(4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form for sample analysis or instrument calibration or when associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by operation of the facility.

3. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter 1: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

Omaha Public Power District is authorized to operate the Fort Calhoun Station, Unit 1, at steady state reactor core power levels not in excess of 1500 megawatts thermal (rated power).

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 249 are hereby incorporated in the license. Omaha Public Power District shall operate the facility in accordance with the Technical Specifications.

C. Security and Safeguards Contingency Plans

The Omaha Public Power District shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The plans, which contain Safeguards Information protected under 10 CFR 73.21, are entitled: "Fort Calhoun Station Security Plan, Training and Qualification Plan, Safeguards Contingency Plan," submitted by letter dated May 19, 2006,

2.0 LIMITING CONDITIONS FOR OPERATION

2.2 Chemical and Volume Control System (Continued)

2.2.2 Boric Acid Flow Paths - Operating

Applicability

Applies to the operational status of the boric acid flow paths whenever the reactor coolant temperature (T_{cold}) is greater than or equal to 210°F.

Objective

To assure operability of equipment required to add negative reactivity.

Specification

At least two of the following boric acid flow paths from OPERABLE borated water sources shall be OPERABLE:

a. A flow path from boric acid storage tank CH-11A, via either a boric acid transfer pump or a gravity feed connection and a charging pump to the Reactor Coolant System.

b. A flow path from boric acid storage tank CH-11B, via either a boric acid transfer pump or a gravity feed connection and a charging pump to the Reactor Coolant System.

c. A flow path from both boric acid storage tanks (CH-11A and CH-11B) via either a boric acid transfer pump or gravity feed connection and a charging pump to the Reactor Coolant System.

d. A flow path from the SIRW tank via a charging pump to the Reactor Coolant System.

Required Actions

(1) With only one of the above required boric acid flow paths to the Reactor Coolant System OPERABLE, restore to at least two OPERABLE boric acid flow paths to the Reactor Coolant System within 72 hours.

(2) With the required actions of (1) not met, or with none of the required boric acid flow paths to the Reactor Coolant System OPERABLE, be in at least HOT SHUTDOWN within 6 hours, in at least subcritical and <300°F within the next 6 hours, and in at least COLD SHUTDOWN within the following 30 hours.

2.0 LIMITING CONDITIONS FOR OPERATION

2.2 Chemical and Volume Control System (Continued)

2.2.4 Charging Pumps - Operating

Applicability

Applies to the operational status of charging pumps whenever the reactor coolant temperature (T_{cold}) is greater than or equal to 210°F.

Objective

To assure operability of equipment required to add negative reactivity.

Specification

At least two charging pumps shall be OPERABLE.

Required Actions

(1) With only one charging pump OPERABLE, restore to at least two OPERABLE charging pumps within 72 hours.

(2) With the required actions of (1) not met, or with no charging pumps OPERABLE, be in at least HOT SHUTDOWN within 6 hours, in at least subcritical and <300°F within the next 6 hours, and in at least COLD SHUTDOWN within the following 30 hours.

2.0 LIMITING CONDITIONS FOR OPERATION

2.2 Chemical and Volume Control System (Continued)

2.2.6 Boric Acid Transfer Pumps - Operating

Applicability

Applies to the operational status of the boric acid transfer pumps whenever the reactor coolant temperature (T_{cold}) is greater than or equal to 210°F.

Objective

To assure operability of equipment required to add negative reactivity.

Specification

At least the boric acid transfer pump(s) in the boric acid flow path(s) required to be OPERABLE pursuant to Specification 2.2.2 shall be OPERABLE if the flow path(s) through the boric acid transfer pump(s) in Specification 2.2.2 is OPERABLE.

Required Actions

(1) With one boric acid transfer pump required to be OPERABLE to complete one of the two boric acid flow paths of Specification 2.2.2 inoperable, restore the boric acid transfer pump to OPERABLE status within 72 hours.

(2) With the required actions of (1) not met, or with two boric acid transfer pumps required to be OPERABLE to complete both of the boric acid flow paths of Specification 2.2.2 inoperable, be in at least HOT SHUTDOWN within 6 hours, in at least subcritical and <300°F within the next 6 hours, and in at least COLD SHUTDOWN within the following 30 hours.

