DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 1

PROPOSED TECHNICAL SPECIFICATIONS

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3.4 SECONDARY SYSTEM DECAY HEAT REMOVAL

Applicability

Applies to the secondary system requirements for removal of reactor decay heat.

Objective

To specify minimum conditions necessary to assure the capability to remove decay heat from the reactor core.

Specification

3.4.1 The reactor shall not be heated above 250°F unless the following conditions are met:

a. Three emergency feedwater pumps (one steam driven pump capable of being driven from an operable steam supply system and two motor driven pumps) and associated manual initiation circuitry shall be operable.

b. Two 100% emergency feedwater flow paths shall be operable. Each flow path shall have at least one flow indicator operable.

3.4.2 In addition to the requirements of 3.4.1, prior to criticality, the automatic initiation circuitry associated with loss of main feedwater pumps as sensed by low hydraulic oil pressure or low discharge pressure shall be operable.

3.4.3 During operation greater than 250°F, the provisions of 3.4.1 and 3.4.2 may be modified to permit the following conditions:

a. One motor driven emergency feedwater pump may be inoperable for a period of up to seven days. If the inoperable pump is not restored to operable status within 7 days, the unit shall be brought to hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

b. One turbine driven emergency feedwater pump or one emergency feedwater flow path may be inoperable for a period of up to 72 hours. If the inoperable pump or flow path is not restored to operable status within 72 hours the unit will be at hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

c. Two motor driven emergency feedwater pumps may be inoperable for a period of up to 12 hours. If at least one pump is not restored to operable status within 12 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

d. With three emergency feedwater pumps and/or both emergency feedwater flow paths inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump and associated emergency feedwater flowpath to operable status. The unit shall be at hot shutdown within

12 hours and below 250°F in another 12 hours if one emergency feedwater pump and associated flowpath are not restored to operable status.

e. If an emergency feedwater pump is inoperable due only to automatic initiation circuitry as specified by 3.4.2, the additional provisions of 3.4.3 a, b, c, and d which require cooldown of the RCS do not apply.

3.4.4 The 16 main steam safety relief valves shall be operable.

3.4.5 A minimum of 72,000 gallons of water per operating unit shall be available in the upper surge tank, condensate storage tank, and hotwell. A minimum of 6 ft. (=30,000 gal.) shall be available in the upper surge tank.

3.4.6 The controls of the Emergency Feedwater System shall be independent of the Integrated Control System.

DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 2

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS

3.4 SECONDARY SYSTEM DECAY HEAT REMOVAL

Applicability

Applies to the secondary system requirements for removal of reactor decay heat.

Objective

To specify minimum conditions necessary to assure the capability to remove decay heat from the reactor core.

Specification

~~3.4.1 Emergency Feedwater System~~

3.4.1 The reactor shall not be heated above 250°F unless the following conditions are met:

a. Three emergency feedwater pumps (one steam driven pump capable of being powered from an operable steam supply system and two motor driven pumps) and associated MANUAL initiation circuitry shall be operable.

b. Two 100% emergency feedwater flow paths shall be operable. Each flow path shall have at least one flow indicator operable.

Added NEW 3.4.2 (See proposed Amendment)

~~3.4.2~~ 3.4.3 During operation greater than 250°F, the provisions of 3.4.1 may be modified to permit the following conditions:

a. One motor driven emergency feedwater pump may be inoperable for a period of up to seven days. If the inoperable pump is not restored to operable status within 7 days, the unit shall be brought to hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

b. One turbine driven emergency feedwater pump or one emergency feedwater flow path may be inoperable for a period of up to 72 hours. If the inoperable pump or flow path is not restored to operable status within 72 hours the unit will be at hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

c. Two motor driven emergency feedwater pumps (at least one pump) may be inoperable for a period of up to 12 hours. If ~~an inoperable pump~~ is not restored to operable status within 12 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

d. With three emergency feedwater pumps and/or both emergency feedwater flow paths inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump and associated emergency feedwater flowpath to operable status. The unit shall be at hot shutdown within 12 hours and below 250°F in another 12 hours if one emergency feedwater pump and associated flowpath are not restored to operable status.

New e. Added (See proposed Amendment)

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3.4.~~3~~ The 16 main steam safety relief valves shall be operable.

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3.4.~~4~~ A minimum of 72,000 gallons of water per operating unit shall be available in the upper surge tank, condensate storage tank, and hotwell. A minimum of 6 ft. (=30,000 gal.) shall be available in the upper surge tank.

