located with the objective of ensuring rapid dissolution of the NaTB. All baskets would be submerged by the post-LOCA flood inventory. The combined volume of the baskets contains sufficient NaTB at maximum hydration and minimum density to ensure that the containment sump water pH following a LOCA would be 7 or greater.

Initial loading of NaTB baskets would be performed based on weight. When the baskets are filled, the level of each basket would be noted and documented for reference in evaluating volume. Subsequent periodic surveillances would verify NaTB volume in each basket based on fill level as the basis for acceptance.

The introduction of filled NaTB baskets results in a minor decrease in containment net free volume and an increase in the available heat sinks in the containment. The additional heat sinks and the reduction in net free volume would not increase the containment peak pressure or decrease the containment pressure assumed in peak fuel cladding temperature calculations for LOCAs. The change does not affect the post-accident containment pressure and temperature profiles used for environmental qualification analyses, as reported in the BVPS-2 UFSAR. The volume of steel added by the baskets was assessed for the effect on maximum containment post-LOCA flood level, and there was no adverse impact.

Elimination of the NaOH spray additive would reduce the post accident containment sump fluid inventory. However, available NPSH calculated for the pumps taking suction from the sump (recirculation spray pumps) would not be adversely affected because the volume of NaOH was not credited when calculating sump inventory.

3.2 Sodium Tetraborate Evaluation

NaTB is predicted to result in a reduction in precipitate formation with no adverse side effects as demonstrated by alternate buffer testing documented in WCAP-16596-NP (Reference 1). As part of a PWROG chemical effects resolution effort, Westinghouse has evaluated several compounds as potential replacement buffers that would minimize the potential for chemical precipitate formation compared to NaOH following a LOCA. The NaOH spray, reacting with aluminum in the containment, has the potential to produce chemical precipitates such as sodium aluminum silicate ($NaAlSi_3O_8$) and aluminum oxyhydroxide (AlOOH), especially at higher pH values. The Westinghouse study determined that NaTB is a good candidate for replacing NaOH.

The proposed change would replace the addition of liquid NaOH in the spray with granular NaTB stored in baskets in the containment sump. As a result of this change the BVPS-2 quench spray would consist only of a boric acid solution with a spray pH as low as 4.6. As indicated in Standard Review Plan (SRP), Section 6.5.2, Rev 2, "Containment Spray as A Fission Product Cleanup System," fresh sprays (sprays with no dissolved iodine) are effective at scrubbing elemental iodine and thus a spray additive is unnecessary during the initial injection phase when the spray solution is being drawn from the Refueling Water Storage Tank (RWST). As described in the SRP, research has shown that elemental iodine can be scrubbed from the atmosphere with borated water, even at low pH. The SRP provides an equation for calculating a first-order removal coefficient that is not dependent on pH.

Since long-term use of a plain boric acid spray could increase the potential for elemental iodine re-evolution during the recirculation phase of the LOCA, the equilibrium sump solution pH must be increased.

The current licensing basis for BVPS-2 credits the Alternative Source Term (AST) with guidance from Regulatory Guide (RG) 1.183 (Reference 3) for calculating radiological dose consequences post-LOCA. The RG 1.183 guidance indicates that if the sump water pH is 7 or greater, then a licensee does not need to evaluate re-evolution of iodines for dose consequences. In accordance with the current licensing basis, the dose analysis need not address iodine re-evolution if the sump water pH of 7 or greater is achieved well within 16 hours after the LOCA and is maintained for the duration of the accident. The 16 hour period is based on NUREG/CR 5732 (Reference 4). The NaTB modification conforms to these aspects of the current licensing basis.

The change in the buffering agent from NaOH to NaTB results in an impact on the long term containment sump water pH. However, since the NaTB baskets were sized to ensure a long term sump water pH of 7 or greater, there is no impact on the current post-LOCA containment and ECCS leakage dose consequence models relative to iodine re-evolution. The only leakage pathway that is potentially impacted by the change in the sump pH was the RWST back-leakage pathway. This leakage pathway was evaluated for the proposed buffer change. The calculated integrated iodine release for this pathway is bounded by the current analysis and therefore the current LOCA dose consequence analysis of record for BVPS-2 remains valid for the NaTB modification.

The Environmental Qualification (EQ) program for BVPS-2 meets the requirements of 10 CFR 50.49. All equipment within the scope of this program has been evaluated for compliance with NUREG 0588 and 10 CFR 50.49 with guidance from Regulatory Guide 1.89 (Reference 5).

The current spray additive system design renders the quench spray solution alkaline because NaOH is injected into the boric acid solution from the RWST at the quench spray pump suctions. Equipment in the EQ program is qualified for a chemical spray with a pH range of 8.0 to 10.5. In the new design, the spray solution during the injection mode would be acidic, consisting of spray solution from the RWST only. The EQ components in the containment have been identified and evaluated for the effects of quench spray with a pH of 4.6 and an alkaline spray during the long term recirculation mode. The evaluation considered the chemical resistance of organic materials, the corrosive effects of metallic materials exposed to the spray, and the duration of the initial acidic spray followed by the longer term alkaline spray. The method used for the EQ evaluations relied on the original EQ test that bounded the pH range of the modified quench spray, when available. If component tests were not bounding, the evaluations were performed against industry information on the resistance of materials to chemicals. The physical installation was evaluated to determine what parts of the component would be subjected to the direct spray. Credit is taken for junction boxes, conduit, and Raychem seals. The evaluations concluded that all environmentally qualified equipment located in the containment is qualified for the revised quench and recirculating sprays without the need for additional protection from spray.

Branch Technical Position 6-1 (Reference 6) states that consideration should be given to hydrogen generation if a long term pH greater than 7.5 is used. Use of NaTB at BVPS-2 would result in a lower pH than for NaOH. Therefore, the post-LOCA hydrogen generation rate would not be increased.

Therefore, the proposed replacement of NaOH with NaTB has less potential for undesirable chemical effects, while maintaining an acceptable long-term sump pH range to minimize radioactivity releases and corrosion of containment materials. The proposed change would not have adverse effects on the radiological analysis, hydrogen generation, or the functional capability of reactor containment systems, structures, and components following a postulated LOCA.

3.3 Technical Specification Changes

The proposed TS changes described in Attachment A are needed to support plant modifications associated with replacement of NaOH with NaTB.

The proposed TS changes as they pertain to BVPS-2 would allow NaTB to replace NaOH and would accomplish the same purpose as existing TS 3.6.8 with respect to ensuring iodine retention effectiveness of the sump water during the recirculation phase of spray operation and minimizing the occurrence of chloride induced stress corrosion cracking of the stainless steel recirculation piping. Both additives maintain pH control to ensure iodine retention and to minimize stress corrosion cracking in stainless steel. However, the use of NaOH has been shown to potentially exacerbate post-LOCA sump screen blockage due to a potential adverse chemical interaction with certain insulation materials used in containment. Therefore, to reduce the potential for such an interaction, FENOC is proposing to replace the NaOH with NaTB which has essentially the same buffering agent characteristics but with less potential adverse consequences. A fully hydrated (decahydrate) form of NaTB would normally be used for initial filling and makeup to the baskets. This form is less likely to absorb large amounts of water under humid conditions. If exposed to dry containment conditions, there is a potential for some loss of water. The chemical properties of the buffer do not change as the result of water loss, but weight does decrease.