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

iii. Four component cooling heat exchangers shall be operable.

iv. All 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 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; 1) One Raw Water pump which may be inoperable as described above if the river water temperature is below 60 degrees Fahrenheit or, 2) SI-3A and SI-3B being simultaneously inoperable. Only two raw water pumps may be out of service during power operations. Either containment spray pump, SI-3A or SI-3B, must be operable 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

2.0 LIMITING CONDITIONS FOR OPERATION

2.7 Electrical Systems (Continued)

(2) Modification of Minimum Requirements

The minimum requirements may be modified to the extent that one of the following conditions will be allowed after the reactor coolant has been heated above 300°F. However, the reactor shall not be made critical unless all minimum requirements are met. If any of the provisions of these exceptions are violated, the reactor shall be placed in a hot shutdown condition within the following 12 hours. If the violation is not corrected within an additional 12 hours, the reactor shall be placed in a cold shutdown condition within an additional 24 hours.

a. Both unit auxiliary power transformers T1A-1 and -2 (4.16 kV) may be inoperable for up to 24 hours provided the operability of both diesel generators is demonstrated immediately.

b. Either house service transformer T1A-3 or T1A-4 (4.16kV) may be inoperable for up to 7 days provided the operability of the diesel generator associated with the inoperable transformer is immediately verified. The NRC Operations Center shall be notified by telephone within 4 hours after transformer inoperability. Continued operation beyond 7 days is permissible, provided a special report is submitted to the NRC within 48 hours after transformer inoperability pursuant to Section 5.9.3 of the Technical Specifications. The special report will outline the plans for restoration of transformer operability and the additional precautions to be taken while the transformer is out of service.

c. Both house service transformers T1A-3 and T1A-4 (4.16kV) may be inoperable for up to 72 hours provided the operability of both diesel generators is immediately verified. The loss of the 161kV incoming line renders both transformers inoperable. The NRC Operations Center shall be notified by telephone within 4 hours after transformer inoperability. Continued operation beyond 72 hours is permissible, provided a special report is submitted to the NRC within 48 hours after both transformers' inoperabiltiy pursuant to Section 5.9.3 of the Technical Specifications. The special report will outline the plans for restoration of the transformers' operability and the additional precautions to be taken while the transformers are out of service.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.2 Reactivity Control Systems and Core Physics Parameters Limits (Continued)

Control Element Assemblies

(4) Full Length CEA Position During Power Operation

All full length (shutdown and regulating) CEA's shall be operable with each CEA of a given group positioned within 12 inches (actual position) of all other CEA's in its group. If one or more of the CEA's is inoperable or misaligned, determine the cause and comply with one of the following:

a. If one or more full length CEA's are inoperable due to: 1) being immovable as a result of excessive friction or mechanical interference, or 2) known to be untrippable, determine that the shutdown margin requirement of Specification 2.10.2(1) is satisfied within 1 hour and be in at least hot shutdown within 7 hours.

b. With one full length CEA inoperable due to causes other than addressed in item a. above, and inserted beyond the Long Term Steady State Insertion Limits but within its above specified alignment requirements, power operation may continue for up to 7 EFPD's per occurrence with a total accumulated time of <14 EFPD per fuel cycle.

c. With one full length CEA inoperable due to causes other than addressed in item a. above, but within its above specified alignment requirements and either fully withdrawn or above the Long Term Steady State Insertion Limits if in CEA group 4, power operation may continue.

d. With one or more full length CEA's misaligned from any other CEA's in its group by more than 12 inches but less than 18 inches (actual position) within one hour either:

(i) Restore the misaligned CEA(s) to within 12 inches (actual position) of any other CEA's in its own group (realignment shall be made while maintaining the allowable CEA sequence and CEA insertion limits of the Power Dependent Insertion Limits Figure provided in the COLR; or

(ii) Declare the CEA's inoperable. Power operation may continue provided all of the following conditions are met:

1. The power level shall be reduced to ≤ 70% of the maximum allowable power level for the existing Reactor Coolant Pump combination within an additional one hour; if negative reactivity insertion is required to reduce power, boration shall be used.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.4 Power Distribution Limits (Continued)

(c) When the linear heat rate is continuously monitored by the excore detectors, withdraw the full length CEA's beyond the long term insertion limits of Specification 2.10.2(7) and maintain the Axial Shape Index, Y_I within the limits of Limiting Condition for Operations for the Excore Monitoring of LHR Figure provided in the COLR. If the linear heat rate is exceeding its limits as determined by the Axial Shape Index, Y_I, being outside the limits of the Limiting Condition for Operation for Excore Monitoring of LHR Figure provided in the COLR:

(i) Restore the reactor power and Axial Shape Index, Y_I, to within the limits of the Limiting Condition for Operations for Excore Monitoring of LHR Figure provided in the COLR within 2 hours, or

(ii) Be in at least hot standby within the next 6 hours.