3.4.5 Emergency Condenser Cooling Water (ECCW) System

a. The RCS shall not be heated above 250°F unless the ECCW System is operable. DELETE

b. If the ECCW System becomes inoperable during operation above 250°F, and the system is not restored to operable status in seven days, then the unit shall be brought to hot shutdown within an additional 12 hours and below 250°F in another 12 hours.

3.4.6 The controls of the emergency feedwater system shall be independent of the Integrated Control System.

DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 3

BASES REVISIONS

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Bases

The Main Feedwater System and the Turbine Bypass System are normally used for decay heat removal and cooldown above 250°F. Feedwater makeup is supplied by operation of a hotwell pump, condensate booster pump, and a main feedwater pump.

Operability of the Emergency Feedwater System (EFW) assures the capability to remove decay heat and cool down the Reactor Coolant System to the operating conditions for switch over to decay heat removal by the Decay Heat Removal System, in the event that the Main Feedwater System is inoperable. The EFW system consists of a turbine driven pump (880 gpm), two motor driven pumps (450 gpm each), and associated flow paths to the steam generators.

The limiting transient requiring maximum EFW flow is the loss of main feedwater with offsite power available. For this transient, a minimum EFW flow rate equivalent to 400 gpm at 1050 psia and no more than 130°F is adequate. Each of the three EFW pumps is capable of delivering this flow.

A 100% flowpath is defined as: The flowpath to either steam generator including associated valves and piping capable of being supplied by either the turbine driven pump or the associated motor driven pump.

One flow indicator or steam generator level indicator per steam generator is sufficient to provide indication of emergency feedwater flow to the steam generators and to confirm Emergency Feedwater System operation. In the event that at least one indicator per steam generator is not available, then the flowpath to this steam generator is considered to be inoperable.

The EFW System is designed to start automatically in the event of loss of both main feedwater pumps as sensed by low hydraulic oil pressure or low feedwater pump discharge pressure. This specific automatic initiation logic is placed in service prior to criticality and may be bypassed when shutdown to prevent inadvertent actuation during startup and shutdown. All automatic initiation logic and control functions are independent from the Integrated Control System (ICS).

Normally, decay heat is removed by steam relief through the Turbine Bypass System to the condenser. Decay heat can also be removed from the steam generators by steam relief through the main steam safety relief valves. The total relief capacity of the 16 main steam safety relief valves is 13,105,000 lbs./hr. In this case the minimum amount of water in the upper surge tank, condensate storage tank, and hotwell is sufficient to remove decay heat for at least 4 hours at hot shutdown conditions. This provides adequate time to establish normal flow through the condenser by restarting a Condenser Cooling Water (CCW) pump in a loss of station power events. The turbine bypass valves can then be utilized to relieve steam to the condenser and commence a cooldown of the RCS.

A 6 foot level in the upper surge tank will ensure that 30,000 gallons of water are available to the EFW pumps from that source. The 6 foot level setpoint includes an allowance for instrument error and for the depletion of inventory while switching to an alternate suction source.

REFERENCES

1. FSAR, Section 10.
2. Selected Licensee Commitments, Section 16.7

DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 4

MARKUP OF CURRENT BASES

Bases

The Main Feedwater System and the Turbine Bypass System are normally used for decay heat removal and cooldown above 250°F. Feedwater makeup is supplied by operation of a hotwell pump, condensate booster pump, and a main feedwater pump.

Operability of the Emergency Feedwater System (EFW) assures the capability to remove decay heat and cool down the Reactor Coolant System to the operating conditions for switch over to decay heat removal by the Decay Heat Removal System, in the event that the Main Feedwater System is inoperable. The EFW system consists of a turbine driven pump (880 gpm), two motor driven pumps (450 gpm each), and associated flow paths to the steam generators.

The decay heat and the reactor coolant pump heat following a reactor trip from 102% power, and the EFW flow rate (90°F feedwater) required to remove this heat demand are as follows:

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Time	Heat Source (% of 2619 MWT)	EFW Flow Required to Match Heat Source (gpm)
2 min	5.031	797
5 min	3.46	548
10 min	3.06	485
30 min	2.49	395
1 hour	2.15	341
2 hours	1.89	299
4 hours	1.74	276

The limiting transient requiring maximum EFW flow is the loss of main feedwater with offsite power available. For this transient, a minimum EFW flow rate equivalent to ~~405~~ 400 gpm at 1050 psia is adequate. Each of the three EFW pumps is capable of delivering this flow. AND NO MORE THAN 130°F

A 100% flowpath is defined as: The flowpath to either steam generator including associated valves and piping capable of being supplied by either the turbine driven pump or the associated motor driven pump.