Proposed TS 3.6.9 is titled "Unit 2 Containment Sump pH Control System" to reflect the new method of pH control. The NaOH is a spray additive, but the NaTB would be dissolved in the post-LOCA fluid collected in the containment sump. The Limiting Conditions for Operation and Actions for NaOH and NaTB are similar. SRs 3.6.9.1 and 3.6.9.2 have the same intent as SRs 3.6.8.1 through 3.6.8.6, but reflect the modified design. SRs 3.6.9.1 and 3.6.9.2 are sufficient to ensure integrity and functionality of the passive delivery devices (the baskets) and to ensure that a sufficient quantity of NaTB would be delivered if required. SRs 3.6.9.1 and 3.6.9.2 are required to be performed less frequently during operation than the SRs for NaOH because the passive nature of the system. In addition, inaccessibility of the baskets while the plant is operating ensures that operability status would not change during the surveillance period (i.e., between refueling outages).

SR 3.6.9.1.b requirements for the quantity of NaTB are based on an analysis that determined the amount of NaTB needed to maintain long term post-LOCA containment sump pH at 7 or greater. The analysis considered the minimum and maximum quantities of boron and borated water. In addition, the formation of acid from radiolysis of air and water, radiolysis of chloride bearing electrical cable insulation and jacketing, and spilled reactor core inventory were included. The quantity of 292 cubic feet of NaTB reflected in proposed SR 3.6.9.1.b is the amount needed to maintain sump water pH at 7 or greater for 30 days assuming minimum NaTB density (48 lbs/ft^3) and maximum hydration.

Since the highest hydrated form of NaTB would normally be used when filling or making up to the baskets, it would not adsorb additional waters of hydration during storage in areas of elevated humidity.. However, the NaTB decahydrate has the potential to densify, occupying less volume than when initially installed. Densification would not affect predicted pH levels; however, a loss of volume identified during surveillances would require addition of NaTB and would increase the overall quantity of NaTB beyond the amount originally installed. The maximum pH that could be achieved would result if the baskets were filled to capacity at maximum NaTB densification. The analysis of this condition resulted in a maximum pH of 8.27 at the start of recirculation. This maximum pH value is bounded by the maximum evaluated pH of 10.5 for NaOH. Therefore, the effects of high pH sump water on equipment qualification and hydrogen generation remain bounded. Since the condition of the baskets being filled to capacity results in an acceptable sump water pH value, no requirements are specified for a NaTB maximum quantity.

Revisions to TS 3.6.8 involve changing the title to "Unit 1 Spray Additive System" and removing of all BVPS-2 requirements. These are administrative in nature and have no technical or safety impact on the existing BVPS-1 TS requirements or system operability.

4.0 REGULATORY EVALUATION

FirstEnergy Nuclear Operating Company proposes to revise Technical Specification (TS) 3.6.8, "Spray Additive System" to allow use of sodium tetraborate (NaTB) in lieu of sodium hydroxide (NaOH) as a containment spray system additive at Beaver Valley Power Station Unit No. 2 (BVPS-2). Use of NaTB is preferable because reactions between NaOH and certain materials in containment may produce undesirable chemical effects that could limit flow through containment sump strainers, thereby reducing available suction head for the Recirculation Spray (RS) pumps supplied by the strainers. Because NaOH is currently in use at both BVPS-1 and BVPS-2, TS 3.6.8 which is common to both units would be revised to remove the requirements for BVPS-2 (rendering TS 3.6.8 applicable to BVPS-1 only) and new TS 3.6.9, "Unit 2 Containment Sump pH Control System" would be created for BVPS-2. The new BVPS-2 TS would achieve the same overall purpose as the requirements that were removed from TS 3.6.8, but would reflect the specific characteristics of the system using NaTB rather than NaOH.

4.1 Significant Hazards Consideration

FirstEnergy Nuclear Operating Company 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 amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   Use of NaTB in lieu of NaOH would not involve a significant increase in probability of a previously evaluated accident because the containment spray additive is not an initiator of any analyzed accident. The NaTB would be stored and delivered by a passive method that does not have potential to affect plant operations. Any existing NaOH delivery system equipment which remains in place but is removed from service would meet existing seismic, electrical and containment isolation requirements. Therefore the change in additive, including removal of NaOH equipment from service, would not result in any failure modes that could initiate an accident.

   The spray additive is used to mitigate the consequences of a LOCA. Use of NaTB as an additive in lieu of NaOH would not involve a significant increase in the consequences of a previously evaluated accident because the amount of NaTB specified in the proposed TS would achieve a pH of 7 or greater, consistent with the current licensing basis. This pH is sufficient to achieve long-term retention of iodine by the containment sump fluid for the purpose of reducing accident related radiation dose following a LOCA.

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

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

   Response: No.

Regarding the proposed use of NaTB in lieu of NaOH, the NaTB would be stored and delivered by a passive method that does not have potential to affect plant operations. Any existing NaOH delivery system equipment remaining in place but which is removed from service would meet existing seismic, electrical and containment isolation requirements. Hydrogen generation would not be significantly impacted by the change. Therefore, no new failure mechanisms, malfunctions, or accident initiators would be introduced by the proposed change and it would not create the possibility of a new or different kind of accident from any previously evaluated.

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

   Response: No.

   Since the quantity of NaTB specified in the amended TS would reduce the potential for undesirable chemical effects while achieving radiation dose reductions, corrosion control and hydrogen generation effects that are comparable to NaOH, the proposed change does not involve a significant reduction in a margin of safety. The primary function of an additive is to reduce loss of coolant accident consequences by controlling the amount of iodine fission products released to containment atmosphere from reactor coolant accumulating in the sump during a LOCA. Because the amended technical specifications would achieve a pH of 7 or greater using NaTB, dose related safety margins would not be significantly reduced. Use of NaTB reduces the potential for undesirable chemical effects that could interfere with recirculation flow through the sump strainers. Any existing NaOH delivery system equipment which remains in place but is removed from service would meet existing seismic, electrical and containment isolation requirements and would not interfere with operation of the existing containment or containment spray system.

Based on the above, FirstEnergy Nuclear Operating Company concludes that the proposed amendments do not involve a 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.

4.2 Applicable Regulatory Requirements/Criteria

Changes described in the license amendment request comply with the following aspects of the regulations and regulatory guides:

Section 50.44 of 10 CFR Part 50.44, "Combustible Gas Control for Nuclear Power Reactors" relates to the requirement for PWR plants to have the capability for ensuring that the concentration of combustible gasses in containment is below a level that would support combustion or detonation that could cause loss of containment integrity.

10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants" requires qualification of electrical equipment with respect to environmental conditions at the location where the equipment must perform its safety function.

10 CFR 50.67, "Accident Source Term" and Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors" provide criteria for evaluating the consequences of applicable design basis accidents. RG 1.183 indicates that analyses should consider iodine re-evolution if the sump liquid pH is not maintained at 7 or greater.

GDC 38, "Containment Heat Removal" and Standard Review Plan (SRP) Section 6.2.2, "Containment Heat Removal Systems" relate to the capability of the containment system to accomplish its safety function. The SRP indicates that the spray system should be designed to accomplish this without pump cavitation occurring. A supporting analysis should be presented in sufficient detail to permit the staff to determine the adequacy of the analysis and should show that the available NPSH is greater than the required NPSH.