(d) When calibration of the ex-core detectors has not been accomplished within the previous 30 equivalent full power days, then:

(i) reduce the axial power distribution monitoring trip setpoints (Figure 1-2) by 0.03 ASI units; and

(ii) reduce the axial power distribution monitoring Limiting Condition for Operations (LCO for Excore Monitoring of LHR and LCO for DNB Monitoring Figures provided in the COLR) by 0.03 ASI units.

When calibration of the ex-core detectors has not been accomplished within the previous 200 equivalent full power days, the power shall be limited to less than that corresponding to 75% of the peak linear heat rate permitted by Specification 2.10.4.(1).

(2) Total Integrated Radial Peaking Factor

The calculated value of F_R^T defined by $F_R^T = F_R (1+T_q)$ shall be within the limit provided in the COLR. F_R is determined from a power distribution map with no non-trippable CEA's inserted and with all full length CEA's at or above the Long Term Steady State Insertion Limit for the existing Reactor Coolant Pump combination. The azimuthal tilt, T_q, is the measured value of T_q at the time F_R is determined.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.4 Power Distribution Limits (Continued)

(5) DNBR Margin During Power Operation Above 15% of Rated Power

(a) The following limits on DNB-related parameters shall be maintained:

(i)	Cold Leg Temperature (Core Inlet Temperature)	as specified in the COLR
(ii)	Pressurizer Pressure	≥ 2075 psia[1]
(iii)	Reactor Coolant Flow rate	≥ 202,500 gpm indicated
(iv)	Axial Shape Index	as specified in the COLR

(b) With any of the above parameters exceeding the limit, restore the parameter to within its limit within 2 hours or reduce power to less than 15% of rated power within the next 8 hours.

Basis

The limitation on linear heat rate ensures that in the event of a LOCA, the peak temperature of the fuel cladding will not exceed 2200°F.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the linear heat rate does not exceed its limit. The Excore Detector Monitoring System performs this function by continuously monitoring the axial shape index (ASI) with the operable quadrant symmetric excore neutron flux detectors. The axial shape index is maintained within the allowable limits of the Limiting Condition for Operation for Excore Monitoring of LHR Figure provided in the COLR. This ASI is adjusted by Specification 2.10.4(1)(c) for the allowed linear heat rate of the Allowable Peak Linear Heat Rate vs. Burnup Figure provided in the COLR and the F_R^T and Core Power Limitations Figure provided in the COLR. In conjunction with the use of the excore monitoring system and in establishing the axial shape index limits, the following assumptions are made: (1) the CEA insertion limits of Specification 2.10.1(6) and long term insertion limits of Specification 2.10.1(7) are satisfied, and (2) the flux peaking augmentation factors are as shown in Figure 2-8.

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[1] Limit not applicable during either a thermal power ramp in excess of 5% of rated thermal power per minute or a thermal power step of greater than 10% of rated thermal power.

2.0 LIMITING CONDITIONS FOR OPERATION
2.15 Instrumentation and Control Systems

Applicability

Applies to plant instrumentation systems.

Objective

To delineate the conditions of the plant instrumentation and control systems necessary to assure reactor safety.

Specifications

The operability, permissible bypass, and Test Maintenance and Inoperable bypass specifications of the plant instrument and control systems shall be in accordance with Tables 2-2 through 2-5.

(1) In the event the number of channels of a particular system in service falls one below the total number of installed channels, the inoperable channel shall be placed in either the bypassed or tripped condition within one hour if the channel is equipped with a key operated bypass switch, and eight hours if jumpers or blocks must be installed in the control circuitry. The inoperable channel may be bypassed for up to 48 hours from time of discovering loss of operability; however, if the inoperability is determined to be the result of malfunctioning RTDs or nuclear detectors supplying signals to the high power level, thermal margin/low pressurizer pressure, and axial power distribution channels, these channels may be bypassed for up to 7 days from time of discovering loss of operability. If the inoperable channel is not restored to OPERABLE status after the allowable time for bypass, it shall be placed in the tripped position or, in the case of malfunctioning RTDs or linear power nuclear detectors, the reactor shall be placed in hot shutdown within 12 hours. If active maintenance and/or surveillance testing is being performed to return a channel to active service or to establish operability, the channel may be bypassed during the period of active maintenance and/or surveillance testing. This specification applies to the high rate trip-wide range log channel when the plant is at or above 10^{-4}% power and is operating below 15% of rated power.

