ATTACHMENT A

## 2.0 LIMITING CONDITIONS FOR OPERATION

### 2.3 Emergency Core Cooling System

Applicability

Applies to the operating status of the emergency core cooling system.

Objective

To assure operability of equipment required to remove decay heat from the core.

Specifications

(1) Minimum Requirements

The reactor shall not be made critical unless all of the following conditions are met:

a. The SIRW tank contains not less than 283,000 gallons of water with a boron concentration of at least the refueling boron concentration at a temperature not less than 50°F.

b. One means of temperature indication (local) of the SIRW tank is operable.

c. All four safety injection tanks are operable and pressurized to at least 240 psig with a tank level of at least 116.2 inches (67%) and a maximum level of 128.1 inches (74%) with refueling boron concentration.

d. One level and one pressure instrument is operable on each safety injection tank.

e. One low-pressure safety injection pump is operable on each associated 4,160 V engineered safety feature bus.

f. One high-pressure safety injection pump is operable on each associated 4,160 V engineered safety feature bus.

g. Both shutdown heat exchangers ~~and three of four component cooling heat exchangers~~ are operable.

h. Piping and valves shall be operable to provide two flow paths from the SIRW tank to the reactor coolant system.

i. All valves, piping and interlocks associated with the above components and required to function during accident conditions are operable. HCV-2914, 2934, 2974, and 2954 shall have power removed from the motor operators by locking open the circuit breakers in the power supply lines to the valve motor operators. FCV-326 shall be locked open.

(2) Modification of Minimum Requirements

During power operation, the Minimum Requirements may be modified to allow one of the following conditions to be true at any one time. If the system is not restored to meet the minimum requirements within the time period specified below, the reactor shall be placed in a hot shutdown condition within 12 hours. If the minimum requirements are not met within an additional 48 hours the reactor shall be placed in a cold shutdown condition within 24 hours.

a. One low-pressure safety injection pump may be inoperable provided the pump is restored to operable status within 24 hours.

b. One high-pressure safety injection pump may be inoperable provided the pump is restored to operable status within 24 hours.

c. One shutdown heat exchanger ~~and two of four component cooling water heat exchangers~~ may be inoperable for a period of no more than 24 hours.

d. Any valves, interlocks or piping directly associated with one of the above components and required to function during accident conditions shall be deemed to be part of that component and shall meet the same requirements as listed for that component.

e. Any valve, interlock or piping associated with the safety injection and shutdown cooling system which is not covered under d. above but which is required to function during accident conditions may be inoperable for a period of no more than 24 hours.

f. One safety injection tank may be inoperable for a period of no more than one hour.

g. Level and pressure instrumentation on one safety injection tank may be inoperable for a period of one hour.

## 2.0 LIMITING CONDITIONS FOR OPERATION

### 2.4 Containment Cooling

Applicability

Applies to the operating status of the containment cooling systems.

Objective

To assure operability of equipment required to remove heat from the containment during normal operating and emergency situations.

Specifications

(1) Minimum Requirements

a. The reactor shall not be made critical, except for low-temperature physics tests, unless all the following are met:

i. The following equipment normally associated with diesel-generator DG-1 (4.16-kV bus 1A3 and associated non-automatically transferring ~~480-Volt~~ bus sections) is operable, except as noted:(1)

| | |
|---|---|
| Raw water pump | AC-10A |
| Raw water pump | AC-10C |
| Component cooling water pump | AC-3A |
| Component cooling water pump | AC-3C |
| Containment spray pump | SI-3A |
| Containment air cooling and filtering unit | VA-3A |
| Containment air cooling unit | VA-7C |

ii. The following equipment normally associated with diesel-generator DG-2 (4.16-kV 1A4 and associated non-automatically transferable 480 Volt bus sections) is operable, except as noted.(1)

| | |
|---|---|
| Raw water pump | AC-10B |
| Raw water pump | AC-10D |
| Component cooling water pump | AC-3B |
| Containment spray pump | SI-3B |
| Containment air cooling and filtering unit | VA-3B |
| Containment air cooling unit | VA-7D |
| Containment spray pump | SI-3C |

iii. Four component cooling heat exchangers shall be operable.

~~iii.~~iv. All ~~heat exchangers,~~ valves, piping and interlocks associated with the above components and required to function during accident conditions are operable.

(1) Reactor may be made critical with one inoperable raw water pump. LCO action statements shall apply.

