

PROPOSED TECHNICAL SPECIFICATIONS CHANGES

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3.4 STEAM AND POWER CONVERSION SYSTEM

Applicability

Applies to the turbine cycle components for removal of reactor decay heat.

Objective

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

Specifications

3.4.1 The reactor shall not be heated above 280°F unless the following conditions are met:

1. Capability to remove decay heat by use of two steam generators.
- *2 Fourteen of the steam system safety valves are operable.
3. A minimum of 11.1 feet (107,000 gallons) of water is available in Tank T41B.
4. (Deleted)
5. Both main steam block valves and both main feedwater isolation valves are operable.

3.4.2 Components required to be operable by Specification 3.4.1 shall not be removed from service for more than 24 consecutive hours. If the system is not restored to meet the requirements of Specification 3.4.1 within 24 hours, the reactor shall be placed in the hot shutdown condition within 12 hours. If the requirements of Specification 3.4.1 are not met within an additional 48 hours, the reactor shall be placed in the cold shutdown condition within 24 hours.

3.4.3 Two (2) EFW trains shall be operable as follows:

1. The motor driven EFW pump and its associated flow path shall be operable when the RCS is above CSD conditions and any Steam Generator is relied upon for heat removal.
2. The turbine driven EFW pump and its associated flow path shall be operable when the RCS temperature is $\geq 280^{\circ}\text{F}$.**

* Except that during hydrotests, with the reactor subcritical, fourteen of the steam system safety valves may be gagged and two (one on each header), may be reset for the duration of the test, to allow the required pressure for the test to be attained.

** Except that the surveillance testing of the turbine driven EFW pump shall be performed at the appropriate plant conditions as specified by Surveillance Requirement 4.8.1.

3.4.4 If the conditions specified in 3.4.3 cannot be met:

1. With the motor driven EFW pump or its associated flow path inoperable and RCS conditions above CSD and RCS temperature $< 280^{\circ}\text{F}$ and any Steam Generator relied upon for heat removal, immediately initiate action to restore the EFW train to operable status.
2. With the RCS temperature $\geq 280^{\circ}\text{F}$ and one steam generator supply path to the turbine driven EFW pump inoperable, restore the steam generator supply path to operable status within 7 days or be in Hot Shutdown within 6 hours and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.
3. With the RCS temperature $\geq 280^{\circ}\text{F}$ and one EFW pump or its associated flow path inoperable, restore the EFW train to operable status within 72 hours or be in Hot Shutdown within 6 hours, and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.
4. With the RCS temperature $\geq 280^{\circ}\text{F}$, both EFW pumps or their associated flow paths inoperable, and the Auxiliary Feedwater pump available, be in Hot Shutdown within 6 hours, and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.
5. With the RCS temperature $\geq 280^{\circ}\text{F}$ and both EFW pumps or their associated flow paths inoperable, and the Auxiliary Feedwater pump unavailable, immediately initiate action to restore one EFW train or the Auxiliary Feedwater pump to operable status. LCO 3.0.3 and all other LCO Required Actions requiring mode changes are suspended until one EFW train or the Auxiliary Feedwater pump is restored to operable status.

Bases

The Emergency Feedwater (EFW) system is designed to provide flow sufficient to remove heat load equal to 3% percent full power operation. The system minimum flow requirement to the steam generator(s) is 500 gpm. This takes into account a single failure, pump recirculation flow, seal leakage and pump wear.

In the event of loss of main feedwater, feedwater is supplied by the emergency feedwater pumps, one which is powered from an operable emergency bus and one which is powered from an operable steam supply system. Both EFW pumps take suction from tank T41B. Decay heat is removed from a steam generator by steam relief through the turbine bypass, atmospheric dump valves, or safety valves. Fourteen of the steam safety valves will relieve the necessary amount of steam for rated reactor power.