One flow indicator or steam generator level indicator per steam generator is sufficient to provide indication of emergency feedwater flow to the steam generators and to confirm emergency feedwater system operation. In the event that at least one indicator per steam generator is not available, then the flowpath to this steam generator is considered to be inoperable.

The EFW System is designed (as sensed by low hydraulic oil pressure) to start automatically in the event of loss of both main feedwater pumps or low main feedwater header pressure. All automatic initiation logic and control functions are independent from the Integrated Control System (ICS). (This specific automatic initiation logic is placed in service prior to criticality and may be bypassed when shutdown to prevent inadvertent actuation during startup and shutdown.)

Normally, decay heat is removed by steam relief through the turbine bypass system to the condenser. ~~Condenser cooling water flow is provided by a siphon effect from Lake Keowee through the condenser for final heat rejection to the Keowee Hydro Plant tailrace. Decay heat removal via recirculation flowpath~~

~~may be maintained for up to 11 hours per unit, assuming the minimum amount of water in the upper surge tanks, condensate storage tank, and hotwell is available. This is based on the conservative estimate of normal makeup being 0.5% of throttle flow. Throttle flow at full load, 11,200,000 lbs./hr., was used to calculate the operation time. For decay heat removal the operation time with the volume of water specified would be considerably increased due to the reduced throttle flow.~~

Decay heat can also be removed from the steam generators by steam relief through the main steam safety relief valves. The total relief capacity of the 16 main steam safety relief valves is 13,105,000 lbs./hr. In this case the minimum amount of water in the upper surge tank, condensate storage tank, and hotwell is sufficient to remove decay heat ~~and reactor coolant pump heat~~ for ~~3~~ 4 hours per unit at hot shutdown conditions.

A 6 foot level in the upper surge tank will ensure that 30,000 gallons of water are available to the EFW pumps from that source. The 6 foot level set-point includes an allowance for instrument error and for the depletion of inventory while switching to an alternate suction source.

REFERENCE

1. FSAR, Section 10.
2. Selected Licensee Commitments, Section 16.7

This provides adequate time to establish normal flow through the condenser by restarting a Condenser Cooling Water (CCW) pump in a loss of station power events. The turbine bypass valves can then be utilized to relieve steam to the condenser and commence a cooldown of the RCS.

DUKE POWER COMPANY
OCONEE NUCLEAR STATION
ATTACHMENT 5

TECHNICAL JUSTIFICATION

The Emergency Feedwater (EFW) System is actuated on loss of both main feedwater pumps as sensed by 1) loss of hydraulic oil pressure to the steam supply stop valves, or 2) low feedwater pumps discharge pressure with a setpoint of 770 psig. During startup or shutdown, when main feedwater pump discharge pressure is less than 770 psig, the automatic initiation circuitry must be bypassed to prevent inadvertent actuation of the EFW System. The pressure switches utilized to indicate low feedwater pump discharge pressure are designed to automatically reset at a value far enough above the actuation setpoint such that they do not experience periods of repeated tripping and resetting oscillations. The difference between the actuation setpoint and reset setpoint is referred to as the reset deadband. Currently the calibration tolerance for these pressure switches has a reset deadband of 100 psig (these pressure switches are scheduled to be replaced in the future to allow for a smaller reset deadband). This means that the EFW automatic initiation circuitry should not be placed in service until main feedwater pump discharge pressure is above 870 psig. Main feedwater pump discharge pressure is related to turbine header pressure in the following manner. Turbine header pressure is normally maintained at 900 psig from hot shutdown to full power conditions. Main feedwater pump discharge pressure is maintained at a value slightly higher (≈35 psig) to enable flow to the steam generators. At hot shutdown conditions, prior to criticality, the unit is verified to be in a stable condition and various systems and components are verified to be configured for imminent power operation. Utilization of the reference point of criticality provides assurance of adequate margin to prevent inadvertent actuation of the EFW System as well as a stable plateau for plant conditions without compromise of the design basis for the EFW system. Design basis events which require the initiation of EFW assume an initial system condition of the reactor at full power.