2.0 **LIMITING CONDITIONS FOR OPERATION**

2.4 Containment Cooling (Continued)

b. During power ~~operating~~ operation one of the components listed in (1)a.i. and ii. may be ~~inoperable~~. If the inoperable component is not restored to operability within seven days, the reactor shall be placed in hot shutdown condition within 12 hours. If the inoperable component is not restored to operability within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

c. For cases involving Raw Water pump inoperability, if the river water temperature is below 60 degrees Fahrenheit, one Raw Water pump may be inoperable indefinitely without applying any LCO action statement. When the river water temperature is greater than 60 degrees Fahrenheit, an inoperable Raw Water pump shall be restored to operability within 7 days or the reactor shall be placed in a hot shutdown condition within 12 hours. If the inoperable Raw Water pump is not restored to operability within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

(2) Modification of Minimum Requirements

a. During power operation, the minimum requirements may be modified to allow a total of two of the components listed in (1)a.i. and ii. to be inoperable at any one time (this does ~~not~~ include one Raw Water pump which may be inoperable as described above if the river water temperature is below 60 degrees Fahrenheit). Only two raw water pumps ~~may be out~~ of service during power operations. If the operability of one of the two components is ~~not~~ restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. LCO 2.4(1)b. shall be applied if one of the inoperable components is restored within 24 hours. If the operability of both components is not restored within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

b. During power operation one component cooling heat exchanger may be inoperable. If the operability of the heat exchanger is not restored within 14 days, the reactor shall be placed in a hot shutdown condition within 12 hours. If two component cooling heat exchangers are inoperable, the reactor shall be placed in hot shutdown condition within 12 hours. If the inoperable heat exchanger(s) is not restored to operability within an additional 48 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

c. Any valves, interlocks and piping directly associated with one of the above components and required to function during accident conditions shall be deemed to be part of that component and shall meet the same requirements as for that component.

d. Any valve, interlock or piping associated with the containment cooling system which is not included in the above paragraph and which is required to function during accident conditions

may be inoperable for a period of no more than 24 hours. If operability is not restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours.

Basis

~~The requirements of Section 2.3, Emergency Core Cooling System, apply to the specifications above with respect to the operability of the~~

~~component cooling heat exchangers and shutdown heat exchangers.~~ A full capacity diesel-generator is connected to each of the two engineered safeguards 4.16-kV buses. Three engineered safeguards 480-Volt double-ended load centers are provided; of the six transformers, three are connected to each of the two 4.16-kV buses. Two load centers are operated as two-bus-section units; the third is provided with a center bus manually transferable to either associated end section. The center bus section supplies HPSI Pump SI-2C, CS Pump SI-3C and Charging Pump CH-1C any of which can thus be supplied from either 4.16-kV bus if required. Three component cooling heat exchangers have sufficient capacity to remove $402 \times 10^6$ BTU/hr following a loss-of-coolant accident.[1] The containment sprays initially take coolant from the safety injection and refueling water (SIRW) tank. Before this supply of water is exhausted (at least 24 minutes)[2] the spray system is transferred to the recirculation mode and the pumps take suction from the containment sump. One shutdown cooling heat exchanger is sufficient to satisfy the spray system requirements during the long-term containment cooling period.[3] In addition, in the unlikely event of the component cooling water supply being lost, raw water can be utilized for direct cooling of certain engineered safeguard components.[4]

The containment spray system is redundant with the containment air recirculation, cooling and iodine removal system for the containment cooling function.[5] The spray system is sized such that two of the three spray pumps would limit the containment pressure to below the design value following a DBA without taking credit for the air coolers or the cooling capacity of the safety injection system.[6] Similarly, two cooling and filtering units or one cooling and filtering unit and both cooling units have the capability of limiting the containment pressure under the same conditions as two spray pumps.[7]

The redundant cooling equipment provided to limit the containment pressure following a DBA is divided between the independent power supply systems. The raw water and component cooling water pumps are similarly distributed on the 4.16-kV and 480 Volt buses to serve the above cooling groups. Each cooling group has a design capacity equal to that required to restrict the containment pressure to below the design value. In the event of a DBA, loss of normal power sources and failure of one diesel-generator to operate, better than one full group would be connected to the available diesel-generator, thus providing more than ample reserve. Any one unit removed from a given bus does not restrict the groups which can be connected to one diesel-generator from fulfilling their design function. The removal of two units from buses which can be connected to one diesel-generator could limit the capability of the associated cooling groups; therefore, to ensure availability of the power supply to the redundant equipment in the event of loss of normal power sources, the diesel-generator serving this redundant equipment is in standby condition. During

normal power operation either two air cooling and filtering units or two air cooling units and one air cooling and filtering unit are in operation to remove heat lost from piping and equipment within the containment.[8] In addition, if during the post-accident phase the component cooling water supply is lost, containment cooling could be maintained until repairs are effected. The component cooling system pumps and heat exchanger, the spray pumps and the shutdown heat exchangers are located in the auxiliary building.[9] [10] The raw water pumps are located in the intake structure.[11]