GDC 41, "Containment Atmosphere Cleanup," requires systems to control fission products, hydrogen, oxygen, and other substances which may be released into the reactor containment to reduce, consistent with the functioning of other associated systems, the concentration and quality of fission products released to the environment following postulated accidents, and to control the concentration of hydrogen or oxygen and other substances in the containment atmosphere following postulated accidents to assure that containment integrity is maintained.

GDC 42, "Inspection of Containment Atmosphere Cleanup Systems," requires the containment atmosphere cleanup systems to be designed to permit appropriate periodic inspection of important components, such as filter frames, ducts, and piping to assure the integrity and capability of the systems.

GDC 43, "Testing of Containment Atmosphere Cleanup Systems," requires the containment atmosphere cleanup systems to 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 systems such as fans, filters, dampers, pumps, and valves and (3) the operability of the systems as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the systems into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of associated systems.

4.3 Precedent

The following licensees have been granted recent license amendments to implement buffer changes involving use of NaTB using passive delivery systems.

Replacement of NaOH with NaTB has been proposed in a license amendment request for Indian Point Unit 3 dated February 28, 2008 (Accession No. ML080670211). The NRC subsequently granted Amendment No. 236 to the facility operating license by letter dated June 9, 2008 (Accession No. ML081140142).

Replacement of trisodium phosphate (TSP) with NaTB has been proposed in a license amendment request for Indian Point Unit 2 dated October 24, 2007 (Accession No. ML073040292). The NRC subsequently granted Amendment No. 253 to the facility operating license by letter dated February 7, 2008 (Accession No. ML080080319).

Replacement of TSP with NaTB has been proposed for a single operating cycle in a license amendment request for Fort Calhoun Unit No. 1 dated August 21, 2006 (Accession No. ML062340039), and for the remainder of the license duration in a subsequent license amendment request dated September 11, 2007 (Accession No. ML072540536). The NRC subsequently granted Amendment Nos. 247 and 253, respectively, to the facility operating license by letters dated November 13, 2006 (Accession No. ML063120248) and March 25, 2008 (Accession No. ML080500023).

4.4 Conclusions

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.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, 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 effluents that may be released offsite, and (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. WCAP-16596-NP, "Evaluation of Alternative Emergency Core Cooling System Buffering Agents," dated July 2006.

2. American Institute of Steel Construction, "Manual of Steel Construction," 9th Edition.

3. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000.

4. NUREG/CR 5732, "Iodine Chemical Forms in LWR Severe Accidents – Final Report," April 1992.

5. Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," June 1984.

6. Branch Technical Position 6-1, "pH for Emergency Coolant Water for Pressurized Water Reactors," dated March 2007.

Attachment A

Beaver Valley Power Station
Proposed Technical Specification Changes

License Amendment Request 08-006

The following is a list of the affected pages:

3.6.8 – 1
3.6.8 – 2
3.6.9 – 1 *

* New page to be inserted.

3.6 CONTAINMENT SYSTEMS

3.6.8 Unit 1 Spray Additive System

LCO 3.6.8 The Spray Additive System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

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
	AND		
	B.2	Be in MODE 5.	84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.8.1	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
SR 3.6.8.2	Verify spray additive tank solution volume is ≥ 4700 gallons. ~~(Unit 1)~~ ~~≥ 8500 gallons (Unit 2).~~	184 days
SR 3.6.8.3	Verify spray additive tank NaOH solution concentration is ≥ 19.5% and ≤ 20% by weight. ~~(Unit 1)~~ ~~≥ 23% and ≤ 25% by weight (Unit 2).~~	184 days
SR 3.6.8.4	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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.8.5	Verify that each chemical injection pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.6.8.6	Verify on recirculation flow that each chemical injection pump develops the required flow rate.	In accordance with the Inservice Testing Program

3.6 CONTAINMENT SYSTEMS

3.6.9 Unit 2 Containment Sump pH Control System

LCO 3.6.9 The Containment Sump pH Control System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment Sump pH Control System inoperable.	A.1 Restore Containment Sump pH Control System to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.9.1	Perform a visual inspection of the six sodium tetraborate storage baskets to verify the following: a. Each storage basket is in place and intact; and, b. Collectively contain ≥ 292 cubic feet of sodium tetraborate.	18 months
SR 3.6.9.2	Verify that a sample from the sodium tetraborate baskets provides adequate pH adjustment of containment sump borated water.	18 months

Attachment B

Beaver Valley Power Station
Proposed Technical Specification Bases Changes

License Amendment Request 08-006

Technical Specification Bases changes are provided for information only.

The following is a list of the affected pages:

Page		Page
B 3.3.2 - 14		
B 3.3.2 – 15		B 3.6.8 – 1
		B 3.6.8 – 2
B 3.6.6 – 1		B 3.6.8 – 3
B 3.6.6 – 2*		B 3.6.8 – 4
B 3.6.6 – 3*		B 3.6.8 – 5
B 3.6.6 – 4		
B 3.6.6 – 5*		B 3.6.9 – 1**
B 3.6.6 – 6*		B 3.6.9 – 2**
		B 3.6.9 – 3**
B 3.6.7 – 1*		B 3.6.9 – 4**
B 3.6.7 – 2		
B 3.6.7 – 3*		
B 3.6.7 – 4*		
B 3.6.7 – 5*		
B 3.6.7 – 6*		
B 3.6.7 – 7*		
B 3.6.7 – 8*		
B 3.6.7 – 9*		

* No Change. Page provided for context only.
** New page to be inserted.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

This Function is anticipatory in nature and has a lead/lag ratio of 50/5.

Steam Line Pressure - Low must be OPERABLE in MODES 1, 2, and 3 (above P-11) when a secondary side break or stuck open valve could result in the rapid depressurization of the steam lines. This signal may be manually blocked by the operator below the P-11 setpoint. Below P-11, feed line break is not a concern. Inside containment SLB will be terminated by automatic steam line isolation via Containment Pressure-Intermediate High High, and outside containment SLB will be terminated by the Steam Line Pressure - Negative Rate - High signal for steam line isolation. This Function is not required to be OPERABLE in MODE 4, 5, or 6 because there is insufficient energy in the secondary side of the unit to cause an accident.

2. <u>Containment Spray Systems</u>

Containment Spray provides five primary functions:

1. Lowers containment pressure and temperature after an HELB in containment,
2. Reduces the amount of radioactive iodine in the containment atmosphere,
3. Adjusts the pH of the water in the containment recirculation sump after a large break LOCA,
4. Mixes the containment atmosphere and minimizes the amount of hydrogen accumulation, and
5. Removes containment heat.

These functions are necessary to:

- Ensure the pressure boundary integrity of the containment structure,
- Limit the release of radioactive iodine to the environment in the event of a failure of the containment structure,
- Minimize corrosion of the components and systems inside containment following a LOCA,
- Control subcompartment and general area hydrogen concentrations to less than 4% by volume, and

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- Remove decay heat to ensure that the containment gas and sump water temperatures are within the containment liner and piping thermal stress limits.

