3.3 EMERGENCY CORE COOLING, REACTOR BUILDING COOLING, REACTOR BUILDING SPRAY AND PENETRATION ROOM VENTILATION SYSTEMS

Applicability

Applies to the emergency core cooling, reactor building cooling, reactor building spray and reactor building penetration room ventilation systems.

Objectivity

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building cooling, reactor building spray and reactor building penetration room ventilation systems.

Specification

3.3.1 The following equipment shall be operable whenever containment integrity is established as required by Specification 3.6.1:

(A) One reactor building spray pump and its associated spray nozzle header.

(B) Two reactor building cooling fans and associated cooling units.

(C) Two out of three service water pumps shall be operable, powered from independent essential buses, to provide redundant and independent flow paths.

(D) Reactor building penetration room ventilation systems consisting of both penetration room fans and their associated filters. All manually operated system valves shall be locked open.

(E) Two engineered safety feature actuated low pressure injection pumps shall be operable.

(F) Both low pressure injection coolers and their cooling water supplies shall be operable.

(G) Two BWST level instrument channels shall be operable.

(H) The borated water storage tank shall have an indicated level of 38.5 $\pm$ 2.0 ft. of borated water with a concentration of 2270 $^{+200}_{-0}$ ppm boron at a temperature not less than 40F. The manual valve on the discharge line from the borated water storage tank shall be locked open.

(I) The four reactor building emergency sump isolation valves to the LPI system shall be either manually or remote-manually operable.

(J) The engineered safety features valves associated with each of the above systems shall be operable or locked in the DE position.

3.3.2 In addition to 3.3.1 above, the following ECCS equipment shall be operable when the reactor coolant system is above 350F and irradiated fuel is in the core:

(A) Two out of three high pressure injection (makeup) pumps shall be maintained operable, powered from independent essential busses, to provide redundant and independent flow paths.

(B) Engineered safety features valves associated with 3.3.2.a above shall be operable or locked in the ES position.

3.3.3 In addition to 3.3.1 and 3.3.2 above, the following ECCS equipment shall be operable when the reactor coolant system is above 800 psig.

(A) The two core flooding tanks shall each contain an indicated minimum of 13 $\pm$ 0.4 feet (1040 $\pm$ 30 ft^3) of borated water at 600 $\pm$ 25 psig.

(B) Core flooding tank boron concentration shall not be less than 2270 ppm boron.

(C) The electrically operated discharge valves from the core flood tanks shall be open and breakers locked open and tagged.

(D) One of the two pressure instrument channels and one of the two level instrument channels per core flood tank shall be operable.

3.3.4 The reactor shall not be made cricical unless the following equipment in addition to 3.3.1, 3.3.2, and 3.3.3 above is operable.

(A) Two reactor building spray pumps and their associated spray nozzle headers and four reactor building emergency cooling fans and associated cooling units.

(B) The sodium thiosulfate tank shall have an indicated level of 31 $\pm$ 1.0 ft. of 21.3 $\pm$ 0.9 wt. % solution of sodium thiosulfate at a minimum temperature of 40F. The sodium hydroxide tank shall have an indicated level of 31 $\pm$ 1.0 ft. of 14.9 $\pm$ 0.3 wt. % solution of sodium hydroxide at a minimum temperature of 40F.

(C) All manual valves in the main discharge lines of the sodium thiosulfate and sodium hydroxide tanks shall be locked open.

(D) Engineered safety feature valves and interlocks associated with 3.3.1, 3.3.2, and 3.3.3 shall be operable or locked in the ES position.

3.3.5 Maintenance shall be allowed during power operation on any component(s) in the high pressure injection, low pressure injection, service water, reactor building spray, reactor building cooling and penetration room

350,000 gallons of borated water are supplied for emergency core cooling and reactor building spray in the event of a loss-of-coolant accident. This amount fulfills requirements for emergency core cooling. 16,000 gallons of borated water are required to reach cold shutdown. The borated water storage tank capacity of 380,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature to prevent crystallization and local freezing of the boric acid. The boron concentration is set at a value that will maintain the core at least 1 percent k/k subcritical at 70F without any control rods in the core. The concentration for 1% k/k subcriticality is 1609 ppm boron in the core, while the minimum value specified in the borated water storage tank is 2270 ppm boron.