Analyses show that after a high heat load accident such as a large break LOCA or Main Steam Line Break inside containment, three in service component cooling heat exchangers will maintain CCW return temperature in an analyzed range. This assumes all of the containment air cooling units are operating which would create the maximum heat load on the CCW system. In order to ensure that three heat exchangers would be in service after a DBA in conjunction with an assumed single failure, four are required to be operable.

If the river temperature is below 70°F, the single failure of a component cooling heat exchanger's RW valve to open would not raise CCW return temperature to an unanalyzed level. A single failure of a RW valve to auto-open will raise CCW return temperature due to CCW passing through a heat exchanger which has no flow. If the river temperature is greater than or equal to 70°F, a single failure of a heat exchanger's RW valve to open could raise CCW return temperature to an unanalyzed level. Therefore, when the river temperature is greater than or equal to 70°F and RW is not in service to a heat exchanger, the heat exchanger is considered inoperable. Having RW in service eliminates the potential failure of a RW valve to open as a credible single active failure.

When a component cooling heat exchanger is inoperable for maintenance and the river temperature is greater than or equal to 70°F, at least one RW and CCW isolation valve is secured in the closed position. This prevents the valve from opening upon receipt of a Safety Injection Actuation Signal, and therefore prevents CCW passing through a heat exchanger that has no RW flow. If the opening stroke time of a RW or CCW isolation valve on a heat exchanger is such that the valve is considered inoperable, the heat exchanger associated with the inoperable valve is still operable as long as the affected RW or CCW valve is maintained in the open position. The RW and CCW isolation valves may be opened or closed intermittently under administrative control without entering the LCO action statement in order to conduct required testing of components.

References

(1) USAR, Section 9.7.5
(2) USAR, Section 6.2.3.1
(3) USAR, Section 6.2.3.4
(4) USAR, Section 9.8.2
(5) USAR, Section 6.4.5
(6) USAR, Section 6.3.5
(7) USAR, Section 14.16.5

(8) USAR, Section 9.10.2.3
(9) USAR, Section 9.7
(10) USAR, Section 6.3
(11) USAR, Section 9.8



~~Ltr. dated: 6/10/87~~

ATTACHMENT B

**DISCUSSION, JUSTIFICATION AND NO SIGNIFICANT HAZARDS CONSIDERATION**

**DISCUSSION AND JUSTIFICATION:**

The Omaha Public Power District (OPPD) proposes to revise the Fort Calhoun Station (FCS) Unit No. 1 Technical Specifications (TS) to provide additional restrictions on the operation of the Component Cooling Water (CCW) system heat exchangers.

The current minimum requirements for CCW heat exchangers are contained in TS 2.3, "Emergency Core Cooling System." This Limiting Condition for Operation (LCO) requires that three of the four heat exchangers be operable when the plant is in operating Modes 1 and 2, if only two are operable then 24 hours is allowed to restore the system to three operable heat exchangers. Additionally, TS 2.4 requires that all heat exchangers associated with containment heat removal required to function during an accident are operable in Modes 1 and 2.

During a Large Break Loss of Coolant Accident (LBLOCA) or a Main Steam Line Break Inside Containment (MSLB/IC), the containment air cooling units and containment air cooling and filtering units will automatically start to remove heat from the containment atmosphere. The heat sink for the containment air coolers is the CCW system. The heat removed from the containment atmosphere is transferred to the Raw Water (RW) system via the component cooling heat exchangers AC-1A, B, C, and D. The heat is then ultimately rejected to the Missouri River by the RW system.

In preparation for, and in response to a service water system operational performance self assessment, the CCW system heat loads were reevaluated to determine the peak temperatures on the system and components cooled by the CCW system. It was determined that if all of the containment coolers were operating the return temperature of the CCW system could exceed the 120° F value stated in the Updated Safety Analysis Report (USAR) as the maximum temperature of the system. The issue of elevated CCW temperatures after a Design Basis Accident was reported to the NRC in Licensee Event Report 50-285/94-10 dated December 14, 1994.