(2) In the event the number of channels of a particular system in service falls to the limits given in the column entitled "Minimum Operable Channels," one of the inoperable channels must be placed in the tripped position or low level actuation permissive position for the auxiliary feedwater system within one hour, if the channel is equipped with a bypass switch, and within eight hours if jumpers or blocks are required; however, if minimum operable channel conditions for SIRW tank low signal are reached, both inoperable channels must be placed in the bypassed condition within eight hours from time of discovery of loss of operability. If at least one inoperable channel has not been restored to OPERABLE status after 48 hours from time of discovering loss of operability, the reactor shall be placed in a hot shutdown condition within the following 12 hours; however, operation can continue without containment ventilation isolation signals available if the containment ventilation isolation valves are closed.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.15 Instrumentation and Control Systems (Continued)

If after 24 hours from time of initiating a hot shutdown procedure at least one inoperable engineered safety features or isolation functions channel has not been restored to OPERABLE status, the reactor shall be placed in a cold shutdown condition within the following 24 hours. This specification applied to the high rate trip-wide range log channel when the plant is at or above 10^{-4}% power and is operating below 15% of rated power.

(3) In the event the number of channels on a particular engineered safety features (ESF) or isolation logic subsystem in service falls below the limits given in the columns entitled "Minimum Operable Channels" or "Minimum Degree of Redundancy," except as conditioned by the column entitled "Permissible Bypass Conditions," sufficient channels shall be restored to OPERABLE status within 48 hours so as to meet the minimum limits or the reactor shall be placed in a hot shutdown condition within the following 12 hours; however, operation can continue without containment ventilation isolation signals available if the ventilation isolation valves are closed. If after 24 hours from time of initiating a hot shutdown procedure sufficient channels have not been restored to OPERABLE status, the reactor shall be placed in a cold shutdown condition within the following 24 hours.

(4) In the event the number of channels of those particular systems in service not described in (3) above falls below the limits given in the columns entitled "Minimum Operable Channels" or "Minimum Degree of Redundancy," except as conditioned by the column entitled "Permissible Bypass Conditions," the reactor shall be placed in a hot shutdown condition within 12 hours. If minimum conditions for engineered safety features or isolation functions are not met within 24 hours from time of discovering loss of operability, the reactor shall be placed in a cold shutdown condition within the following 24 hours. If the number of OPERABLE high rate trip-wide range log channels falls below that given in the column entitled "Minimum Operable Channels" in Table 2-2 and the reactor is at or above 10^{-4}% power and at or below 15% of rated power, reactor critical operation shall be discontinued and the plant placed in an operational mode allowing repair of the inoperable channels before startup or reactor critical operation may proceed.

If during power operation, the rod block function of the secondary CEA position indication system and rod block circuit are inoperable for more than 24 hours, or the plant computer PDIL alarm, CEA group deviation alarm and the CEA sequencing function are inoperable for more than 48 hours, the CEAs shall be withdrawn and maintained at fully withdrawn and the control rod drive system mode switch shall be maintained in the off position except when manual motion of CEA Group 4 is required to control axial power distribution.

(5) In the event that the number of operable channels of the listed Alternate Shutdown Panels or the Auxiliary Feedwater Panel instrumentation or control circuits falls below the required number of channels, either restore the required number of channels to OPERABLE status within seven (7) days, or be in hot shutdown (Mode 3) within the next twelve hours. This specification is applicable in Modes 1 and 2.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.15 Instrumentation and Control Systems (Continued)

Function/Instrument or Control Parameter	Location	Required Number of Channels
1. Reactivity Control		
a. Source Range Power	AI-212	1
b. Reactor Wide Range Logarithmic Power	AI-212	1
2. Reactor Coolant System Pressure Control		
a. Pressurizer Wide Range Pressure (0-2500 psia)	AI-179	1
3. Decay Heat Removal via Steam Generators		
a. Reactor Coolant Hot Leg Temperature	AI-185	1 (Note 1)
b. Reactor Coolant Cold Leg Temperature	AI-185	1 (Note 1)
c. Steam Generator Pressure	AI-179	1 per Steam Generator
d. Steam Generator Narrow Range Level	AI-179	1 per Steam Generator
e. Steam Generator Wide Range Level	AI-179	1 per Steam Generator
4. Reactor Coolant System Inventory Controls		
a. Pressurizer Level	AI-185	1
b. Volume Control Tank Level	AI-185	1
c. Charging Pump CH-1B and its associated controls	AI-185	1
d. Charging Isolation Valve Control	AI-185	1
5. Transfer Functions		
a. All Transfer Switches/Lockout Relays	AI-185	1
b. All Transfer Switches/Lockout Relays	AI-179	1

Note 1: One reactor coolant hot leg temperature indication and one reactor coolant cold leg temperature indication channel must both be operable on the same steam generator (i.e., RC-2A or RC-2B).