The containment spray actuation signal starts the Quench Spray pumps and aligns the discharge of the pumps to the containment spray nozzle headers in the upper levels of containment. Water is drawn from the RWST by the Quench Spray pumps ~~and mixed with a sodium hydroxide solution from the spray additive tank~~. At Unit 1, water from the RWST is mixed with a sodium hydroxide solution from the spray additive tank at the suctions of the Quench Spray pumps. At Unit 2, sodium tetraborate is added to the recirculation spray solution as the sodium tetraborate storage baskets are submerged by water accumulating in the containment sump. The Quench Spray pumps are manually stopped following receipt of a low RWST level alarm. The Recirculation Spray pumps are started automatically and take suction from the containment sump to continue containment spray. Recirculation spray is actuated manually or by Containment Pressure - High High coincident with RWST Level Low.

a.(1) Quench Spray - Manual Initiation

The operator can initiate quench spray at any time from the control room by simultaneously actuating two containment spray actuation switches in the same train. Because an inadvertent actuation of quench spray could have undesirable consequences, two switches must be actuated simultaneously to initiate quench spray. There are two sets of two switches each in the control room. Simultaneously actuating the two switches in either set will actuate quench spray in both trains in Unit 2 and one train in Unit 1. Two Manual Initiation switches in each train are required to be OPERABLE to ensure no single failure disables the Manual Initiation Function. Manual Initiation of quench spray also actuates Phase B containment isolation. Note that manual initiation of containment spray will initiate a recirculation spray pump start if an RWST Level Low signal is present. Alternatively, an operator can individually start each recirculation spray pump using the control board pump switches.

a.(2) Quench Spray - Automatic Actuation Logic and Actuation Relays

This LCO requires two trains to be OPERABLE. Actuation logic consists of all circuitry housed within the actuation subsystems, including the initiating relay contacts responsible for actuating the ESF equipment. Manual and automatic initiation of quench spray must be OPERABLE in MODES 1, 2, and 3 when there is a potential for an accident to occur, and sufficient energy in the primary or secondary systems to pose a threat to containment integrity due to overpressure conditions. Manual initiation is

B 3.6 CONTAINMENT SYSTEMS

B 3.6.6 Quench Spray (QS) System

BASES

BACKGROUND

The QS System is designed to provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. The QS System, operating in conjunction with the Recirculation Spray (RS) System, is designed to cool and depressurize the containment structure to less than 50% of the peak calculated containment pressure within 24 hours following a Design Basis Accident (DBA). Reduction of containment pressure and the iodine removal capability of the spray limit the release of fission product radioactivity from containment to the environment in the event of a DBA.

The QS System consists of two separate trains of adequate capacity, each capable of meeting the design bases. Each train includes a spray pump, spray headers, nozzles, valves, and piping. The two Unit 2 containment spray ring headers are shared by both QS System trains. Each train is powered from a separate Engineered Safety Features (ESF) bus. The refueling water storage tank (RWST) supplies borated water to the QS System.

The QS System is actuated either automatically by a Containment High-High pressure signal or manually. The QS System provides a spray of cold borated water into the upper regions of containment to reduce the containment pressure and temperature during a DBA. Each train of the QS System provides adequate spray coverage to meet the system design requirements for containment heat and iodine fission product removal. The Unit 1 QS System also provides flow to the containment sump to improve the net positive suction head available to the RS System pumps.

The Unit 1Spray Additive System injects a sodium hydroxide (NaOH) solution into the quench spray. ~~The Unit 2 Spray Additive System also injects NaOH solution directly into the containment sump.~~ The resulting alkaline pH of the spray ~~and Unit 2 containment sump~~ enhances the ability of the spray to scavenge iodine fission products from the containment atmosphere. In Unit 2 the Containment Sump pH Control System provides sodium tetraborate (NaTB) to the containment sump. The NaOH added to the Unit 1 spray and the NaTB added to the Unit 2 containment sump water ~~also~~ ensure~~s~~ an alkaline pH for the solution recirculated in the containment sump. The alkaline pH of the containment sump water minimizes the evolution of iodine and minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to the fluid.

The QS System is a containment ESF system. It is designed to ensure that the heat removal capability required during the post accident period can be attained. Operation of the QS System and RS System provides the required heat removal capability to limit post accident conditions to

BACKGROUND (continued)

less than the containment design values and depressurize the containment structure to less than 50% of the peak calculated containment pressure within 24 hours following a DBA.

The QS and RS Systems limit the temperature and pressure that could be expected following a DBA and ensures that containment leakage is maintained consistent with the accident analysis.

APPLICABLE SAFETY ANALYSES

The limiting DBAs considered are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed, with respect to the worst case single active failure. The appropriate single failure is assumed in the safety analysis. However, the maximum calculated peak containment pressure results from a LOCA postulated to occur in the RCS hot leg. The calculated peak containment pressure from this location occurs during the blowdown phase, prior to the actuation of any safety related equipment, consequently there is no single failure assumed in this analysis. The SLB resulted in the maximum calculated peak containment temperature and containment liner temperature. The Unit 1 SLB that resulted in the peak containment temperature occurred at 100% RTP, with the worst case single failure of a main steam check valve. The Unit 1 SLB that resulted in the peak containment liner temperature occurred at 30% RTP, with the worst case single failure of a main steam check valve. The Unit 2 SLB that resulted in the peak containment temperature occurred at 100% RTP and peak containment liner temperature occurred at 0% RTP, with the worst case single failure of a main steam isolation valve.

During normal operation, the containment internal pressure is maintained within the limits of LCO 3.6.4, "Containment Pressure." Maintaining containment pressure within the required limits during operation ensures the capability to depressurize the containment to less than 50% of the peak calculated containment pressure within 24 hours after a DBA.

The DBA analyses (Ref. 1) show that the maximum peak containment pressure of 43.1 psig (Unit 1) and 44.8 psig (Unit 2) results from the LOCA analysis and is calculated to be less than the containment design pressure. The maximum peak containment atmosphere temperature of 355.9°F (Unit 1) and 345.6°F (Unit 2) and the maximum containment liner temperature of 257.9°F (Unit 1) and 248.7°F (Unit 2) results from the SLB analysis. The containment liner design temperature is 280°F. The containment air temperatures resulting from DBAs are used to establish

BASES

APPLICABLE SAFETY ANALYSES (continued)

EQ requirements (Ref. 2) for equipment inside containment. The EQ requirements provide assurance the equipment inside containment required to function during and after a DBA performs as designed during the adverse environmental conditions resulting from a DBA. Air temperature profiles (containment air temperature vs time) are calculated for each DBA to establish EQ design requirements for the equipment inside containment. The equipment inside containment required to function during and after a DBA is confirmed to be capable of performing its design function under the applicable EQ requirement (i.e., air temperature profile). Therefore, it is concluded that the calculated transient containment atmosphere temperatures resulting from various DBAs, including the most limiting temperature from a SLB, are acceptable.

The modeled QS System actuation from the containment analysis is based upon a response time associated with exceeding the Containment High-High pressure signal setpoint to achieving full flow through the quench spray nozzles. A delayed response time initiation provides conservative analyses of peak calculated containment temperature and pressure responses. The QS System total response time is specified in the Licensing Requirements Manual (LRM) and includes the signal delay, diesel generator startup time, and system startup time.

For certain aspects of accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the cooling effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 3).