The EFW system is considered to be operable when the components and flow paths required to provide EFW flow to the steam generators are operable. This requires that the turbine driven EFW pump be operable with redundant steam supplies from each of the main steam lines upstream of the MSIVs (CV-2617 and CV-2667) and capable of supplying EFW flow to either of the two steam generators. The motor driven EFW pump and associated flow path to the EFW system is also required to be operable. The piping, valves, instrumentation, and controls in the required flow paths shall also be operable. One EFW train, which includes the motor driven EFW pump, is required to be operable when above CSD and below 280°F with any steam generator relied upon for heat removal. This is because of reduced heat removal requirements, the short duration EFW would be required, and the insufficient steam supply available in this condition to power the turbine driven EFW pump.

When one of the required EFW trains is inoperable, action must be taken to restore the train to operable status within 72 hours. This condition includes loss of the steam supply to the turbine driven EFW pump. The 72 hour completion time is reasonable, based on the redundant capabilities afforded by the EFW system, time needed for repairs, and the low probability of a DBA occurring during this time period.

With two EFW trains inoperable, the unit must be placed in a mode in which the LCO does not apply using the Auxiliary Feedwater pump. With RCS temperature < 280°F the Decay Heat Removal system may be placed in operation.

With both EFW trains inoperable and the Auxiliary Feedwater pump unavailable, the unit is in a seriously degraded condition with only limited means for conducting a cooldown using nonsafety grade equipment. In such a condition, the unit should not be perturbed by any action, including a power change, that might result in a trip. The seriousness of this condition requires that action be started immediately to restore at least one EFW pump or the Auxiliary Feedwater pump to Operable status. LCO 3.0.3 is not applicable, as it could force the unit into a less safe condition.

The minimum amount of water in tank T41B would be adequate for about 4.5 hours of operation. This is based on the estimate of the average emergency flow to a steam generator being 390 gpm. This operation time with the volume of water specified would not be reached, since the decay heat removal system could be brought into operation within 4 hours or less.

A portion of tank T41B is protected from tornado missiles. The protected volume is sufficient to provide a thirty minute supply of water. This thirty minute period is sufficient to allow manual operator action, if required, to transfer suction of the emergency feedwater pumps to service water.

- 3.5.1.13 The Seismic Monitoring Instrumentation shall be operable with a minimum measurement range of 0.01 - 1.0 g for Triaxial Time - History Accelerographs, 0.05 - 1.0 g for Triaxial Peak Accelerographs, and 2-25.4 Hz for Triaxial Response Spectrum Recorders.
- 3.5.1.14 The Main Steam Line Radiation Monitoring Instrumentation shall be operable with a minimum measurement range from 10^{-1} to 10^4 mR/hr, whenever the reactor is above the cold shutdown condition.
- 3.5.1.15 Initiate functions of the EFIC system which are bypassed at cold shutdown conditions shall have the following minimum operability conditions:
- a. "low steam generator pressure" initiate shall be operable when the main steam pressure exceeds 750 psig.
 - b. "loss of 4 RC pumps" initiate shall be operable when neutron flux exceeds 10% power.
 - c. "main feedwater pumps tripped" initiate shall be operable when neutron flux exceeds 10% power.
- 3.5.1.16 The automatic steam generator isolation system within EFIC shall be operable when main steam pressure is greater than 750 psig.

The OPERABILITY of the Seismic Monitoring Instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix "A" of 10CFR Part 100. The instrumentation is consistent with the recommendations of Safety Guide 12, "Instrumentation for Earthquake," published March 19, 1971, and NUREG-0800 Section 3.7.4, "Seismic Instrumentation."

To support loss of main feedwater analyses, steam line/feedwater line break analyses, SBLOCA analyses, and NUREG-0737 requirements, the EFIC system is designed to automatically initiate EFW when:

1. all four RC pumps are tripped
2. both main feedwater pumps are tripped
3. the level of either steam generator is low
4. either steam generator pressure is low
5. ESAS ECCS actuation (high RB pressure or low RCS pressure)

The EFIC system is also designed to isolate the affected steam generator on a steam line/feedwater line break and supply EFW to the intact generator according to the following logic:

- If both SG's are above 600 psig, supply EFW to both SG's.
- If one SG is below 600 psig, supply EFW to the other SG.
- If both SG's are below 600 psig, but the pressure difference between the two SG's exceeds 100 psig, supply EFW only to the SG with the higher pressure.
- If both SG's are below 600 psig and the pressure difference is less than 100 psig, supply EFW to both SG's.