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.15 Instrumentation and Control Systems (Continued)

Function/Instrument or Control Parameter		Location	Required Number of Channels
6.	Auxiliary Feedwater Controls		
a.	Steam Generator RC-2A and 2B Auxiliary Feedwater Isolation Inboard and Outboard Valves Control	AI-179	1
b.	Steam-Driven Pump FW-10 Recirculation Valve Control	AI-179	1
c.	Steam-Driven Pump FW-10 Steam Isolation Valve Control	AI-179	1
d.	Steam from Steam Generator RC-2A and RC-2B to FW-10 Steam Isolation Valve Control	AI-179	1

Basis

During plant operation, the complete instrumentation systems will normally be in service. This specification outlines limiting conditions for operation necessary to preserve the effectiveness of the reactor protective system (RPS) and engineered safety features (ESF) system when one or more of the channels are out of service. Reactor safety is provided by RPS, which automatically initiates appropriate action to prevent exceeding established limits. Safety is not compromised, however, by contined operation with certain instrumentation channels out of service since provisions were made for this in the plant design.

The RPS and most engineered safety feature channels are supplied with sufficient redundancy to provide the capability for channel test at power, except for backup channels such as derived circuits in the ESF logic system.

When one of the four channels is taken out of service for maintenance, RPS logic can be changed to a two-out-of-three coincidence for a reactor trip by bypassing the removed channel. If the bypass is not effected, the out-of-service channel (Power Removed) assumes a tripped condition (except high rate-of-change of power, high power level and high pressurizer pressure),[1] which results in a one-out-of-three channel logic. If in the 2-out-of-4 logic system of the RPS one channel is bypassed and a second channel manually placed in a tripped condition, the resulting logic is 1-out-of-2. At rated power, the minimum OPERABLE high-power level channel is 3 in order to provide adequate power tilt detection. If only 2 channels are OPERABLE, the reactor power level is reduced to 70% rated power which protects the reactor from possibly exceeding design peaking factors due to undetected flux tilts and from exceeding dropped CEA peaking factors.

2.0 LIMITING CONDITIONS FOR OPERATION

2.15 Instrumentation and Control Systems (Continued)

Basis (Continued)

The ESF logic system is a Class 1 protection system designed to satisfy the criteria of IEEE 279, August 1968. Two functionally redundant ESF logic subsystems "A" and "B" are provided to ensure high reliability and effective in-service testing. These logic subsystems are designed for individual reliability and maximum attainable mutual independence both physically and electrically. Either logic subsystem acting alone can automatically actuate engineered safety features and essential supporting systems.

All Engineered Safety Features are initiated by 2-out-of-4 logic matrices except containment high radiation which operates on a 1-out-of-2 basis. The number of installed channels for Containment Radiation High Signal (CRHS) is two. CRHS isolates the containment pressure relief, air sample and purge system valves.

Entry into Technical Specification 2.15(3) is made when conditions have caused one logic subsystem ("A" or "B") to become inoperable but the redundant logic subsystem remains operable. The loss of a prime initiation relay (which renders all 4 channels of a logic subsystem inoperable) is the condition most likely to cause entry into Technical Specification 2.15(3). In this situation, the remaining ESF logic subsystem still has the capability to automatically actuate engineered safety features equipment and essential supporting systems. The 48-hour completion time is commensurate with the importance of avoiding the vulnerability of a single failure in the remaining ESF logic subsystem. Technical Specification 2.15(3) will not be used upon loss of the common channels that affect both "A" and "B" subsystems prime initiators operability unless the permissible bypass condition is met. Upon exiting TS 2.15(3) following the restoration of a prime initiation relay to OPERABLE status, if any channel(s) remain inoperable, the appropriate Limiting Conditions for Operation (LCO) (TS 2.15(1) or (2) is applicable with the length of inoperability measured from time of discovery of: 1) prime initiation relay inoperable, or 2) channel inoperability, whichever is longer.

The ESF system provides a 2-out-of-4 logic on the signals used to actuate the equipment connected to each of the two emergency diesel generator units.

The rod block system automatically inhibits all CEA motion in the event a LCO on CEA insertion, CEA deviation, CEA overlap or CEA sequencing is approached. The installation of the rod block system ensures that no single failure in the control element drive control system (other than a dropped CEA) can cause the CEAs to move such that the CEA insertion, deviation, sequencing or overlap limits are exceeded. Accordingly, with the rod block system installed, only the dropped CEA event is considered an Anticipated Operational Occurrence (AOO) and factored into the derivation of the Limiting Safety System Settings (LSSS) and LCO. With the rod block function out-of-service, several additional CEA deviation events must be considered as AOOs. Analysis of these incidents indicates that the single CEA withdrawal incident is the most limiting of these events. An analysis of the at-power single CEA withdrawal incident was performed for Fort Calhoun for various initial Group 4 insertions, and it has been concluded that the LCO and LSSS are valid for a Group 4 insertion of less than or equal to 15%.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.15 Instrumentation and Control Systems (Continued)

Basis (Continued)

The control rod top and bottom lights are lit from limit switches on the Regulating CEAs and from reed switches on the Shutdown CEAs. These lights can be used to provide positive verification of control rod position for the purposes of disabling either the primary or secondary position indication during surveillance testing as long as the rods continue to remain at the top or bottom of their allowable travel.