Inadvertent actuation of the QS System is also evaluated, and the resultant reduction in containment pressure is calculated. The maximum calculated reduction in containment pressure does not reduce containment pressure below the minimum containment design pressure of 8.0 psia.

The QS System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

During a DBA, one train of the QS System is required to provide the heat removal capability assumed in the safety analyses for containment. The required QS System train, with spray pH adjusted by the Spray Additive System for Unit 1, is also necessary to scavenge iodine fission products from the containment atmosphere and ensure their retention in the containment sump water. In Unit 2, pH control for iodine fission product removal is provided by the Containment Sump pH Control System. To ensure that ~~these~~ requirements for heat removal and pH control at BVPS-1 and for heat removal at BVPS-2 are met, two QS System trains must be OPERABLE with power from two safety related, independent power supplies. Therefore, in the event of an accident, at least one train in each system will operate, assuming that the worst case single active failure occurs.

Each QS System includes a spray pump, spray headers, nozzles, valves, piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature requiring the operation of the QS System.

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

ACTIONS

A.1

If one QS train is inoperable, it must be restored to OPERABLE status within 72 hours. The components in this degraded condition are capable of providing 100% of the heat removal needs (and iodine removal needs for Unit 1) after an accident. The 72 hour Completion Time was developed taking into account the redundant heat removal capabilities (and iodine removal capabilities in Unit 1) afforded by the OPERABLE train and the low probability of a DBA occurring during this period.

B.1 and B.2

If the Required Action and associated Completion Time are not met, 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 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

No change. Provided for context only.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.6.1

Verifying the correct alignment of manual, power operated, and automatic valves, excluding check valves, in the QS System provides assurance that the proper flow path exists for QS System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they were verified to be in the correct position prior to being secured. This SR does not require any testing or valve manipulation. Rather, it involves verification that those valves outside containment and capable of potentially being mispositioned are in the correct position.

SR 3.6.6.2

Verifying that each QS System pump's developed head at the flow test point is greater than or equal to the required developed head ensures that QS System pump performance has not degraded during the cycle. The term "required developed head" refers to the value that is assumed in the Containment Integrity Safety Analysis for the QS pump's developed head at a specific flow point. This value for the required developed head at a flow point is defined as the Minimum Operating Point (MOP) in the Inservice Testing (IST) Program. The verification that the pump's developed head at the flow test point is greater than or equal to the required developed head is performed by using a MOP curve. The MOP curve is contained in the IST Program and was developed using the required developed head at a specific flow point as a reference point. From the reference point, a curve was drawn which is a constant percentage below the current pump performance curve. Based on the MOP curve, a verification is performed to ensure that the pump's developed head at the flow test point is greater than or equal to the required developed head. Flow and differential head are normal test parameters of centrifugal pump performance required by the ASME Code (Ref. 4). Since the QS System pumps cannot be tested with flow through the spray headers, they are tested on bypass flow. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.6.3 and SR 3.6.6.4

These SRs ensure that each QS automatic valve actuates to its correct position and each QS pump starts upon receipt of an actual or simulated 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 these Surveillances under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillances were performed with the reactor at power. However, this does not preclude performance of this Surveillance at power when it can be accomplished in a safe manner. Operating experience has shown that these components usually pass the Surveillances when performed at an 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.6.5

This SR is performed following maintenance when the potential for nozzle blockage has been determined to exist by an engineering evaluation. The required evaluation will also specify an appropriate test method for determining the spray header OPERABILITY. This SR ensures that each spray nozzle is unobstructed and that spray coverage of the containment during an accident is not degraded. Due to the passive nature of the design of the nozzle, a test following maintenance that results in the potential for nozzle blockage is considered adequate to detect obstruction of the nozzles.

REFERENCES

1. UFSAR, Chapter 14 (Unit 1), and UFSAR, Section 6.2 (Unit 2).
2. 10 CFR 50.49.
3. 10 CFR 50, Appendix K.
4. ASME code for Operation and Maintenance of Nuclear Power Plants.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.7 Recirculation Spray (RS) System

BASES

BACKGROUND

The RS System, operating in conjunction with the Quench Spray (QS) System, is designed to limit the post accident pressure and temperature in the containment to less than the design values and to depressurize the containment structure to less than 50% of the peak calculated containment pressure within 24 hours following a Design Basis Accident (DBA). The reduction of containment pressure and the removal of iodine from the containment atmosphere by the spray limit the release of fission product radioactivity from containment to the environment in the event of a DBA.

The RS System consists of two separate trains of adequate capacity, each capable of meeting the design and accident analysis bases.

Unit 1

The Unit 1 Recirculation Spray System consists of four 50 percent capacity subsystems (2 per train). Each subsystem is composed of a spray pump, associated heat exchanger and flow path. Two of the recirculation spray pumps are located outside containment (RS-P-2A and RS-P-2B) and two pumps are located inside containment (RS-P-1A and RS-P-1B). The flow path from each pump is piped to an individual 180° recirculation spray header inside containment. Train "A" electrical power and river water is supplied to the subsystems containing recirculation spray pumps RS-P-1A and RS-P-2A. Train "B" electrical power and river water is supplied to the subsystems containing recirculation spray pumps RS-P-1B and RS-P-2B.

Unit 2

The Unit 2 Recirculation Spray System consists of four 50 percent capacity subsystems (2 per train). Each subsystem is composed of a spray pump, associated heat exchanger and flow path. All recirculation spray pumps are located outside containment and supply flow to two 360° recirculation spray ring headers located in containment. One spray ring is supplied by the "A" train subsystem containing recirculation spray pump 2RSS-P21A and the "B" train subsystem containing recirculation spray pump 2RSS-P21D with the other spray ring being supplied by the "A" train subsystem containing recirculation spray pump 2RSS-P21C and the "B" train subsystem containing recirculation spray pump 2RSS-P21B. When the water in the refueling water storage tank has reached a predetermined Level Extreme Low setpoint, the C and D subsystems are automatically switched to the cold leg recirculation mode of Emergency Core Cooling System (ECCS) operation.

BACKGROUND (continued)

Each train of the RS System provides adequate spray coverage to meet the system design requirements for containment heat and iodine fission product removal.

The RS System provides a spray of subcooled water into the upper regions of containment to reduce the containment pressure and temperature during a DBA. At Unit 1, upon receipt of a coincident High High Containment Pressure signal (Containment Isolation Phase B (CIB)) and a RWST Level Low signal, the Unit 1 RS-P-1A and RS-P-1B pumps immediately start. The Unit 1 RS-P-2A and RS-P-2B pumps start after a 15 ± 3 second time delay for emergency generator loading considerations. At Unit 2, upon receipt of a High-High Containment Pressure signal (Containment Isolation Phase B (CIB)) coincident with an RWST Level Low, all the Unit 2 RS pumps start immediately following receipt of the actuations signal. The RS pumps take suction from the containment sump and discharge through their respective spray coolers to the spray headers and into the containment atmosphere. Heat is transferred from the containment sump water to river/service water in the spray coolers.

The Unit 1 Spray Additive System injects a sodium hydroxide (NaOH) solution into the suction of the QS System pumps. The Unit 2 Containment Sump pH Control System provides sodium tetraborate to the containment sumpSpray Additive System also injects NaOH solution directly into the containment sump. The NaOH added to the Unit 1 QS System spray and the sodium tetraborate added to the Unit 2 containment sump ensures an alkaline pH for the solution recirculated in the containment sump. The resulting alkaline pH of the RS spray (pumped from the sump) enhances the ability of the spray to scavenge iodine fission products from the containment atmosphere. The alkaline pH of the containment sump water minimizes the evolution of iodine and minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to the fluid.