Specification 3.3.2 assures that above 305F two high pressure injection pumps are also available to provide injection water as the energy of the reactor coolant system is increased.

Specification 3.3.3 assures that above 800 psig both core flooding tanks are operational. Since their design pressure is 600 $\pm$ 25 psig, they are not brought into the operational state until 800 psig to prevent spurious injection of borated water. Both core flooding tanks are specified as a single core flood tank has insufficient inventory to reflood the core.(1)

Specification 3.3.4 assures that prior to going critical the redundant reactor building cooling unit and spray are operational.

The spray system utilizes common suction lines with the low pressure injection system. If a single train of equipment is removed from either system, the other train must be assured to be operable in each system.

The iodine removal function of the reactor building spray system requires one spray pump and the sodium thiosulfate and sodium hydroxide tank contents. Sodium thiosulfate is stored with a boric acid-sodium hydroxide buffer (1.3 $\pm$ 0.2 wt.% boric acid and 0.55 $\pm$ 0.1 wt. % sodium hydroxide) to stabilize the pH in the range of 9 to 10. The sodium hydroxide tank contains sufficient sodium hydroxide to stabilize the pH of the solution during the recirculation phase following a LOCA.

When the reactor is critical, maintenance is allowed per Specification 3.3.5. Operability of the specified components shall be based on the results of testing as required by Technical Specification 4.5. The maintenance period of up to 24 hours is acceptable is the operability of equipment redundant to that removed from service is demonstrated within 24 hours prior to removal. Exceptions to Specification 3.3.6 permit continued operation for seven days if one of two BWST level instrument channels is operable or if either the pressure or level instrument channel in the CFT instrument channel is operable.

In the event that the need for emergency core cooling should occur, functioning of one train (one high pressure injection pump, one low pressure injection pump, and both core flooding tanks) will protect the core and in the event of a main coolant loop severence, limit the peak clad temperature to less than 2300F and the metal-water reaction to that representing less than 1 percent of the clad.

The service water system consists of two independent but interconnected, full capacity, 100% redundant systems, to ensure continuous heat removal.(4)

One service water pump is required for normal operation. The normal operating requirements are greater than the emergency requirements following a loss-of-coolant accident.

3.11 EMERGENCY COOLING POND

Applicability

Applies to the emergency cooling pond.

Objective

To assure the availability of a sufficient supply of cooling water inventory in the emergency cooling pond.

Specification

3.11.1 The reactor shall not be taken critical unless the average emergency cooling pond water depth is equal to or greater than 3 feet. The pond water depth may be less than 3 feet during power operation for a maximum of 24 hours. If after 24 hours the pond water depth is not equal to or greater than 3 feet the reactor shall be brought to the hot shutdown condition using normal operating procedures.

Bases

The requirement of Specification 3.11.1 provides for sufficient water inventory in the emergency cooling pond to handle a DBA with a concurrent failure of the Dardanelle Reservoir. This minimum water depth takes into account (1) water loss from evaporation due to both heat load and climatological conditions, (2) pond bottom irregularities and (3) suction pipe level at the pond. The minimum water depth also corresponds to the effective depth used to determine pond response and assures the applicability of the calculational model for pond evaporation.

4.13 EMERGENCY COOLING POND

Applicability

Applies to the emergency cooling pond.

Objective

To verify the availability of a sufficient supply of cooling water inventory in the emergency cooling pond.

Specification

4.13.1 The emergency cooling pond water level shall be recorded daily to ensure that the average pond water depth is equal to or greater than 3 feet.

4.13.2 Soundings shall be made annually of the emergency cooling pond bottom to ensure that the required volume of water is available.

Bases

The requirements of Specification 4.13 provide for verification of a sufficient water inventory in the emergency cooling pond to handle a DBA with a concurrent failure of the Dardanelle Reservoir. This specification ensures that Specification 3.11.1 is met.

Should the inspection of one of the wires reveal any significant physical change (pitting or loss of area), additional wires shall be removed from the applicable surveillance tendons and inspected to determine the extent and cause change. The sheathing filler will be sampled and inspected for changes in physical appearance.