Calculations performed by ABB-Combustion Engineering (ABB-CE) indicate that the CCW return temperature (i.e., mixed exit temperature) from the component cooling heat exchangers could exceed 160°F after a LBLOCA or MSLB/IC with the present TS minimum requirements for the heat exchangers. Evaluation indicated that the CCW system (and components cooled by CCW) could withstand temperatures above the 120°F temperature stated in the USAR, but a return temperature above 158°F would require additional evaluation of thermal-induced stresses on the CCW return side pipe supports. In order to maintain the peak CCW return temperature less than or equal to 158°F, additional restrictions must be placed on the number of heat exchangers required to be operable.

**DISCUSSION AND JUSTIFICATION (Continued):**

The proposed change relocates the operability requirements for the component cooling heat exchangers from TS 2.3 to TS 2.4. This places the heat exchanger specifications in a more appropriate TS section (i.e., with the RW and CCW pumps). This proposed change also imposes more restrictive operability requirements on the heat exchangers to ensure that the CCW system is maintained within its analyzed design basis.

**TECHNICAL SPECIFICATION MINIMUM REQUIREMENTS**

Analyses show that after a high heat load accident such as a LBLOCA or MSLB/IC, three in service component cooling heat exchangers will maintain CCW return temperature in an analyzed range. This assumes that all of the containment air cooling units are operating which would create the maximum heat load on the CCW system. In order to ensure that three heat exchangers would be in service after a DBA in conjunction with an assumed single failure, four are required to be operable.

The RW valves to the component cooling heat exchangers are fail-open valves and open on a Safety Injection Actuation Signal (SIAS). These valves may be open or closed during normal operation depending on the number of heat exchangers in service. If the river temperature is below 70°F, the single failure of a heat exchanger's RW valve to open would not raise CCW return temperature to an unanalyzed level. A single failure of a RW valve to auto-open will raise CCW return temperature due to CCW passing through a heat exchanger which has no RW flow. When the river temperature is greater than or equal to 70°F, the single failure of a heat exchanger's RW valve to open, in conjunction with a LBLOCA or MSLB/IC, would raise CCW return temperature to an unanalyzed level. Therefore, when the river temperature is greater than or equal to 70°F, four heat exchangers are required to have RW in service (i.e., RW valves open on all heat exchangers). Having RW in service eliminates the potential failure of a RW valve to open as a credible single active failure. The valves may be closed intermittently under administrative control without entering the LCO action statement in order to conduct required testing of components. With these restrictions on the component cooling heat exchangers, the peak CCW return temperature following a DBA will be within an analyzed range with inoperable RW and or CCW pumps as allowed in TS 2.4.

A 14 day allowed outage time is proposed for one heat exchanger to be inoperable. This time was chosen as a reasonable amount of time to do certain required maintenance work on the heat exchangers. The proposed change was evaluated utilizing the probabilistic risk analysis model of the FCS Individual Plant Examination. The IPE concluded that the routine testing and maintenance activities, for the RW and CCW systems, are not significant contributors to severe accident risk.

**DISCUSSION AND JUSTIFICATION (Continued):**

**ADMINISTRATIVE CHANGES**

TS 2.4(1)a.i. is being corrected from "diesel-generator D-1" to state "diesel-generator DG-1."

TS 2.4(1)a.ii. is being corrected from "diesel-generator D-2" to state "diesel-generator DG-2."

TS 2.4(1)a. is being corrected from "During power operating..." to state "During power operation..." to correspond to terms defined in the TS.

TS 2.4(2) first paragraph is being revised to make "component" plural to reflect proper English. This paragraph is also being revised to clarify the statement "If the operability of one component is not restored.." to state "If the operability of one of the two components is not restored..," and to state that "the reactor shall be placed in a hot shutdown condition ..." instead of "the reactor shall be place in a hot shutdown condition ..." to reflect proper English.

**BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION:**

The proposed changes do not involve significant hazards consideration because operation of Fort Calhoun Station Unit No. 1 in accordance with these changes would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

In preparation for, and in response to a service water system operational performance self assessment, the heat loads in the Component Cooling Water (CCW) system were reevaluated to determine the peak temperatures on the system and components cooled by the CCW system. It was determined that if all of the containment coolers were operating, the return temperature of the CCW system could exceed the 120° F stated in the Updated Safety Analysis Report (USAR) as the maximum temperature of the system.