The RS System is a containment ESF system. It is designed to ensure that the heat removal capability required during the post accident period can be attained. Operation of the QS and RS systems provides the required heat removal capability to limit post accident conditions to less than the containment design values and depressurize the containment structure to less than 50% of the peak calculated containment pressure within 24 hours following a DBA.

The RS System limits the temperature and pressure that could be expected following a DBA and ensures that containment leakage is maintained consistent with the accident analysis.

APPLICABLE SAFETY ANALYSES

The limiting DBAs considered are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients; DBAs are assumed not to occur simultaneously or consecutively. The postulated DBAs are analyzed assuming the worst case single active failure. The appropriate single failure is assumed in the safety analysis. However, the maximum calculated peak containment pressure results from a LOCA postulated to occur in the RCS hot leg. The calculated peak containment pressure from this location occurs during the blowdown phase, prior to the actuation of any safety related equipment, consequently there is no single failure assumed in this analysis. The SLB resulted in the maximum calculated peak containment temperature and containment liner temperature. The Unit 1 SLB that resulted in the peak containment temperature occurred at 100% RTP, with the worst case single failure of a main steam check valve. The Unit 1 SLB that resulted in the peak containment liner temperature occurred at 30% RTP, with the worst case single failure of a main steam check valve. The Unit 2 SLB that resulted in the peak containment temperature occurred at 100% RTP, with the worst case single failure of a main steam isolation valve (Ref. 1). The Unit 2 SLB that resulted in the peak containment liner temperature occurred at 0% RTP, with the worst case single failure of a main steam isolation valve (Ref. 1).

The peak containment pressure following a high energy line break is affected by the initial total pressure and temperature of the containment atmosphere. Maximizing the initial containment total pressure and average atmospheric temperature maximizes the calculated peak pressure.

During normal operation, the containment internal pressure is maintained within the limits of LCO 3.6.4, "Containment Pressure." Maintaining containment pressure within the required limits during operation ensures the capability to depressurize the containment to less than 50% of the peak calculated containment pressure within 24 hours after a DBA. This capability and the variation of containment pressure are functions of river/service water temperature, RWST water temperature, and the containment air temperature.

The DBA analyses show that the maximum peak containment pressure of 43.1 psig (Unit 1) and 44.8 psig (Unit 2) results from the LOCA analysis and is calculated to be less than the containment design pressure. The maximum containment atmosphere temperature of 355.9°F (Unit 1) and 346.6°F (Unit 2) and the maximum containment liner temperature of 257.9°F (Unit 1) and 248.7°F (Unit 2) result from the SLB analysis. The containment liner design temperature is 280°F. The containment air temperatures resulting from DBAs are used to establish equipment qualification (EQ) requirements (Ref. 2) for equipment inside containment.

APPLICABLE SAFETY ANALYSES (continued)

The EQ requirements provide assurance the equipment inside containment required to function during and after a DBA performs as designed during the adverse environmental conditions resulting from a DBA. Air temperature profiles (containment air temperature vs time) are calculated for each DBA to establish EQ design requirements for the equipment inside containment. The equipment inside containment required to function during and after a DBA is confirmed to be capable of performing its design function under the applicable EQ requirement (i.e., air temperature profile). Therefore, it is concluded that the calculated transient containment atmosphere temperatures resulting from various DBAs, including the most limiting temperature from a SLB, are acceptable. The RS System is not credited in the SLB containment analysis.

The RS System actuation model from the containment analysis is based upon a response time between receipt of the RWST Level Low signal in coincidence with the Containment Pressure High High to achieving full flow through the RS System spray nozzles. A delay in response time initiation provides conservative analyses of peak calculated containment temperature and pressure. The RS System maximum time from coincidence of Containment Pressure High High and RWST Level Low to the start of effective RS spray is 65 seconds for Unit 1 and 77 seconds for Unit 2.

In the case of the Unit 2 RS System, the containment safety analysis models the operation of the system consistent with the system design. The Unit 2 analysis models the RS subsystems starting in the spray mode of operation. When the unit is shifted to the ECCS recirculation mode of operation the containment analysis models a reduction in recirculation spray flow to account for the Unit 2 RS subsystems used for the ECCS low head recirculation function.

For certain aspects of accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the cooling effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 3).

The RS System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

During a DBA, one train (two subsystems) of the RS System is required to provide the minimum heat removal capability assumed in the safety analysis. To ensure that this requirement is met, four RS subsystems must be OPERABLE. This will ensure that at least one train will operate assuming the worst case single failure occurs.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause an increase in containment pressure and temperature requiring the operation of the RS System.

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

ACTIONS

The ACTIONS are modified by a Note that is only applicable to Unit 2. The Note states that in addition to the applicable Required Actions of LCO 3.6.7, "RS System," the Conditions and Required Actions of LCO 3.5.2, "ECCS Operating," or LCO 3.5.3, "ECCS Shutdown," may also be applicable when subsystem(s) containing RS pumps 2RSS-P21C or 2RSS-P21D are inoperable. The Note is provided to identify the relationship of these RS subsystems to the Unit 2 ECCS design. Although the affected subsystems are identified as part of the RS System, they also provide an ECCS safety function (low head recirculation). Therefore, depending on the inoperable condition of these Unit 2 RS subsystems the Actions of one or both of the affected LCOs (RS System and ECCS) may be applicable.

A.1

This Required Action is only applicable to Unit 1. With one of the RS subsystems inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. The components in this degraded condition are capable of providing more than 100% of the heat removal needs (i.e., three of the four RS subsystems remain OPERABLE) after an accident. The 7 day Completion Time was developed taking into account the redundant heat removal capabilities afforded by combinations of the RS and QS systems and the low probability of a DBA occurring during this period.

The Action Condition is modified by a Note that identifies the Action as only applicable to Unit 1.

No change. Provided for context only.

ACTIONS (continued)

B.1

This Required Action is only applicable to Unit 1. With two of the required RS subsystems inoperable in the one train, at least one of the inoperable RS subsystems must be restored to OPERABLE status within 72 hours. The components in this degraded condition are capable of providing 100% of the heat removal needs after an accident. The 72 hour Completion Time was developed taking into account the redundant heat removal capability afforded by the OPERABLE subsystems, a reasonable amount of time for repairs, and the low probability of a DBA occurring during this period.

The Action Condition is modified by a Note that identifies the Action as only applicable to Unit 1.

C.1

This Required Action is only applicable to Unit 2. With a single RS subsystem inoperable or two subsystems inoperable in the same train, the inoperable subsystem(s) must be restored to OPERABLE status within 72 hours. The remaining OPERABLE subsystems in this degraded condition are capable of providing 100% of the required heat removal and ECCS low head recirculation functions after an accident. The 72 hour Completion Time was developed taking into account the redundant capability afforded by the remaining OPERABLE subsystems, a reasonable amount of time for repairs, and the low probability of a DBA occurring during this period.

The Action Condition is modified by a Note that identifies the Action as only applicable to Unit 2.