The operability of the Alternate Shutdown Panel (AI-185), including Wide Range Logarithmic Power and Source Range Monitors on AI-212, and Emergency Auxiliary Feedwater Panel (AI-179) instrument and control circuits ensures that sufficient capability is available to permit entry into and maintenance of the Hot Shutdown Mode from locations outside of the Control Room. This capability is required in the event that Control Room habitability is lost due to fire in the cable spreading room or Control Room.

Variances which may exist at startup between the more accurate Δ T-Power and Nuclear Instrumentation Power (NI-Power) are not significant for enabling of the trip functions. By 15% of rated power as measured by the uncalibrated NI Power, the Axial Power Distribution (APD) and Loss of Load (LOL) trip functions are enabled while the High Rate of Change of Power trip is bypassed.

The APD trip function acts to limit the axial power shape to the range assumed in the setpoint analysis. Significant margins to local power density limits exist at 15% power, as well as power levels up to at least 30% (where NI calibration occurs).

The LOL trip function acts as an anticipatory trip for the high pressurizer pressure and high power trips in order to limit the severity of a LOL transient. This trip is not credited in the USAR Chapter 14 Safety Analyses and any variance between Δ T-Power and NI-Power has no effect on the safety analysis.

The High Rate of Change of Power trip acts to limit power excursions from low power levels and bypassing of this trip at a high power level is conservative. This trip is not credited in the USAR Chapter 14 Safety Analyses for Mode 1 operation. Any variance between ΔT-Power and NI-Power has no effect on the safety analysis.

References

(1) USAR, Section 7.2.7.1

TABLE 2-2

Instrument Operating Requirements for Reactor Protective System

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Condition	Test, Maintenance and Inoperable Bypass
1	Manual (Trip Buttons)	1	None	None	N/A
2	High Power Level	2[(b)(c)]	1[(c)]	Thermal Power Input Bypassed below 10^{-4}% of Rated Power[(a)(d)]	(e)
3	Thermal Margin/Low Pressurizer Pressure	2[(b)]	1	Below 10^{-4}% of Rated Power[(a)(d)]	(e)
4	High Pressurizer Pressure	2[(b)]	1	None	(e)
5	Low R.C. Flow	2[(b)]	1	Below 10^{-4}% of Rated Power [(a)(d)]	(e)
6	Low Steam Generator Water Level	2/Steam Gen[(b)]	1/Steam Gen	None	(e)
7	Low Steam Generator Pressure	2/Steam Gen[(b)]	1/Steam Gen	Below 600 psia[(a)(d)]	(e)
8	Containment High Pressure	2[(b)]	1	During Leak Test	(e)
9	Axial Power Distribution	2[(b)(c)]	1[(c)]	Below 15% of Rated Power[(g)]	(e)
10	High Rate Trip-wide Range Log Channels	2[(b)]	1	Below 10^{-4}% and above 15% of Rated Power[(a)(g)]	(e)
11	Loss of Load	2[(b)]	1	Below 15% of Rated Power[(g)]	(e)
12	Steam Generator Differential Pressure	2[(b)]	1	None	(e)

a. Bypass automatically removed.

b. Specification 2.15(2) is applicable.

TABLE 2-2
(Continued)

c. If two channels are inoperable, load shall be reduced to 70% or less of rated power.

d. For low power physics testing this trip may be bypassed up to 10^{-1}% of rated power.

e. Specification 2.15(1) is applicable.

f. Deleted.

g. For each channel, the same bistable automatically activates the Loss of Load and Axial Power Distribution (APD) trips and automatically bypasses the high rate trip at 15% of rated power. Only the APD trip is a Limiting Safety System Setting. Therefore, the bistable is set to actuate within the APD tolerance band.