At cold shutdown conditions all EFIC initiate and isolate functions are bypassed except low steam generator level initiate. The bypassed functions will be automatically reset at the values or plant conditions identified in Specification 3.5.1.15. "Loss of 4 RC pumps" initiate and "low steam generator pressure" initiate are the only shutdown bypasses to be manually initiated during cooldown. If reset is not done manually, they will automatically reset. Main feedwater pump trip bypass is automatically removed above 10% power.

REFERENCE

FSAR, Section 7.1
FSAR, Section 2.7.6

4.8 EMERGENCY FEEDWATER PUMP TESTING

Applicability

Applies to the periodic testing of the turbine and electric motor driven emergency feedwater pumps.

Objective

To verify that the emergency feedwater pump and associated valves are operable.

Specification

- 4.8.1 Each EFW train shall be demonstrated operable:
- a) By verifying on a STAGGERED TEST BASIS:
 1. at least once per 31 days or within 24 hours after reaching the Hot Shutdown condition following a plant heatup and prior to criticality, that the turbine-driven pump starts, operates for a minimum of 5 minutes and develops a discharge pressure of ≥ 1200 psig at a flow of ≥ 500 gpm through the test loop flow path.
 2. at least once per 31 days by verifying that the motor driven EFW pump starts, operates for a minimum of 5 minutes and develops a discharge pressure of ≥ 1200 psig at a flow of ≥ 500 gpm through the test loop flow path.
 - b) At least once per 31 days by verifying that each valve (manual, power operated or automatic) in each EFW flowpath that is not locked, sealed, or otherwise secured in position, is in its correct position.
 - c) Prior to relying upon any steam generator for heat removal whenever the plant has been in CSD or less for > 30 days, verify proper alignment of each manual valve in each required EFW flow path, which if mispositioned may degrade EFW operation, from the 'Q' condensate storage tank to each steam generator.
 - d) At least once per 92 days by cycling each motor-operated valve in each flowpath through at least one complete cycle.
 - e) At least once per 18 months by functionally testing each EFW train and:
 1. Verifying that each automatic valve in each flowpath actuates automatically to its correct position on receipt of an actual or simulated actuation signal.

2. Verifying that the automatic steam supply valves associated with the steam turbine driven EFW pump actuate to their correct positions upon receipt of an actual or simulated actuation signal. This test is not required to be performed until 24 hours after reaching 800 psig in the steam generators.
3. Verifying that the motor-driven EFW pump starts automatically upon receipt of an actual or simulated actuation signal.
4. Verifying that feedwater is delivered to each steam generator using the electric motor-driven EFW pump.
5. Verifying that the EFW system can be operated manually by over-riding automatic signals to the EFW valves.

Bases

The monthly testing frequency will be sufficient to verify that both emergency feedwater pumps are operable. Verification of correct operation will be made both from the control room instrumentation and direct visual observation of the pumps. The cycling of the emergency valves assures valve operability when called upon to function. Testing of the turbine driven EFW pump is delayed until suitable test conditions are established. This deferral is required because there is insufficient steam pressure to perform the test at 280°F. Testing may occur at a lower steam generator pressure if operational experience shows that sufficient steam pressure to perform the test exists.

Surveillance Requirement 4.8.1.c ensures that the EFW system is properly aligned by verifying the flow paths to each steam generator prior to relying upon any steam generator for heat removal after more than 30 days in Cold Shutdown or below. Operability of the EFW flow paths must be demonstrated before sufficient core heat is generated that would require the operation of the EFW system during a subsequent shutdown. This requirement is reasonable, based on engineering judgment, in view of other administrative controls to ensure that the flow paths are operable. To further ensure EFW system alignment, flow path operability is verified following extended outages to determine no misalignment of valves has occurred. This SR ensures that the flow path from the 'Q' CST to the steam generators is properly aligned.

The functional test, performed once every 18 months, will verify that the flow path to the steam generators is open and that water reaches the steam generators from the emergency feedwater system. The test is done during shutdown to avoid thermal cycle to the emergency feedwater nozzles on the steam generator due to the lower temperature of the emergency feedwater.