4.4.2.2 Inspection Intervals and Reports

The inspection intervals, measured from the date of the initial structural test, shall be one year, three years, five years, and every five years thereafter or as modified based on experience. Tendon surveillance may be conducted during reactor operation provided design conditions regarding loss of adjacent tendons are satisfied at all times.

A quantitative analytical report covering results of each inspection shall be submitted (required by Technical Specification 6.7) and shall especially address the following conditions, should they develop:

(1) Broken wires.

(2) The force-time trend line for any tendon, when extrapolated, that extends beyond either the upper or lower bounds of the predicted design band.

(3) Unexpected changes in tendon conditions or sheathing filler properties.

4.4.2.3 End Anchorage Concrete Surveillance

A. The end anchorages of the surveillance tendons and adjacent concrete surface will be inspected.

B. The inspection interval will be one-half year and one year after the structural integrity test.

C. The selected inspection location shall include:

(1) Four (4) locations on one buttress (hoop tendon anchorage)

(2) Two (2) locations on the top of the ring girder (vertical tendon anchorage).

(3) One (1) location on the ring girder (dome tendon anchorage).

HELPING BUILD ARKANSAS

ARKANSAS POWER & LIGHT COMPANY

9TH & LOUISIANA STREETS • LITTLE ROCK, ARKANSAS 72203 • (501) 372-4311

October 7, 1975

Director Of Nuclear Reactor Regulation
ATTN: D. L. Ziemann, Chief
Operating Reactor Branch #2
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Arkansas Power & Light Company
Arkansas Nuclear One-Unit 1
Docket No. 50-313
License No. DPR-51
Proposed Technical Specifications

Dear Mr. Ziemann:

Attached find several proposed technical specifications concerning spray chemical additive tanks, emergency cooling pond, and tendon surveillance. The basis for change for each is as follows:

Pages 36, 37, 39 - The changes to Specifications 3.3.1 and 3.3.4 establishes level and concentration bands for spray chemical additive tanks based on as-built data. The establishment of error bands on the required parameters provides more flexibility in surveillance requirements and limiting conditions for operation, yet results in no reduction in the margin of safety to the public. No effect on plant operation will result.

Pages 66a, 110a - Annual sounding of the emergency cooling pond showed that the pond depth was not the required 3.0 ft. with the surface elevation at 344 ft. 0 inches. Therefore, per Specification 4.13.2, a change to Specifications 3.11.1 and 4.13.1 is necessitated. However, to avoid future changes to the Technical Specifications in the event that the pond bottom elevation again changes, the specifications have been revised to eliminate elevations and show minimum water depths in their stead. The revision to Specification 3.11.1 also allows time to bring the pond level to a depth of $\geq$ 3 ft. during power operation which will add flexibility to plant operation.

Copy of preceding

10802

Page 86 - With the issue of Regulatory Guide 1.85, Rev. 1, "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures" (July 1974), it has been determined that the frequency of tendon surveillance does not warrant the requirement to perform tendon surveillance the second year after the initial containment structural integrity test. Deletion of the second year tendon surveillance will not jeopardize the structural integrity of the containment due to tendon surveillances which will take place 1 and 3 years after the structural integrity test. These surveillances will serve to determine the performance of the system during its initial years. No impact on plant operation will result.

Your prompt review, comments and/or approval is requested.

Very truly yours,

J. D. Phillips

J. D. Phillips
Senior Vice President

JDP:tw

Attachment

3.3 EMERGENCY CORE COOLING, REACTOR BUILDING COOLING, REACTOR BUILDING SPRAY AND PENETRATION ROOM VENTILATION SYSTEMS

Applicability

Applies to the emergency core cooling, reactor building cooling, reactor building spray and reactor building penetration room ventilation systems.

Objectivity

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building cooling, reactor building spray and reactor building penetration room ventilation systems.

Specification

3.3.1 The following equipment shall be operable whenever containment integrity is established as required by Specification 3.6.1:

(A) One reactor building spray pump and its associated spray nozzle header.

(B) Two reactor building cooling fans and associated cooling units.

(C) Two out of three service water pumps shall be operable, powered from independent essential buses, to provide redundant and independent flow paths.

(D) Reactor building penetration room ventilation systems consisting of both penetration room fans and their associated filters. All manually operated system valves shall be locked open.

(E) Two engineered safety feature actuated low pressure injection pumps shall be operable.

