Attachment B to BECo Letter 93- 062

Amended Technical Specification Pages:

3
37
38
45
70

valve closure, are bypassed when reactor pressure is less than 600 psig, the low pressure main steam line isolation valve closure trip is bypassed, the reactor protection system is energized with IRM neutron monitoring system trips and control rod withdrawal interlocks in service.

2. Run Mode - In this mode the reactor system pressure is at or above 785 psig and the reactor protection system is energized with APRM protection and RBM interlocks in service.

3. Shutdown Mode - The reactor is in the shutdown mode when the reactor mode switch is in the shutdown mode position and no core alterations are being performed.

   a. Hot Shutdown means conditions as above with reactor coolant temperature greater than 212 F.

   b. Cold Shutdown means conditions as above with reactor coolant temperature equal to or less than 212 F.

4. Refuel Mode - The reactor is in the refuel mode when the mode switch is in the refuel mode position. When the mode switch is in the refuel position, the refueling interlocks are in service.

L. Design Power - Design power means a steady-state power level of 1998 thermal megawatts.

M. Primary Containment Integrity - Primary containment integrity means that the drywell and pressure suppression chamber are intact and all of the following conditions are satisfied:

1. All manual containment isolation valves on lines connected to the reactor coolant system or containment which are not required to be open during accident conditions are closed.

2. At least one door in each airlock is closed and sealed.

3. All blind flanges and manways are closed.

4. All automatic primary containment isolation valves are operable or at least one containment isolation valve in each line having an inoperable valve shall be deactivated in the isolated condition.

5. All containment isolation check valves are operable or at least one containment valve in each line having an inoperable valve is secured in the isolated position.

N. Secondary Containment Integrity - Secondary containment integrity means that the reactor building is intact and the following conditions are met:

level, the rate of power rise is no more than five percent of rated power per minute, and the APRM system would be more than adequate to assure a scram before power could exceed the safety limit. The 15% APRM scram remains active until the mode switch is placed in the RUN position.

The analysis to support operation at various power and flow relationships has considered operation with two recirculation pumps.

Intermediate Range Monitor (IRM)

The IRM system consists of 8 chambers, 4 in each of the reactor protection system logic channels. The IRM is a 5-decade instrument which covers the range of power level between that covered by the SRM and the APRM. The 5 decades are covered by the IRM by means of a range switch and the 5 decades are broken down into 10 ranges, each being one-half of a decade in size.

The IRM scram setting of 120/125 of full scale is active in each range of the IRM. For example, if the instrument were on Range 1, the scram setting would be a 120/125 of full scale for that range; likewise, if the instrument were on Range 5, the scram would be 120/125 of full scale on that range. Thus, as the IRM is ranged up to accommodate the increase in power level, the scram setting is also ranged up. The most significant sources of reactivity change during the power increase are due to control rod withdrawal. For in-sequence control rod withdrawal, the rate of change of power is slow enough due to the physical limitation of withdrawing control rods that heat flux is in equilibrium with the neutron flux, and an IRM scram would result in a reactor shutdown well before any safety limit is exceeded.

In order to ensure that the IRM provided adequate protection against the single rod withdrawal error, a range of rod withdrawal accidents was analyzed. This analysis included starting the accident at various power levels. The most severe case involves an initial condition in which the reactor is just subcritical and the IRM system is not yet on scale. This condition exists at quarter rod density. Additional conservatism was taken in this analysis by assuming that the IRM channel closest to the withdrawn rod is bypassed. The results of this analysis show that the reactor is scrammed and peak core power limited to one percent of rated power, thus maintaining MCPR above the safety limit MCPR. Based on the above analysis, the IRM provides protection against local control rod withdrawal errors and continuous withdrawal of control rods in sequence and provides backup protection for the APRM.

Reactor Low Water Level

The setpoint for low level scram is above the bottom of the separator skirt. This level has been used in transient analyses dealing with coolant inventory decrease. The results show that scram at this level properly protects the fuel and the pressure barrier, because MCPR remains well above the safety limit MCPR in all cases, and system pressure does not reach the safety valve settings. The scram setting is approximately 15 inches below the normal operating range and is thus sufficient to avoid spurious scrams.

Turbine Stop Valve Closure

The turbine stop valve closure scram anticipates the pressure, neutron flux, and heat flux increase that could result from rapid closure of the turbine stop valves. With a scram trip setting of ≤ 10 percent of valve closure from full open, the resultant increase in surface heat flux is limited such that MCPR remains above the safety limit MCPR even during the worst case transient that assumes the turbine bypass is closed.

Turbine Control Valve Fast Closure

The turbine control valve fast closure scram anticipates the pressure, neutron flux, and heat flux increase that could result from fast closure of the turbine control valves due to load rejection exceeding the capability of the bypass valves. The reactor protection system initiates a scram when fast closure of the control valves is initiated by the acceleration relay. This setting and the fact that control valve closure time is approximately twice as long as that for the stop valves means that resulting transients, while similar, are less severe than for stop valve closure. MCPR remains above the safety limit MCPR.