The automatic actuation circuitry testing and calibration will be performed per Surveillance Specification 4.1, and will be sufficient to assure that this circuitry will perform its intended function when called upon.

MARKUP OF CURRENT ANO-1 TECHNICAL SPECIFICATIONS

(FOR INFO ONLY)

3.4 STEAM AND POWER CONVERSION SYSTEM

Applicability

Applies to the turbine cycle components for removal of reactor decay heat.

Objective

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

Specification

3.4.1 The reactor shall not be heated above 280°F unless the following conditions are met:

1. Capability to remove decay heat by use of two steam generators.
- *2. Fourteen of the steam system safety valves are operable.
3. A minimum of 11.1 feet (107,000 gallons) of water is available in Tank T41B.
- **4. ~~(Deleted) Both EFW pumps and their flow paths are operable.~~
5. Both main steam block valves and both main feedwater isolation valves are operable.

~~3.4.2 Initiate functions of the EFIC system which are bypassed at cold shutdown conditions shall have the following minimum operability conditions:~~

- ~~a. "low steam generator pressure" initiate shall be operable when the main steam pressure exceeds 750 psig.~~
- ~~b. "loss of 4 RC pumps" initiate shall be operable when neutron flux exceeds 10% power.~~
- ~~c. "main feedwater pumps tripped" initiate shall be operable when neutron flux exceeds 10% power.~~

* Except that during hydrotests, with the reactor subcritical, fourteen of the steam system safety valves may be gagged and two (one on each header), may be reset for the duration of the test, to allow the required pressure for the test to be attained.

~~**Except that a test with available steam pressure of the steam driven EFW pump shall demonstrate its functionality until completion of surveillance testing at hot shutdown conditions as required by Surveillance Requirement 4.8.1.~~

~~3.4.3 The automatic steam generator isolation system within EFIC shall be operable when main steam pressure is greater than 750 psig.~~

~~3.4.42 Components required to be operable by Specification 3.4.1, 3.4.2, and 3.4.3 shall not be removed from service for more than 24 consecutive hours. If the system is not restored to meet the requirements of Specification 3.4.1, 3.4.2 and 3.4.3 within 24 hours, the reactor shall be placed in the hot shutdown condition within 12 hours. If the requirements of Specification 3.4.1, 3.4.2, and 3.4.3 are not met within an additional 48 hours, the reactor shall be placed in the cold shutdown condition within 24 hours.~~

~~3.4.53 If the condition specified in 3.4.1.4 cannot be met~~ Two (2) EFW trains shall be operable as follows:

~~1. With one EFW flow path inoperable, the unit shall be brought to hot shutdown within 36 hours, and if not restored to an operable status within the next 36 hours, the unit shall be brought to cold shutdown within the next 12 hours or at the maximum safe rate~~ The motor driven EFW pump and its associated flow path shall be operable when the RCS is above CSD conditions and any Steam Generator is relied upon for heat removal.

~~2. If both EFW trains are inoperable, restore one train to operable status within one hour or be in hot shutdown within the next 6 hours and cold shutdown within the next 12 hours or at the maximum safe rate~~ The turbine driven EFW pump and its associated flow path shall be operable when the RCS temperature is $\geq 280^{\circ}\text{F}$.*

~~3. If both EFW trains and the AFW pump are inoperable, the unit shall be immediately run back to 5% full power with feedwater supplied from the MFW pumps. As soon as an EFW train or the AFW train is operable, the unit shall be placed in cold shutdown within the next 12 hours or at the maximum safe rate.~~

~~3.4.4 If the conditions specified in 3.4.3 cannot be met:~~

1. With the motor driven EFW pump or its associated flow path inoperable and RCS conditions above CSD and RCS temperature $< 280^{\circ}\text{F}$ and any Steam Generator relied upon for heat removal, immediately initiate action to restore the EFW train to operable status.

2. With the RCS temperature $\geq 280^{\circ}\text{F}$ and one steam generator supply path to the turbine driven EFW pump inoperable, restore the steam generator supply path to operable status within 7 days or be in Hot Shutdown within 6 hours and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.