During a Large Break Loss of Coolant Accident (LBLOCA) or a Main Steam Line Break Inside Containment (MSLB/IC), the containment air cooling units and containment air cooling and filtering units will automatically start to remove heat from the containment atmosphere. The heat sink for the containment air coolers is the CCW system. The heat removed from the containment atmosphere is transferred to the Raw Water (RW) system via the component cooling heat exchangers AC-1A, B, C, and D. The heat is then ultimately rejected to the Missouri River by the RW system.

Calculations indicate that the CCW return temperature (i.e., mixed exit temperature) from the component cooling heat exchangers could exceed 160°F after a LBLOCA or MSLB/IC with the present TS minimum requirements for the heat exchangers. Further evaluation indicated that the CCW system (and components cooled by CCW) could withstand temperatures above the 120°F temperature stated in the USAR, but a return temperature above 158°F would require additional evaluation of thermal-induced stresses on the CCW return side pipe supports. In order to maintain the peak CCW return temperature to less than or equal to 158°F, additional restrictions must be placed on the number of component cooling heat exchangers required to be operable.

The current minimum requirements for component cooling heat exchangers are contained in Technical Specification (TS) 2.3, "Emergency Core Cooling System," and require that three of the four heat exchangers be operable when the plant is in operating Modes 1 and 2. Analyses show that three in service heat exchangers will maintain the CCW temperatures in an analyzed range following a DBA. In order to ensure that three heat exchangers are available, in conjunction with an assumed single failure, four are required to be operable. The proposed change would

**BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION (Continued):**

place additional restrictions on the operation of the CCW heat exchangers by requiring four heat exchangers to be operable in Modes 1 and 2, and if only three are operable then provide 14 days to restore the system to four operable heat exchangers.

The proposed change does not involve a significant increase in the probability of an accident previously evaluated. The proposed change does not impact systems, structures, or components that are initiators of any analyzed accidents.

The proposed change does not involve a significant increase in the consequences of an accident previously evaluated. The proposed change ensures that the CCW system and safety-related components cooled by the CCW will perform their safety functions in response to previously evaluated accidents. The proposed change was evaluated utilizing the probabilistic risk analysis model of the FCS Individual Plant Examination. The IPE concluded that the routine testing and maintenance activities, for the RW and CCW systems (e.g., inoperability of components for testing and maintenance) are not significant contributors to severe accident risk.

Therefore, the proposed change would not increase the probability or consequences of an accident previously evaluated.

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed change does not create an initiator for a new or different kind of accident from those previously evaluated. The proposed change places additional restrictions on the operation of equipment to ensure that the CCW system and safety-related components cooled by the CCW will perform their safety functions. The additional restrictions were evaluated in combination with existing allowances on RW and CCW pump inoperability, to confirm that the peak CCW return temperature would be in an analyzed range, and will not adversely impact the operability of the CCW system or safety-related components cooled by CCW. These restrictions are valid up to and including a river temperature of 90°F, which is the upper bound currently cited in the USAR.

Various single active failures were postulated to determine the most limiting failure in conjunction with the maximum heat load from the containment air coolers. It was determined that with the river temperature less than 70°F, a single failure of a RW valve to open on a component cooling heat exchanger would not raise the CCW return temperature to an unanalyzed level, but with the river temperature

**BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION (Continued):**

greater than or equal to 70°F, the CCW return temperature could be at an unanalyzed level. Therefore, it is proposed that when the river temperature is greater than or equal to 70°F four heat exchangers have RW in service (i.e., RW valves open). Having RW in service eliminates the potential failure of a RW valve to auto-open as a credible single active failure.

The proposed change ensures that the CCW system and safety-related components cooled by the CCW will perform their safety functions. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Involve a significant reduction in a margin of safety.

The proposed change provides additional restrictions on the CCW system and ensures that the CCW system will perform its design safety function. These additional restrictions ensure that the CCW system will be capable of removing the maximum heat load from the containment cooling system following a DBA and thereby ensures that the containment pressure remains below its limit as assumed in the USAR. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Therefore based on the above considerations, it is OPPD's position that this proposed amendment does not involve significant hazards considerations as defined by 10 CFR 50.92 and the proposed changes will not result in a condition which significantly alters the impact of the Station on the environment. Thus, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and pursuant to 10 CFR 51.22(b) no environmental assessment need be prepared.