(F) Both low pressure injection coolers and their cooling water supplies shall be operable.

(G) Two BWST level instrument channels shall be operable.

(H) The borated water storage tank shall have an indicated level of 38.5 $\pm$ 2.0 ft. of borated water with a concentration of 2270 $^{+200}_{-0}$ ppm boron at a temperature not less than 40F. The manual valve on the discharge line from the borated water storage tank shall be locked open.

(I) The four reactor building emergency sump isolation valves to the LPI system shall be either manually or remote-manually operable.

(J) The engineered safety features valves associated with each of the above systems shall be operable or locked in the DE position.

3.3.2 In addition to 3.3.1 above, the following ECCS equipment shall be operable when the reactor coolant system is above 350F and irradiated fuel is in the core:

(A) Two out of three high pressure injection (makeup) pumps shall be maintained operable, powered from independent essential busses, to provide redundant and independent flow paths.

(B) Engineered safety features valves associated with 3.3.2.a above shall be operable or locked in the ES position.

3.3.3 In addition to 3.3.1 and 3.3.2 above, the following ECCS equipment shall be operable when the reactor coolant system is above 800 psig.

(A) The two core flooding tanks shall each contain an indicated minimum of 13 $\pm$ 0.4 feet (1040 $\pm$ 30 ft^3) of borated water at 600 $\pm$ 25 psig.

(B) Core flooding tank boron concentration shall not be less than 2270 ppm boron.

(C) The electrically operated discharge valves from the core flood tanks shall be open and breakers locked open and tagged.

(D) One of the two pressure instrument channels and one of the two level instrument channels per core flood tank shall be operable.

3.3.4 The reactor shall not be made cricical unless the following equipment in addition to 3.3.1, 3.3.2, and 3.3.3 above is operable.

(A) Two reactor building spray pumps and their associated spray nozzle headers and four reactor building emergency cooling fans and associated cooling units.

(B) The sodium thiosulfate tank shall have an indicated level of 31 $\pm$ 1.0 ft. of 21.3 $\pm$ 0.9 wt. % solution of sodium thiosulfate at a minimum temperature of 40F. The sodium hydroxide tank shall have an indicated level of 31 $\pm$ 1.0 ft. of 14.9 $\pm$ 0.3 wt. % solution of sodium hydroxide at a minimum temperature of 40F.

(C) All manual valves in the main discharge lines of the sodium thiosulfate and sodium hydroxide tanks shall be locked open.

(D) Engineered safety feature valves and interlocks associated with 3.3.1, 3.3.2, and 3.3.3 shall be operable or locked in the ES position.

3.3.5 Maintenance shall be allowed during power operation on any component(s) in the high pressure injection, low pressure injection, service water, reactor building spray, reactor building cooling and penetration room

350,000 gallons of borated water are supplied for emergency core cooling and reactor building spray in the event of a loss-of-coolant accident. This amount fulfills requirements for emergency core cooling. 16,000 gallons of borated water are required to reach cold shutdown. The borated water storage tank capacity of 380,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature to prevent crystallization and local freezing of the boric acid. The boron concentration is set at a value that will maintain the core at least 1 percent k/k subcritical at 70F without any control rods in the core. The concentration for 1% k/k subcriticality is 1609 ppm boron in the core, while the minimum value specified in the borated water storage tank is 2270 ppm boron.

Specification 3.3.2 assures that above 305F two high pressure injection pumps are also available to provide injection water as the energy of the reactor coolant system is increased.

Specification 3.3.3 assures that above 800 psig both core flooding tanks are operational. Since their design pressure is 600 $\pm$ 25 psig, they are not brought into the operational state until 800 psig to prevent spurious injection of borated water. Both core flooding tanks are specified as a single core flood tank has insufficient inventory to reflood the core.(1)

Specification 3.3.4 assures that prior to going critical the redundant reactor building cooling unit and spray are operational.

The spray system utilizes common suction lines with the low pressure injection system. If a single train of equipment is removed from either system, the other train must be assured to be operable in each system.

The iodine removal function of the reactor building spray system requires one spray pump and the sodium thiosulfate and sodium hydroxide tank contents. Sodium thiosulfate is stored with a boric acid-sodium hydroxide buffer (1.3 $\pm$ 0.2 wt.% boric acid and 0.55 $\pm$ 0.1 wt. % sodium hydroxide) to stabilize the pH in the range of 9 to 10. The sodium hydroxide tank contains sufficient sodium hydroxide to stabilize the pH of the solution during the recirculation phase following a LOCA.