TABLE 2-3

Instrument Operating Requirements for Engineered Safety Features

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Condition	Test, Maintenance and Inoperable Bypass
1	Safety Injection				
A	Manual	1	None	None	N/A
B	High Containment Pressure				
	Logic Subsystem A	2[(a)(d)(l)]	1	During Leak	(f)
	Logic Subsystem B	2[(a)(d)(l)]	1	Test	
C	Pressurizer Low/Low Pressure				
	Logic Subsystem A	2[(a)(d)(l)]	1	Reactor Coolant	(f)
	Logic Subsystem B	2[(a)(d)(l)]	1	Pressure Less Than 1700 psia[(b)]	
2	Containment Spray				
A	Manual	1	None	None	N/A
B	High Containment Pressure				
	Logic Subsystem A	2[(a)(c)(d)(l)]	1	During Leak	(f)
	Logic Subsystem B	2[(a)(c)(d)(l)]	1	Test	
C	Pressurizer Low/Low Pressure				
	Logic Subsystem A	2[(a)(c)(d)(l)]	1	Reactor Coolant	(f)
	Logic Subsystem B	2[(a)(c)(d)(l)]	1	Pressure Less Than 1700 psia[(b)]	
3	Recirculation				
A	Manual	1	None	None	N/A
B	SIRW Tank Low Level				
	Logic Subsystem A	2[(a)(k)(l)]	1	None	(j)
	Logic Subsystem B	2[(a)(k)(l)]	1		
4	Emergency Off-Site Power Trip				
A	Manual	1[(e)]	None	None	N/A
B	Emergency Bus Low Voltage (Each Bus)				
	-Loss of Voltage	2[(d)]	1	Reactor Coolant	(f)
	-Degraded Voltage	2[(a)(d)]	1	Temperature Less Than 300° F	

TABLE 2-3
(Continued)

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Condition	Test, Maintenance and Inoperable Bypass
5	Auxiliary Feedwater				
A	Manual	1	None	None	N/A
B	Auto. Initiation Logic Subsystem A Logic Subsystem B			Operating Modes 3, 4, and 5	
	-Steam Generator Low Level	2[(a)(d)(l)]	1		(h)
	-Steam Generator Low Pressure	3[(a)(g)(l)]	1		(i)
	-Steam Generator Differential Pressure	3[(a)(g)(l)]	1		(i)

a Circuits on ESF Logic Subsystems A and B each have 4 channels.

b Auto removal of bypass above 1700 psia.

c Coincident high containment pressure and pressurizer pressure low signals required for initiation of containment spray.

d If minimum OPERABLE channel conditions are reached, one inoperable channel must be placed in the tripped condition or low level actuation position for auxiliary feedwater system within eight hours from the time of discovery of loss of operability. Specification 2.15(2) is applicable.

e Control switch on incoming breaker.

f If one channel becomes inoperable, that channel must be placed in the tripped or bypassed condition within eight hours from time of discovery of loss of operability. Specification 2.15(1) is applicable.

g Three channels required because bypass or failure results in auxiliary feedwater actuation block in the affected channel.

h Specification 2.15(1) is applicable.

TABLE 2-3
(Continued)

i If the channel becomes inoperable, that channel must be placed in the bypassed condition within eight hours from time of discovery of loss of operability. If the channel is not returned to OPERABLE status within 48 hours from time of discovery of loss of operability, one of the eight channels may continue to be placed in the bypassed condition provided the Plant Review Committee has reviewed and documented the judgment concerning prolonged operation in bypass of the inoperable channel. The channel shall be returned to OPERABLE status no later than during the next cold shutdown. If one of the four channels on one steam generator is in prolonged bypass and a channel on the other steam generator becomes inoperable, the second inoperable channel must be placed in bypass within eight hours from time of discovery of loss of operability. If one of the inoperable channels is not returned to OPERABLE status within seven days from the time of discovery of the second loss of operability, the unit must be placed in hot shutdown within the following 12 hours.

j If one channel becomes inoperable, that channel must be placed in the bypassed condition within eight hours from time of discovery of loss of operability. If the channel is not returned to OPERABLE status within 48 hours from time of discovery of loss of operability, one of the eight channels may continue to be placed in the bypassed condition provided the Plant Review Committee has reviewed and documented the judgment concerning prolonged operation in bypass of the inoperable channel. The channel shall be returned to OPERABLE status no later than during the next cold shutdown. If a channel is in prolonged bypass and a channel on the opposite train becomes inoperable, the second inoperable channel must be placed in bypass within eight hours from time of discovery of loss of operability. If one of the inoperable channels is not returned to OPERABLE status within seven days from the time of discovery of the second loss of operability, the unit must be placed in hot shutdown within the following 12 hours.

k Specification 2.15(2) is applicable.

l Specification 2.15(3) is applicable. If ESF Logic Subsystems A and B are inoperable, enter Specification 2.0.1.