3. With the RCS temperature $\geq 280^{\circ}\text{F}$ and one EFW pump or its associated flow path inoperable, restore the EFW train to operable status within 72 hours or be in Hot Shutdown within 6 hours, and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.

4. With the RCS temperature $\geq 280^{\circ}\text{F}$, both EFW pumps or their associated flow paths inoperable, and the Auxiliary Feedwater pump available, be in Hot Shutdown within 6 hours, and reduce RCS temperature to $< 280^{\circ}\text{F}$ within the next 12 hours.

5. With the RCS temperature $\geq 280^{\circ}\text{F}$ and both EFW pumps or their associated flow paths inoperable, and the Auxiliary Feedwater pump unavailable, immediately initiate action to restore one EFW train or the Auxiliary Feedwater pump to operable status. LCO 3.0.3 and all other LCO Required Actions requiring mode changes are suspended until one EFW train or the Auxiliary Feedwater pump is restored to operable status.

* Except that the surveillance testing of the turbine driven EFW pump shall be performed at the appropriate plant conditions as specified by Surveillance Requirement 4.8.1.

Amendment No. 50, 91

40a

Bases

The Emergency Feedwater (EFW) system is designed to provide flow sufficient to remove heat load equal to 3% percent full power operation. The system minimum flow requirement to the steam generator(s) is 500 gpm. This takes into account a single failure, pump recirculation flow, seal leakage and pump wear.

~~To support loss of main feedwater analyses, steam line/feedwater line break analyses, SBLOCA analyses, and NUREC-0737 requirements, the EFIC system is designed to automatically initiate EFW when:~~

- ~~1. all four RC pumps are tripped~~
- ~~2. both main feedwater pumps are tripped~~
- ~~3. the level of either steam generator is low~~
- ~~4. either steam generator pressure is low~~
- ~~5. ESAS ECCS actuation (high RB pressure or low RCS pressure)~~

~~The EFIC system is also designed to isolate the affected steam generator on a steam line/feedwater line break and supply EFW to the intact generator according to the following logic:~~

- ~~1. If both SG's are above 600 psig, supply EFW to both SG's.~~
- ~~2. If one SG is below 600 psig, supply EFW to the other SG.~~
- ~~3. If both SG's are below 600 psig, but the pressure difference between the two SG's exceeds 150 psig, supply EFW only to the SG with the higher pressure.~~
- ~~4. If both SG's are below 600 psig and the pressure difference is less than 150 psig, supply EFW to both SG's.~~

~~At cold shutdown conditions all EFIC initiate and isolate functions are bypassed except low steam generator level initiate. The bypassed functions will be automatically reset at the values or plant conditions identified in Specification 3.4.2. "Loss of 4 RC pumps" initiate and "low steam generator~~

~~pressure" initiate are the only shutdown bypasses to be manually initiated during cooldown. If reset is not done manually, they will automatically reset. Main feedwater pump trip bypass is automatically removed above 10% power.~~

In the event of loss of main feedwater, feedwater is supplied by the emergency feedwater pumps, one which is powered from an operable emergency bus and one which is powered from an operable steam supply system. Both EFW pumps take suction from tank T41B. Decay heat is removed from a steam generator by steam relief through the turbine bypass, atmospheric dump valves, or safety valves. Fourteen of the steam safety valves will relieve the necessary amount of steam for rated reactor power.

The EFW system is considered to be operable when the components and flow paths required to provide EFW flow to the steam generators are operable. This requires that the turbine driven EFW pump be operable with redundant steam supplies from each of the main steam lines upstream of the MSIVs (CV-2617 and CV-2667) and capable of supplying EFW flow to either of the two steam generators. The motor driven EFW pump and associated flow path to the EFW system is also required to be operable. The piping, valves, instrumentation, and controls in the required flow paths shall also be operable. One EFW train, which includes the motor driven EFW pump, is required to be operable when above CSD and below 280°F with any steam generator relied upon for heat removal. This is because of reduced heat removal requirements, the short duration EFW would be required, and the insufficient steam supply available in this condition to power the turbine driven EFW pump.

