

3.4 STEAM AND POWER CONVERSION SYSTEM

Applicability

Applies to the operating status of the steam and power conversion system.

Objective

To specify minimum conditions of steam-relieving capacity and auxiliary feed-water supply necessary to assure the capability of removing decay heat from the reactor, and to limit the concentration of activity that might be released by steam relief to the atmosphere.

Specification

(except as specified in 3.4.A.2 below):

A. Steam Generator Safety and Power Operated Relief Valves

1. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 350°F unless the following conditions are satisfied. ~~If these conditions cannot be satisfied within one hour initiate the action necessary to place the unit in HOT SHUTDOWN, and be in at least HOT SHUTDOWN within the next 6 hours and reduce reactor system average temperature below 350°F within the following 6 hours.~~

- a. Ten steam generator safety valves shall be OPERABLE with lift settings of 1077, 1093, 1110, 1120 and 1131 psig $\pm 1\%$ except during testing.

- b. Both steam generator power-operated relief valves for that reactor are OPERABLE.

B. Auxiliary Feedwater System

1. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 350°F unless the following conditions are satisfied (except as specified in 3.4.B.2 below):

- a. For single unit operation, the turbine-driven pump associated with that reactor plus one motor-driven pump are OPERABLE.
- b. For two-unit operation, all four auxiliary feedwater pumps are OPERABLE.
- c. Valves and piping associated with the above components are OPERABLE except that during STARTUP OPERATION necessary changes may be made in motor-operated valve position. All such changes shall be under direct administrative control.

2. During STARTUP OPERATION or POWER OPERATION, the following condition of inoperability may exist provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, be in at least HOT SHUTDOWN within the next 6 hours and reduce reactor coolant system average temperature below 350°F within the following 6 hours.

- a. One steam generator power-operated relief valve may be inoperable for 48 hours.

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3.4 STEAM AND POWER CONVERSION SYSTEMS

Bases

A reactor shutdown from power requires removal of decay heat. Decay heat removal requirements are normally satisfied by the steam bypass to the condenser and by continued feedwater flow to the steam generators. Normal feedwater flow to the steam generators is provided by operation of the turbine-cycle feedwater system.

The ten steam generator safety valves have a total combined rated capability of 7,745,000 lbs/hr. The total full power steam flow is 7,094,000 lbs/hr; therefore, the ten steam generator safety valves will be able to relieve the total steam flow if necessary (Reference 1).

In the unlikely event of complete loss of offsite electrical power to either or both reactors, continued removal of decay heat would be assured by availability of either the steam-driven auxiliary feedwater pump or the motor-driven auxiliary feedwater pump associated with each reactor, and by steam discharge to the atmosphere through the steam generator safety valves. One auxiliary feedwater pump can supply sufficient feedwater for removal of decay heat from one reactor. The motor-driven auxiliary feedwater pump for each reactor can be made available to the other reactor. During STARTUP OPERATIONS, the Auxiliary Feedwater motor-operated injection valves maybe less than full open as necessary to facilitate plant startup.

The minimum amount of water specified for the condensate storage tanks is sufficient to remove the decay heat generated by one reactor in the first 24 hours of shutdown. Essentially unlimited replenishment of the condensate storage supply is available from the intake structures through the cooling water system.

The two steam generator power-operated relief valves located upstream of the main steam isolation valves are required to remove decay heat and cool the reactor down following a high energy line rupture outside containment (Reference 2). Isolation dampers are required in ventilation ducts that penetrate those rooms containing equipment needed for the accident.

Insert

a high energy line rupture outside containment.

The limitations on secondary system specific activity ensure that the resultant off-site radiation dose will be limited to a small fraction of 10 CFR Part 100 limits in the event of a steam line rupture. This dose also includes the effects of a coincident 1.0 gpm primary to secondary tube leak in the steam generator of the affected steam line. These values are consistent with the assumptions used in the accident analyses.

following a steam generator tube rupture event (Reference 3) and

Reference

1. USAR, Section 11.9.4
2. USAR, Appendix I

3. USAR, Section 14.5.4

Insert to page B.3.4-1

The steam generator power operated relief valves are provided with manual upstream block valves to permit testing at power and to provide a means of isolation.