D.1 and D.2

If the inoperable RS subsystem(s) 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 additional time and is reasonable considering that the driving force for a release of radioactive material from the Reactor Coolant System is reduced in MODE 3.

BASES

ACTIONS (continued)

E.1

With three or more RS subsystems inoperable, the unit is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.6.7.1

Verifying the correct alignment of manual, power operated, and automatic valves, excluding check valves, in the RS System provides assurance that the proper flow path exists for operation of the RS System. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified as being in the correct position prior to being secured. This SR does not require any testing or valve manipulation. Rather, it involves verification that those valves outside containment and capable of potentially being mispositioned are in the correct position.

SR 3.6.7.2

Verifying that each RS System pump's developed head at the flow test point is greater than or equal to the required developed head ensures that RS System pump performance has not degraded during the cycle. The term "required developed head" refers to the value that is assumed in the Containment Integrity Safety Analysis for the RS pump's developed head at a specific flow point. This value for the required developed head at a flow point is defined as the Minimum Operating Point (MOP) in the Inservice Testing (IST) Program. The verification that the pump's developed head at the flow test point is greater than or equal to the required developed head is performed by using a MOP curve. The MOP curve is contained in the IST Program and was developed using the required developed head at a specific flow point as a reference point. From the reference point, a curve was drawn which is a constant percentage below the current pump performance curve. Based on the MOP curve, a verification is performed to ensure that the pump's developed head at the flow test point is greater than or equal to the required developed head. Flow and differential head are normal test parameters of centrifugal pump performance required by the ASME Code (Ref. 4). Since the RS System pumps cannot be tested with flow through the spray headers, they are tested on bypass flow. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.7.3

These SRs ensure that each automatic valve actuates and that the RS System pumps start upon receipt of an actual or simulated coincident with a Containment Pressure High High/RWST Level Low signal. However, the Unit 1 RS-P-2A and RS-P-2B pumps start after an additional delay of 15 ± 3 seconds for emergency diesel generator loading considerations. The start delay time is also verified for the RS System pumps.

For the RS function of the Containment Spray System, this Surveillance includes a verification of the associated required slave relay operation. Recirculation Spray – Automatic Actuation, Function 2.b.1 in LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," does not include a requirement to perform a SLAVE RELAY TEST due to equipment safety concerns if such a test was performed at power. Therefore, verification of the required slave relay OPERABILITY for the Recirculation Spray-Automatic Actuation, Function 2.b.1 in LCO 3.3.2 is included in this 18-month Surveillance.

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. However, this does not preclude performance of this Surveillance at power when it can be accomplished in a safe manner. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency was considered to be acceptable from a reliability standpoint.

SR 3.6.7.4

This SR is performed following maintenance when the potential for nozzle blockage has been determined to exist by an engineering evaluation. The required evaluation will also specify an appropriate test method for determining the spray ring OPERABILITY. Due to the passive design of the spray rings and their normally dry state, a test following maintenance that results in the potential for nozzle blockage is considered adequate for detecting obstruction of the nozzles.

No change. Provided for context only.

BASES

REFERENCES	1.	UFSAR, Chapter 14 (Unit 1), and UFSAR, Section 6.2 (Unit 2).
	2.	10 CFR 50.49.
	3.	10 CFR 50, Appendix K.
	4.	ASME code for Operation and Maintenance of Nuclear Power Plants.

Provided for information only.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.8 Unit 1 Spray Additive System

BASES

BACKGROUND

The Spray Additive System (commonly referred to as the Chemical Addition System) is a subsystem of the Quench Spray (QS) 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 by the addition of sodium hydroxide (NaOH). This alkaline pHthat 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.

Unit 1

The addition of the NaOH solution from the spray additive tank occurs when the Spray Additive System is initiated by a containment isolation phase B signal. Two redundant spray additive subsystems, one for each train of the QS System, supply the NaOH solution to the suction of the QS pumps. Each subsystem contains two 50% capacity positive displacement pumps and associated flow path valves. The two spray additive subsystems are electrically redundant and independent. Two subsystems are required OPERABLE to ensure the safety function can be performed in the event a single active failure disables one subsystem or one train of the QS System. During the time the spray additive tank is being injected into the QS System, the resulting quench spray has a pH of 8.5 to 10.4. The final pH of the containment sump water after a DBA, including the contents of the refueling water storage tank (RWST), is approximately 7.9 to 8.9.

Unit 2

The addition of the NaOH solution from the spray additive tank to the quench spray is accomplished by means of two redundant, positive displacement pumps and associated flow path valves. Each pump provides 100% capacity NaOH injection for both trains of the QS System. One positive displacement pump is designated as a preferred pump, with the second one used as a backup. In the automatic mode of operation, the Train A pump is started by a containment isolation phase B signal. Should the Train A pump not start or stop during its required operation, the Train B pump is started by a containment isolation phase B signal and a low flow signal from the Train A pump. The start signal for the Train A pump will be blocked at this time. Only one pump in operation is

Provided for information only.

BASES

BACKGROUND (continued)

~~required. However, both pumps are required OPERABLE to ensure the safety function can be performed in the event a single active failure disables one pump. The operation of the Spray Additive System is divided into two stages. The first stage directs flow from the spray additive tank to the suction of the QS pumps upon receiving a containment isolation phase B signal. This alignment maintains the spray pH between 8.5 and 10.5. The second stage begins once the RWST is below a predetermined level. The flow from the spray additive pump is then automatically diverted from the suction of the QS pumps to the containment sump. This alignment will inject the remaining NaOH solution into the containment sump. The final pH of the containment sump water after a DBA, including the contents of the RWST, is approximately 8 which exceeds the minimum acceptable pH of 7.~~

The operation of the Spray Additive System enhances the iodine absorption capacity of the Quench Spray System and 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 for the first 24 hours following the accident and at half the design value for the next 29 days. The analysis assumes that 63% of containment is covered by the spray (Ref. 1).

The DBA response time assumed for the Spray Additive System is the same as for the Quench Spray System and is discussed in the Bases for LCO 3.6.6, "Quench Spray System."

The DBA analyses assume that one train of the Quench Spray System/Spray Additive System is inoperable and that sufficient NaOH solution is added to achieve the required pH values.

The Spray Additive System satisfies Criterion 3 of 10 CFR 50.36(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 raise the spray and containment sump pH to the required values. Achieving the required pH values

Provided for information only.

BASES

LCO (continued)

maximizes the effectiveness of the iodine removal mechanism without introducing conditions that may induce caustic stress corrosion cracking of mechanical system components. In order to ensure sufficient NaOH is added, each Spray Additive System injection pump must be able to start automatically when required and be capable of delivering the required flow. In addition, it is essential that valves in the Spray Additive System flow paths are properly positioned and that automatic valves are capable of activating to their correct positions.

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 prior to release 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.

Provided for information only.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.8.1

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 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 that those valves outside containment and capable of potentially being mispositioned are in the correct position.

SR 3.6.8.2

To provide effective iodine removal, the containment spray must be an alkaline solution. Since the RWST contents are normally acidic, the contained 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 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 3.6.8.3

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 NaOH concentration is verified by chemical analysis. 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 3.6.8.4

This SR provides verification that each automatic valve in the Spray Additive System flow path actuates to its correct position. 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. However, this does not preclude performance

Provided for information only.