When one of the required EFW trains is inoperable, action must be taken to restore the train to operable status within 72 hours. This condition includes loss of the steam supply to the turbine driven EFW pump. The 72 hour completion time is reasonable, based on the redundant capabilities afforded by the EFW system, time needed for repairs, and the low probability of a DBA occurring during this time period.

With two EFW trains inoperable, the unit must be placed in a mode in which the LCO does not apply using the Auxiliary Feedwater pump. With RCS temperature < 280°F the Decay Heat Removal system may be placed in operation.

With both EFW trains inoperable and the Auxiliary Feedwater pump unavailable, the unit is in a seriously degraded condition with only limited means for conducting a cooldown using nonsafety grade equipment. In such a condition, the unit should not be perturbed by any action, including a power change, that might result in a trip. The seriousness of this condition requires that action be started immediately to restore at least one EFW pump or the Auxiliary Feedwater pump to Operable status. LCO 3.0.3 is not applicable, as it could force the unit into a less safe condition.

The minimum amount of water in tank T41B would be adequate for about 4.5 hours of operation. This is based on the estimate of the average emergency flow to a steam generator being 390 gpm. This operation time with the volume of water specified would not be reached, since the decay heat removal system could be brought into operation within 4 hours or less.

A portion of tank T41B is protected from tornado missiles. The protected volume is sufficient to provide a thirty minute supply of water. This thirty minute period is sufficient to allow manual operator action, if required, to transfer suction of the emergency feedwater pumps to service water.

3.5.1.13 The Seismic Monitoring Instrumentation shall be operable with a minimum measurement range of 0.01 - 1.0 g for Triaxial Time - History Accelerographs, 0.05 - 1.0 g for Triaxial Peak Accelerographs, and 2-25.4 Hz for Triaxial Response Spectrum Recorders.

3.5.1.14 The Main Steam Line Radiation Monitoring Instrumentation shall be operable with a minimum measurement range from 10^{-1} to 10^4 mR/hr, whenever the reactor is above the cold shutdown condition.

3.5.1.15 Initiate functions of the EFIC system which are bypassed at cold shutdown conditions shall have the following minimum operability conditions:

a. "low steam generator pressure" initiate shall be operable when the main steam pressure exceeds 750 psig.

b. "loss of 4 RC pumps" initiate shall be operable when neutron flux exceeds 10% power.

c. "main feedwater pumps tripped" initiate shall be operable when neutron flux exceeds 10% power.

3.5.1.16 The automatic steam generator isolation system within EFIC shall be operable when main steam pressure is greater than 750 psig.

The OPERABILITY of the Seismic Monitoring Instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix "A" of 10CFR Part 100. The instrumentation is consistent with the recommendations of Safety Guide 12, "Instrumentation for Earthquake," published March 19, 1971, and NUREG-0800 Section 3.7.4, "Seismic Instrumentation."

To support loss of main feedwater analyses, steam line/feedwater line break analyses, SBLOCA analyses, and NUREG-0737 requirements, the EFIC system is designed to automatically initiate EFW when:

1. all four RC pumps are tripped
2. both main feedwater pumps are tripped
3. the level of either steam generator is low
4. either steam generator pressure is low
5. ESAS ECCS actuation (high RB pressure or low RCS pressure)

The EFIC system is also designed to isolate the affected steam generator on a steam line/feedwater line break and supply EFW to the intact generator according to the following logic:

- If both SG's are above 600 psig, supply EFW to both SG's.
- If one SG is below 600 psig, supply EFW to the other SG.
- If both SG's are below 600 psig, but the pressure difference between the two SG's exceeds 100 psig, supply EFW only to the SG with the higher pressure.
- If both SG's are below 600 psig and the pressure difference is less than 100 psig, supply EFW to both SG's.

At cold shutdown conditions all EFIC initiate and isolate functions are bypassed except low steam generator level initiate. The bypassed functions will be automatically reset at the values or plant conditions identified in Specification 3.5.1.15. "Loss of 4 RC pumps" initiate and "low steam generator pressure" initiate are the only shutdown bypasses to be manually initiated during cooldown. If reset is not done manually, they will automatically reset. Main feedwater pump trip bypass is automatically removed above 10% power.