TABLE 2-4

Instrument Operating Conditions for Isolation Functions

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Condition	Test, Maintenance and Inoperable Bypass
1	Containment Isolation				
A	Manual	1	None	None	N/A
B	Containment High Pressure				
	Logic Subsystem A	2[(a)(e)(g)]	1	During Leak	(f)
	Logic Subsystem B	2[(a)(e)(g)]	1	Test	
C	Pressurizer Low/Low Pressure				
	Logic Subsystem A	2[(a)(e)(g)]	1	Reactor Coolant	(f)
	Logic Subsystem B	2[(a)(e)(g)]	1	Pressure Less Than 1700 psia[(b)]	
2	Steam Generator Isolation				
A	Manual	1	None	None	N/A
B	Steam Generator Isolation	1	None	None	N/A
	(i) Steam Generator Low Pressure				
	Logic Subsystem A	2/Steam Gen [(e)(g)]	1/Steam Gen	Steam Generator Pressure Less Than 600 psia[(c)]	(f)
	Logic Subsystem B	2/Steam Gen [(e)(g)]	1/Steam Gen		
	(ii) Containment High Pressure				
	Logic Subsystem A	2[(a)(e)(g)]	1	During Leak	(f)
	Logic Subsystem B	2[(a)(e)(g)]	1	Test	
3	Ventilation Isolation				
A	Manual	1	None	None	N/A
B	Containment High Radiation				
	Logic Subsystem A	1[(d)(g)]	None	If Containment	(f)
	Logic Subsystem B	1[(d)(g)]	None	Relief and Purge Valves are Closed	

a Circuits on ESF Logic Subsystems A and B each have 4 channels.
b Auto removal of bypass prior to exceeding 1700 psia.
c Auto removal of bypass prior to exceeding 600 psia.

TABLE 2-4
(Continued)

d A and B trains are both actuated by either the Containment or Auxiliary Building Exhaust Stack initiating channels. The number of installed channels for Containment Radiation High Signal is two for purposes of Specification 2.15(1).

e If minimum operable channel conditions are reached, one inoperable channel must be placed in the tripped condition within eight hours from the time of discovery of loss of operability. Specification 2.15(2) is applicable.

f If one channel becomes inoperable, that channel must be placed in the tripped or bypassed condition within eight hours from the time of discovery of loss of operability. Specification 2.15(1) is applicable.

g Specification 2.15(3) is applicable. If ESF Logic Subsystems A and B are inoperable, enter Specification 2.0.1.

TABLE 2-5

Instrumentation Operating Requirements for Other Safety Feature Functions

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Condition
1	CEA Position Indication Systems	1	None	None
2	Pressurizer Level	1	None	Not Applicable
3	PORV Acoustic Position Indication-Direct	1 [(a)(c)]	None	Not Applicable
4	Safety Valve Acoustic Position Indication	1 [(a)(c)]	None	Not Applicable
5	PORV/Safety Valve Tail Pipe Temperature	1 [(d)(b)]	None	Not Applicable

NOTES:

a One channel per valve.
b One RTD for both PORV's; two RTD's, one for each code safety.
c If item 5 is operable, requirements of specification 2.15 are modified for items 3 and 4 to "Restore inoperable channels to operability within 7 days or be in hot shutdown within 12 hours."
d If items 3 and 4 are operable, requirements of specification 2.15 are modified for item 5 to "Restore inoperable channels to operability within 7 days or be in hot shutdown within 12 hours."

TABLE 3-2 (continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING OF ENGINEERED SAFETY FEATURES, INSTRUMENTATION AND CONTROLS

Channel Description	Surveillance Function		Frequency	Surveillance Method	
18. SIRW Tank Temperature	a.	Check	D[6]	a.	Verify that temperature is within limits.
	b.	Test	R	b.	Measure temperature of SIRW tank with standard laboratory instruments.
19. Manual Recirculation Actuation	a.	Test	R	a.	CHANNEL FUNCTIONAL TEST
20. Recirculation Actuation Logic	a.	Test	Q	a.	CHANNEL FUNCTIONAL TEST
	b.	Test	R[7]	b.	CHANNEL FUNCTIONAL TEST
21. 4.16 KV Emergency Bus Low Voltage (Loss of Voltage and Degraded Voltage) Actuation Logic	a.	Check	S	a.	Verify voltage readings are above alarm initiation on degraded voltage level - supervisory lights "on".
	b.	Test	Q	b.	CHANNEL FUNCTIONAL TEST (Undervoltage relay)
	c.	Calibrate	R	c.	CHANNEL CALIBRATION
22. Manual Emergency Off-site Power Low Trip Actuation	a.	Test	R	a.	CHANNEL FUNCTIONAL TEST