BASES

SURVEILLANCE REQUIREMENTS (continued)

of this Surveillance at power when it can be accomplished in a safe manner. 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.

SR 3.6.8.5

This SR ensures that each required spray additive pump starts upon receipt of an actual or simulated containment phase B isolation signal. ~~In addition, for Unit 2, this Surveillance ensures that the backup spray additive pump will start if the preferred pump fails.~~ The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage. However, this does not preclude performance of this Surveillance at power when it can be accomplished in a safe manner. Operating experience has shown that these components usually pass the Surveillances when performed at an 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.8.6

To ensure that the correct pH level is established in the borated water solution provided by the Quench Spray System, the recirculation flow rate of each Spray Additive System injection pump is verified in accordance with the Inservice Testing Program. The required ~~Unit 1~~ pump recirculation flow rate is ≥ 25 gpm and ≤ 35 gpm. ~~The required Unit 2 pump recirculation flow rate is ≥ 40 gpm and ≤ 60 gpm.~~ This SR provides assurance that the correct amount of NaOH will be metered into the flow path upon Quench Spray System initiation. The inservice testing confirms component OPERABILITY, trends performance, and detects incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

REFERENCES

1. UFSAR, Chapter 14 (Unit 1)~~, and UFSAR, Chapter 15 (Unit 2).~~

Provided for information only.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.9 Unit 2 Containment Sump pH Control System

BASES

BACKGROUND

The Containment Sump pH Control System is a passive system consisting of six baskets of sodium tetraborate (NaTB) that assist 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 during recirculation from the sump, the spray solution is adjusted to an alkaline pH that promotes iodine hydrolysis, in which iodine is converted to nonvolatile forms.

The NaTB is stored in baskets in the containment. The initial quench spray is acidic since it is a boric acid solution from the Refueling Water Storage Tank (RWST). As the initial spray solution, and subsequently the recirculation solution, comes in contact with the NaTB, the NaTB dissolves, raising the pH of the sump solution. The final pH of the containment sump water after a DBA is alkaline. An alkaline pH minimizes the evolution of iodine as well as the occurrence of chloride and caustic stress corrosion on mechanical systems and components.

Provided for information only.

BASES

APPLICABLE SAFETY ANALYSES

The Containment Sump pH Control System is essential to the removal of airborne iodine within containment following a DBA.

Quench spray consists of a boric acid solution with a spray pH as low as 4.6. As indicated in Standard Review Plan (SRP), Section 6.5.2, Rev 2, "Containment Spray as A Fission Product Cleanup System", fresh sprays (i.e., sprays with no dissolved iodine) are effective at scrubbing elemental iodine and thus a spray additive is unnecessary during the initial injection phase when the spray solution is being drawn from the RWST. As described in the SRP, research has shown that elemental iodine can be scrubbed from the atmosphere with borated water, even at low pH.

Since long-term use of a plain boric acid spray could increase the potential for elemental iodine re-evolution during the recirculation phase of the LOCA, the equilibrium sump solution pH is increased by adding NaTB. Regulatory Guide 1.183 guidance indicates that if the sump water pH is 7 or greater, then a licensee does not need to evaluate re-evolution of iodines for dose consequences. In accordance with the current licensing basis, the dose analysis need not address iodine re-evolution if the sump water pH of 7 or greater is achieved well within 16 hours after the LOCA and is maintained for the duration of the accident. The Containment Sump pH Control System provides a passive safeguard with six baskets of NaTB located in the containment. The basket contents dissolve as the sump fills, raising pH to the required value and maintaining it at or above that value throughout the accident.

The Unit 2 Containment Sump pH Control System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The Containment Sump pH Control System is necessary to reduce the release of radioactive material to the environment in the event of a DBA. To be considered OPERABLE, the six sodium tetraborate storage baskets must be in place and intact (i.e., having no relevant component removed, destroyed or damaged such that the basket cannot perform its function), collectively contain ≥ 292 cubic feet of sodium tetraborate and be capable of providing the required pH adjustment.

Provided for information only.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment requiring the operation of the Containment Sump pH Control System. The Containment Sump pH Control System assists in reducing the iodine fission product inventory prior to release 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 Containment Sump pH Control System is not required to be OPERABLE in MODE 5 or 6.

ACTIONS

A.1

If the Containment Sump pH Control System is inoperable, it must be restored to OPERABLE within 72 hours. The pH adjustment of the recirculation spray solution for corrosion protection and iodine removal is reduced in this condition. The 72 hour Completion Time takes into account that the condition which caused the inoperable system would most likely allow this passive system to continue to provide some capability for pH adjustment and iodine removal, the Containment Spray System would still be available and would remove some iodine from the containment atmosphere in the event of a DBA, and the low probability of the worst case DBA occurring during this period.

B.1 and B.2

If the Containment Sump pH Control 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 Containment Sump pH Control 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.

Provided for information only.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.9.1

This SR provides visual verification that the six sodium tetraborate storage baskets are in place and intact and collectively contain ≥ 292 cubic feet of sodium tetraborate. This amount of NaTB is sufficient to ensure that the recirculation solution following a LOCA is at the correct pH level. No upper limit for quantity of NaTB is specified because pH values calculated assuming the baskets are filled to capacity demonstrated acceptable pH values. The 18 months frequency is sufficient to ensure that this passive system is intact and contains the required amount of sodium tetraborate.

SR 3.6.9.2

This SR verifies via sampling that the sodium tetraborate contained in the NaTB storage baskets provides adequate adjustment of containment sump borated water. The 18 months frequency is sufficient to ensure the required buffering ability of the sodium tetraborate after exposure to the containment environment.

REFERENCES

1. UFSAR, Chapter 15 (Unit 2).

Attachment C

Beaver Valley Power Station
Final Typed Pages with Proposed Technical Specification Changes

License Amendment Request 08-006

The following is a list of the affected pages:

3.6.8 – 1
3.6.8 – 2
3.6.9 – 1 *

* New page to be inserted.

3.6 CONTAINMENT SYSTEMS

3.6.8 Unit 1 Spray Additive System

LCO 3.6.8 The Spray Additive System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

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. <u>AND</u> B.2 Be in MODE 5.	6 hours 84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.8.1	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
SR 3.6.8.2	Verify spray additive tank solution volume is $\geq$ 4700 gallons.	184 days
SR 3.6.8.3	Verify spray additive tank NaOH solution concentration is $\geq$ 19.5% and $\leq$ 20% by weight.	184 days
SR 3.6.8.4	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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.8.5	Verify that each chemical injection pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.6.8.6	Verify on recirculation flow that each chemical injection pump develops the required flow rate.	In accordance with the Inservice Testing Program

3.6 CONTAINMENT SYSTEMS

3.6.9 Unit 2 Containment Sump pH Control System

LCO 3.6.9 The Containment Sump pH Control System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Containment Sump pH Control System inoperable.	A.1	Restore Containment Sump pH Control System to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	84 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.9.1	Perform a visual inspection of the six sodium tetraborate storage baskets to verify the following: a. Each storage basket is in place and intact; and, b. Collectively contain ≥ 292 cubic feet of sodium tetraborate.	18 months
SR 3.6.9.2	Verify that a sample from the sodium tetraborate baskets provides adequate pH adjustment of containment sump borated water.	18 months