REFERENCE

FSAR, Section 7.1
FSAR, Section 2.7.6

4.8 EMERGENCY FEEDWATER PUMP TESTING

Applicability

Applies to the periodic testing of the turbine and electric motor driven emergency feedwater pumps.

Objective

To verify that the emergency feedwater pump and associated valves are operable.

Specification

4.8.1 Each EFW train shall be demonstrated operable:

- a) By verifying on a STAGGERED TEST BASIS:
 1. at least once per 31 days or ~~upon achieving hot shutdown~~ within 24 hours after reaching the Hot Shutdown condition following a plant heatup and prior to criticality, that the turbine-driven pump starts, operates for a minimum of 5 minutes and develops a discharge pressure of ≥ 1200 psig at a flow of ≥ 500 gpm through the test loop flow path.
 2. at least once per 31 days by verifying that the motor driven EFW pump starts, operates for a minimum of 5 minutes and develops a discharge pressure of ≥ 1200 psig at a flow of ≥ 500 gpm ~~therough~~through the test loop flow path.
- b) At least once per 31 days by verifying that each valve (manual, power operated or automatic) in each EFW flowpath that is not locked, sealed, or otherwise secured in position, is in its correct position.
- c) ~~Prior to exceeding 280°F reactor coolant temperature and after any EFW flowpath manual valve alterations by verifying that each manual valve in each EFW flowpath which, if mispositioned may degrade EFW operation, is locked in its correct position~~ Prior to relying upon any steam generator for heat removal whenever the plant has been in CSD or less for > 30 days, verify proper alignment of each manual valve in each required EFW flow path, which if mispositioned may degrade EFW operation, from the 'Q' condensate storage tank to each steam generator.
- d) At least once per 92 days by cycling each motor-operated valve in each flowpath through at least one complete cycle.
- e) At least once per 18 months by functionally testing each EFW train and:
 - 1) Verifying that each automatic valve in each flowpath actuates automatically to its correct position on receipt of an actual or simulated actuation signal.

2. Verifying that the automatic steam supply valves associated with the steam turbine driven EFW pump actuate to their correct positions upon receipt of an actual or simulated actuation signal. This test is not required to be performed until 24 hours after reaching 600 psig in the steam generators.
3. Verifying that the motor-driven EFW pump starts automatically upon receipt of an actual or simulated actuation signal.
4. Verifying that feedwater is delivered to each steam generator using the electric motor-driven EFW pump.
5. Verifying that the EFW system can be operated manually by over-riding automatic signals to the EFW valves.

Bases

The monthly testing frequency will be sufficient to verify that both emergency feedwater pumps are operable. Verification of correct operation will be made both from the control room instrumentation and direct visual observation of the pumps. The cycling of the emergency valves assures valve operability when called upon to function. Testing of the turbine driven EFW pump is delayed until suitable test conditions are established. This deferral is required because there is insufficient steam pressure to perform the test at 280°F. Testing may occur at a lower steam generator pressure of operational experience shows that sufficient steam pressure to perform the test exists.

Surveillance Requirement 4.8.1.c ensures that the EFW system is properly aligned by verifying the flow paths to each steam generator prior to relying upon any steam generator for heat removal after more than 30 days in Cold Shutdown or below. Operability of the EFW flow paths must be demonstrated before sufficient core heat is generated that would require the operation of the EFW system during a subsequent shutdown. The frequency is reasonable, based on engineering judgment, in view of other administrative controls to ensure that the flow paths are operable. To further ensure EFW system alignment, flow path operability is verified following extended outages to determine no misalignment of valves has occurred. This SR ensures that the flow path from the 'Q' CST to the steam generators is properly aligned.

The functional test, performed once every 18 months, will verify that the flow path to the steam generators is open and that water reaches the steam generators from the emergency feedwater system. The test is done during shutdown to avoid thermal cycle to the emergency feedwater nozzles on the steam generator due to the lower temperature of the emergency feedwater.

The automatic actuation circuitry testing and calibration will be performed per Surveillance Specification 4.1, and will be sufficient to assure that this circuitry will perform its intended function when called upon.