Existing requirements in Technical Specification 3.4 specify that the "initiation circuitry" for the EFW pumps shall be operable whenever RCS temperature is greater than 250 °F. This specification is mute as to whether the initiation circuitry required is automatic or manual. The existing Technical Specification Bases discuss operability of the automatic initiation logic but do not address the need to bypass this logic. This Technical Specification is currently interpreted to require that the automatic initiation be operable and enabled at a discharge pressure greater than the setpoint for EFW System automatic initiation. This also implies that the automatic initiation circuitry may be bypassed prior to discharge pressure decreasing to the initiation setpoint although RCS temperature is above 250°F. Changes to Technical Specifications provided in Attachment 1 clarify the current Technical Specification requirements:

1) TS 3.4.1.a will now require that manual initiation circuitry associated with the EFW pumps on loss of main feedwater be operable whenever the EFW pumps are required to be operable.

2) A new TS 3.4.2 has been added to require that the automatic initiation circuitry be operable prior to criticality. This requirement eliminates the potential for confusion that the automatic initiation can be operable

below 770 psig. Criticality was selected because the 100 psig reset deadband could cause inadvertent actuation of the EFW system with main feedwater pump discharge pressure at 870 psig, which is close to the normal operating discharge pressure of 900 psig plus ≈35 psig. Criticality provides a reference point where plant stability can be assured and design basis of the EFW system will not be compromised.

3) Existing TS 3.4.2 has been renumbered to 3.4.3. The proposed TS 3.4.3.e on page 3.4-2 clarifies the requirements in the event automatic initiation is inoperable. Specifically, the actions for inoperable automatic initiation are identical to the associated inoperable EFW pumps. However, cooldown to less than 250 °F is not required since shutdown to hot shutdown will exit the applicability for automatic initiation circuitry.

Proposed TS 3.4.3.c adds clarification that at least one motor driven EFW pump must be returned to operable status within 12 hours in the event both pumps are inoperable.

Proposed TS 3.4.3.d clarifies that if one emergency flowpath is restored, then continuation of shutdown and/or cooldown is not required.

This TS proposal eliminates the requirement for operability of the Emergency Condenser Cooling Water (ECCW) System (current TS 3.4.5). This is based upon analyses performed in regard to requirements for Station Blackout (SBO) events. Current TS bases address the fact that decay heat is normally removed by steam relief to the condenser via the turbine bypass valves. In the event normal condenser cooling water flow is not available, flow is provided by a siphon effect from Lake Keowee through the condenser to the Keowee Hydro Plant tailrace. This method of decay heat removal is desirable although not necessary. The absence of this method of decay heat removal is not considered to be risk significant in accident analysis and is not modeled in the Oconee PRA studies. Therefore, the risk associated with the removal the ECCW system for secondary system decay heat removal is considered insignificant. The primary success path for secondary systems decay heat removal is from the steam generators by steam relief through the main steam safety relief valves as identified in the current TS bases. These bases further state sufficient inventory exist to remove decay heat for 3 hours if the minimum volume specified by TS 3.4.4 (72,000 gal) is maintained. Subsequent analyses have concluded that 72,000 gal inventory in secondary systems of each unit is more than adequate to cope with SBO events for 4 hours (actual requirements are approximately 65,000 gal per unit).

In addition, the Auxiliary Service Water pump can pump lake water directly into the steam generators after the secondary side is depressurized with the manual atmospheric dump valves. This ensures that decay heat removal through the secondary side can continue as long as necessary. (Re: February 13, 1984 letter from H. B. Tucker - Duke to Harold R. Denton - NRC regarding proposed Technical Specification 3.4.5).

In 1992, the NRC approved the Duke response to the SBO rule that involves a 4 hour coping duration without reliance upon ECCW flow through the condenser. (Re: Letters dated March 10, 1992 and December 3, 1992 from L. A. Wiens - NRC to J. W. Hampton - Duke regarding the Safety Evaluation Report and Supplemental Safety Evaluation Report associated with the station blackout rule, 10 CFR 50.63). Therefore, since the primary success path for secondary decay heat removal for

design basis events does not depend upon the availability of ECCW flow through the condenser, this flow path is not essential for Oconee and can be eliminated from the Secondary System Decay Heat Removal Technical Specification. TS bases has also been revised to reflect this change.