In order to assure timely response to a steam generator tube rupture event, a steam generator power operated relief valve is considered operable when it is capable of being remotely operated and when its associated block valve is open.

Exhibit C

Prairie Island Nuclear Generating Plant

License Amendment Request Dated February 26, 1991

Revised Technical Specification Pages

Exhibit C consists of the revised pages for the Prairie Island Nuclear Generating Plant Technical Specification with the proposed changes incorporated. The revised pages are listed below:

TS.3.4-1

B.3.4-1

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Specification

A. Steam Generator Safety and Power Operated Relief Valves

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 - a. Ten steam generator safety valves shall be OPERABLE with lift settings of 1077, 1093, 1110, 1120 and 1131 psig $\pm 1\%$ except during testing.
 - b. Both steam generator power-operated relief valves for that reactor are OPERABLE.
2. During STARTUP OPERATION or POWER OPERATION, the following condition of inoperability may exist provided STARTUP OPERATION is discontinued until OPERABILITY is restored. If OPERABILITY is not restored within the time specified, be in at least HOT SHUTDOWN within the next 6 hours and reduce reactor coolant system average temperature below 350°F within the following 6 hours.
 - a. One steam generator power-operated relief valve may be inoperable for 48 hours.

B. Auxiliary Feedwater System

1. A reactor shall not be made or maintained critical nor shall reactor coolant system average temperature exceed 350°F unless the following conditions are satisfied (except as specified in 3.4.B.2 below):
 - a. For single unit operation, the turbine-driven pump associated with that reactor plus one motor-driven pump are OPERABLE.
 - b. For two-unit operation, all four auxiliary feedwater pumps are OPERABLE.
 - c. Valves and piping associated with the above components are OPERABLE except that during STARTUP OPERATION necessary changes may be made in motor-operated valve position. All such changes shall be under direct administrative control.

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A reactor shutdown from power requires removal of decay heat. Decay heat removal requirements are normally satisfied by the steam bypass to the condenser and by continued feedwater flow to the steam generators. Normal feedwater flow to the steam generators is provided by operation of the turbine-cycle feedwater system.

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In the unlikely event of complete loss of offsite electrical power to either or both reactors, continued removal of decay heat would be assured by availability of either the steam-driven auxiliary feedwater pump or the motor-driven auxiliary feedwater pump associated with each reactor, and by steam discharge to the atmosphere through the steam generator safety valves. One auxiliary feedwater pump can supply sufficient feedwater for removal of decay heat from one reactor. The motor-driven auxiliary feedwater pump for each reactor can be made available to the other reactor. During STARTUP OPERATIONS, the Auxiliary Feedwater motor-operated injection valves maybe less than full open as necessary to facilitate plant startup.

The minimum amount of water specified for the condensate storage tanks is sufficient to remove the decay heat generated by one reactor in the first 24 hours of shutdown. Essentially unlimited replenishment of the condensate storage supply is available from the intake structures through the cooling water system.

The two steam generator power-operated relief valves located upstream of the main steam isolation valves are required to remove decay heat and cool the reactor down following a steam generator tube rupture event (Reference 3) and following a high energy line rupture outside containment (Reference 2). The steam generator power operated relief valves are provided with manual upstream block valves to permit testing at power and to provide a means of isolation.

In order to assure timely response to a steam generator tube rupture event, a steam generator power operated relief valve is considered operable when it is capable of being remotely operated and when its associated block valve is open.

Isolation dampers are required in ventilation ducts that penetrate those rooms containing equipment needed for a high energy line rupture outside containment.

The limitations on secondary system specific activity ensure that the resultant off-site radiation dose will be limited to a small fraction of 10 CFR Part 100 limits in the event of a steam line rupture. This dose also includes the effects of a coincident 1.0 gpm primary to secondary tube leak in the steam generator of the affected steam line. These values are consistent with the assumptions used in the accident analyses.

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1. USAR, Section 11.9.4
2. USAR, Appendix I
3. USAR, Section 14.5.4