Main Condenser Low Vacuum

To protect the main condenser against overpressure, a loss of condenser vacuum initiates automatic closure of the turbine stop valves and turbine bypass valves. To anticipate the transient and automatic scram resulting from the closure of the turbine stop valves, low condenser vacuum initiates a scram. The low vacuum scram setpoint is selected to initiate a scram before the closure of the turbine stop valves is initiated.

Main Steam Line Isolation Valve Closure

The low pressure isolation of the main steam lines at 810 psig (as specified in Table 3.2.A) was provided to protect against rapid reactor depressurization and the resulting rapid cooldown of the vessel. Advantage is taken of the scram feature that occurs when the main steam line isolation valves are closed, to provide for reactor shutdown so that high power operation at low reactor pressure does not occur, thus providing protection for the fuel cladding integrity safety limit. Operation of the reactor at pressures lower than 785 psig requires the reactor mode switch be in the startup position where protection of the fuel cladding integrity safety limit is provided by the IRM high neutron flux scram and APRM 15% scram. Thus, the combination of main steam line low pressure isolation and isolation valve closure scram assures the availability of neutron flux scram protection over the entire

PNPS TABLE 3.2.A

INSTRUMENTATION THAT INITIATES PRIMARY CONTAINMENT ISOLATION

Operable Instrument Channels Per Trip System (1) Minimum	Available	Instrument	Trip Level Setting	Action (2)
2(7)	2	Reactor Low Water Level	$\geq$9" indicated level (3)	A and D
1	1	Reactor High Pressure	$\leq$110 psig	D
2	2	Reactor Low-Low Water Level	at or above -49 in. indicated level (4)	A
2	2	Reactor High Water Level	$\leq$48" indicated level (5)	B
2(7)	2	High Drywell Pressure	$\leq$2.5 psig	A
2	2	High Radiation Main Steam Line Tunnel (9)	$\leq$7 times normal rated full power background	B
2	2	Low Pressure Main Steam Line	$\geq$810 psig (8)	B
2(6)	2	High Flow Main Steam Line	$\leq$140% of rated steam flow	B
2	2	Main Steam Line Tunnel Exhaust Duct High Temperature	$\leq$170^{o}F	B
2	2	Turbine Basement Exhaust Duct High Temperature	$\leq$150^{o}F	B
1	1	Reactor Cleanup System High Flow	$\leq$300% of rated flow	C
2	2	Reactor Cleanup System High Temperature	$\leq$150^{o}F	C

dent. With the established setting of 7 times normal background, and main steam line isolation valve closure, fission product release is limited so that 10 CFR 100 guidelines are not exceeded for this accident. Reference FSAR Section 14.5.1 and Appendix R.3.2.5.

Pressure instrumentation is provided to close the main steam isolation valves in RUN mode before the reactor pressure drops below 785 psig. This function is primarily intended to prevent excessive vessel depressurization in the event of a malfunction of the nuclear system pressure regulator. This function also provides automatic protection of the low-pressure core-thermal-power safety limit (25% of rated core thermal power for reactor pressure < 785 psig). In the Refuel or Startup Mode, the inventory loss associated with such a malfunction would be limited by closure of the Main Steam Isolation Valves due to either high or low reactor water level; no fuel would be uncovered. This function is not required to satisfy any safety design bases.

The HPCI high flow and temperature instrumentation are provided to detect a break in the HPCI steam piping. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1 out of 2 logic, and all sensors are required to be operable.

Temperature is monitored at three (3) locations with four (4) temperature sensors at each location. Two (2) sensors at each location are powered by "A" direct current control bus and two (2) by "B" direct current control bus. Each pair of sensors, e.g., "A" or "B", at each location are physically separated and the tripping of either "A" or "B" bus sensor will actuate HPCI isolation valves.

The trip settings of ≤ 300% of design flow for high flow and 200°F or 170°F, depending on sensor location, for high temperature are such that core uncovery is prevented and fission product release is within limits.

The RCIC high flow and temperature instrumentation are arranged the same as that for the HPCI. The trip setting of ≤ 300% for high flow and 200°F, 170°F and 150°F, depending on sensor location, for temperature are based on the same criteria as the HPCI.

The Reactor Water Cleanup System high flow and temperature instrumentation are arranged similar as that for the HPCI. The trip settings are such that core uncovery is prevented and fission product release is within limits.

The instrumentation which initiates CSCS action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the Specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed.

Attachment C to BECo Letter #93-062

valve closure, are bypassed when reactor pressure is less than 600 psig, the low pressure main steam line isolation valve closure trip is bypassed, the reactor protection system is energized with IRM neutron monitoring system trips and control rod withdrawal interlocks in service.

2. Run Mode - In this mode the reactor system pressure is at or above ~~600 psig~~ 785 psig and the reactor protection system is energized with APRM protection and RBM interlocks in service.