When the reactor is critical, maintenance is allowed per Specification 3.3.5. Operability of the specified components shall be based on the results of testing as required by Technical Specification 4.5. The maintenance period of up to 24 hours is acceptable is the operability of equipment redundant to that removed from service is demonstrated within 24 hours prior to removal. Exceptions to Specification 3.3.6 permit continued operation for seven days if one of two BWST level instrument channels is operable or if either the pressure or level instrument channel in the CFT instrument channel is operable.

In the event that the need for emergency core cooling should occur, functioning of one train (one high pressure injection pump, one low pressure injection pump, and both core flooding tanks) will protect the core and in the event of a main coolant loop severence, limit the peak clad temperature to less than 2300F and the metal-water reaction to that representing less than 1 percent of the clad.

The service water system consists of two independent but interconnected, full capacity, 100% redundant systems, to ensure continuous heat removal.(4)

One service water pump is required for normal operation. The normal operating requirements are greater than the emergency requirements following a loss-of-coolant accident.

3.11 EMERGENCY COOLING POND

Applicability

Applies to the emergency cooling pond.

Objective

To assure the availability of a sufficient supply of cooling water inventory in the emergency cooling pond.

Specification

3.11.1 The reactor shall not be taken critical unless the average emergency cooling pond water depth is equal to or greater than 3 feet. The pond water depth may be less than 3 feet during power operation for a maximum of 24 hours. If after 24 hours the pond water depth is not equal to or greater than 3 feet the reactor shall be brought to the hot shutdown condition using normal operating procedures.

Bases

The requirement of Specification 3.11.1 provides for sufficient water inventory in the emergency cooling pond to handle a DBA with a concurrent failure of the Dardanelle Reservoir. This minimum water depth takes into account (1) water loss from evaporation due to both heat load and climatological conditions, (2) pond bottom irregularities and (3) suction pipe level at the pond. The minimum water depth also corresponds to the effective depth used to determine pond response and assures the applicability of the calculational model for pond evaporation.

4.13 EMERGENCY COOLING POND

Applicability

Applies to the emergency cooling pond

Objective

To verify the availability of a sufficient supply of cooling water inventory in the emergency cooling pond.

Specification

4.13.1 The emergency cooling pond water level shall be recorded daily to ensure that the average pond water depth is equal to or greater than 3 feet.

4.13.2 Soundings shall be made annually of the emergency cooling pond bottom to ensure that the required volume of water is available.

Bases

The requirements of Specification 4.13 provide for verification of a sufficient water inventory in the emergency cooling pond to handle a DBA with a concurrent failure of the Dardanelle Reservoir. This specification ensures that Specification 3.11.1 is met.

Should the inspection of one of the wires reveal any significant physical change (pitting or loss of area), additional wires shall be removed from the applicable surveillance tendons and inspected to determine the extent and cause change. The sheathing filler will be sampled and inspected for changes in physical appearance.

4.4.2.2 Inspection Intervals and Reports

The inspection intervals, measured from the date of the initial structural test, shall be one year, three years, five years, and every five years thereafter or as modified based on experience. Tendon surveillance may be conducted during reactor operation provided design conditions regarding loss of adjacent tendons are satisfied at all times.

A quantitative analytical report covering results of each inspection shall be submitted (required by Technical Specification 6.7) and shall especially address the following conditions, should they develop:

(1) Broken wires.

(2) The force-time trend line for any tendon, when extrapolated, that extends beyond either the upper or lower bounds of the predicted design band.

(3) Unexpected changes in tendon conditions or sheathing filler properties.

4.4.2.3 End Anchorage Concrete Surveillance

A. The end anchorages of the surveillance tendons and adjacent concrete surface will be inspected.

B. The inspection interval will be one-half year and one year after the structural integrity test.

C. The selected inspection location shall include:

(1) Four (4) locations on one buttress (hoop tendon anchorage)

(2) Two (2) locations on the top of the ring girder (vertical tendon anchorage).

(3) One (1) location on the ring girder (dome tendon anchorage).