Technical Specification bases associated with the EFW flow rate required for a transient involving loss of main feedwater with offsite power available is being changed to agree with the FSAR which was changed to reflect analysis that allows for upper surge tank temperatures of 130°F.

DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 6
NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by NRC regulations in 10CFR50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

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

Each accident analysis addressed within the Oconee FSAR has been examined with respect to changes proposed within this amendment request. The design basis of the Emergency Feedwater (EFW) System is to supply feedwater to the steam generators in the event Main Feedwater is lost. The EFW system provides the required flow rate to cool the RCS down to the point at which the Decay Heat Removal System is designed to operate. The EFW system is also designed to cool the RCS following a small break LOCA. Changes included within this amendment request are provided to clarify requirements for the operability of EFW. Specifically, these changes clarify that automatic initiation circuitry due to low main feedwater pump discharge pressure or low hydraulic oil pressure may be bypassed when the reactor is shutdown to prevent inadvertent actuation. In addition, these changes provide that if an EFW pump is inoperable due only to the inoperability of automatic initiation, cooldown to below 250°F is not necessary after the reactor is shutdown. Accident analysis for the loss of main feedwater, and subsequent initiation of EFW, assumes initial conditions of the reactor at full power operation. The utilization of criticality for this specific automatic initiation circuitry to be operable ensures the EFW system is operated within the boundaries of design basis for Oconee while also providing a reasonable margin to prevent inadvertent actuation. It is not possible to place this automatic initiation circuitry in service prior to exceeding 250°F because the main feedwater pump discharge pressure is well below the initiation setpoint at this value. Manual initiation circuitry operability is required prior to exceeding an RCS temperature of 250°F. This change only clarifies existing configuration and control for the Oconee units and does not increase the probability or consequences of any accident previously evaluated.

This change also removes the requirement for Emergency Condenser Cooling Water (ECCW) System operability for the removal of decay heat using the secondary systems. The ability to provide flow through the condenser from the ECCW system is a preferred method for decay heat removal. However, this mode of operation is not necessary to prevent or mitigate any accident previously evaluated. The primary success path for decay heat removal following loss of station power events, and thus loss of normal CCW flow, is the use of the turbine driven EFW pump providing flow to the steam generators and heat removal via the main steam safety relief valves to the atmosphere. Analysis has shown that sufficient inventory exists in secondary systems, as limited by Technical Specification 3.4.4, to provide

for decay heat removal. Therefore, this proposed change deletes the requirement for ECCW for secondary systems decay heat removal. The probability or consequences of any design basis accident are not increased by this change. As such, this change will not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

Changes included within this amendment request are provided to clarify existing requirements for operability of the EFW System and remove the requirement for ECCW flow through the condenser for decay heat removal. Operation of Oconee units in accordance with these Technical Specifications will not create any failure modes not bounded by previously evaluated accidents. Previously evaluated accidents assume an initial condition of power operation for loss of main feedwater events. Providing for automatic initiation prior to criticality ensures operation within the bounds of design analysis. Previously evaluated accidents also assume the removal of decay heat, following loss of normal CCW flow, to be via the main steam safety relief valves to the atmosphere which eliminates the need for ECCW operability. Consequently, this change will not create the possibility of a new or different kind of accident from any kind of accident previously evaluated.

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

The design basis of the EFW system is to supply feedwater to the steam generators in the event Main Feedwater is lost. By providing clarification that manual initiation circuitry is operable prior to exceeding an RCS temperature of 250°F and automatic initiation circuitry, due to low main feedwater discharge pressure or low hydraulic oil pressure, is operable prior to criticality, there is no significant reduction in the margin of safety associated with this amendment request. The ECCW system is designed to provide a means to remove decay heat without a loss of secondary side inventory. However, analysis has shown that sufficient secondary side inventory exist, as specified by Technical Specification 3.4.4, to provide for coping with loss of station power events. Furthermore, even though this method of decay heat removal is desirable, Oconee PRA studies do not model the loss of ECCW for accident precursors since it is not required and margins of safety are not reduced if it is not available. Changes included within this amendment request clarify existing requirements for the operability of secondary systems for decay heat removal based on previously evaluated accidents. As such, all margins of safety are preserved. Therefore, there will be no reduction in any margin of safety.

Duke has concluded, based on the above and the technical justification in Attachment 3, that there are no significant hazards considerations involved in this amendment request.