3. Shutdown Mode - The reactor is in the shutdown mode when the reactor mode switch is in the shutdown mode position and no core alterations are being performed.

   a. Hot Shutdown means conditions as above with reactor coolant temperature greater than 212°F.

   b. Cold Shutdown means conditions as above with reactor coolant temperature equal to or less than 212°F.

4. Refuel Mode - The reactor is in the refuel mode when the mode switch is in the refuel mode position. When the mode switch is in the refuel position, the refueling interlocks are in service.

L. Design Power - Design power means a steady-state power level of 1998 thermal megawatts.

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1. All manual containment isolation valves on lines connected to the reactor coolant system or containment which are not required to be open during accident conditions are closed.

2. At least one door in each airlock is closed and sealed.

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4. All automatic primary containment isolation valves are operable or at least one containment isolation valve in each line having an inoperable valve shall be deactivated in the isolated condition.

5. All containment isolation check valves are operable or at least one containment valve in each line having an inoperable valve is secured in the isolated position.

N. Secondary Containment Integrity - Secondary containment integrity means that the reactor building is intact and the following conditions are met:

3.1 BASES (Cont'd)

level, the rate of power rise is no more than five percent of rated power per minute, and the APRM system would be more than adequate to assure a scram before power could exceed the safety limit. The 15% APRM scram remains active until the mode switch is placed in the RUN position. ~~This switch occurs when reactor pressure is greater than 880 psig~~.

The analysis to support operation at various power and flow relationships has considered operation with two recirculation pumps.

Intermediate Range Monitor (IRM)

The IRM system consists of 8 chambers, 4 in each of the reactor protection system logic channels. The IRM is a 5-decade instrument which covers the range of power level between that covered by the SRM and the APRM. The 5 decades are covered by the IRM by means of a range switch and the 5 decades are broken down into 10 ranges, each being one-half of a decade in size.

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In order to ensure that the IRM provided adequate protection against the single rod withdrawal error, a range of rod withdrawal accidents was analyzed. This analysis included starting the accident at various power levels. The most severe case involves an initial condition in which the reactor is just subcritical and the IRM system is not yet on scale. This condition exists at quarter rod density. Additional conservatism was taken in this analysis by assuming that the IRM channel closest to the withdrawn rod is bypassed. The results of this analysis show that the reactor is scrammed and peak core power limited to one percent of rated power, thus maintaining MCPR above the safety limit MCPR. Based on the above analysis, the IRM provides protection against local control rod withdrawal errors and continuous withdrawal of control rods in sequence and provides backup protection for the APRM.

Reactor Low Water Level

The setpoint for low level scram is above the bottom of the separator skirt. This level has been used in transient analyses dealing with coolant inventory decrease. The results show that scram at this level properly protects the fuel and the pressure barrier, because MCPR remains well above the safety limit MCPR in all cases, and system pressure does not reach the safety valve settings. The scram setting is approximately 15 inches below the normal operating range and is thus sufficient to avoid spurious scrams.

Turbine Stop Valve Closure

The turbine stop valve closure scram anticipates the pressure, neutron flux, and heat flux increase that could result from rapid closure of the turbine stop valves. With a scram trip setting of ≤ 10 percent of valve closure from full open, the resultant increase in surface heat flux is limited such that MCPR remains above the safety limit MCPR even during the worst case transient that assumes the turbine bypass is closed.

Turbine Control Valve Fast Closure

The turbine control valve fast closure scram anticipates the pressure, neutron flux, and heat flux increase that could result from fast closure of the turbine control valves due to load rejection exceeding the capability of the bypass valves. The reactor protection system initiates a scram when fast closure of the control valves is initiated by the acceleration relay. This setting and the fact that control valve closure time is approximately twice as long as that for the stop valves means that resulting transients, while similar, are less severe than for stop valve closure. MCPR remains above the safety limit MCPR.

Main Condenser Low Vacuum

To protect the main condenser against overpressure, a loss of condenser vacuum initiates automatic closure of the turbine stop valves and turbine bypass valves. To anticipate the transient and automatic scram resulting from the closure of the turbine stop valves, low condenser vacuum initiates a scram. The low vacuum scram setpoint is selected to initiate a scram before the closure of the turbine stop valves is initiated.

Main Steam Line Isolation Valve Closure

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The low pressure isolation of the main steam lines at 880 psig (as specified in Table 3.2.A) was provided to protect against rapid reactor depressurization and the resulting rapid cooldown of the vessel. Advantage is taken of the scram feature that occurs when the main steam line isolation valves are closed, to provide for reactor shutdown so that high power operation at low reactor pressure does not occur, thus providing protection for the fuel cladding integrity safety limit. Operation of the reactor at pressures lower than 785 psig requires the reactor mode switch be in the startup position where protection of the fuel cladding integrity safety limit is provided by the IRM high neutron flux scram and APRM 15% scram. Thus, the combination of main steam line low pressure isolation and isolation valve closure scram assures the availability of neutron flux scram protection over the entire

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2(7)	2	Reactor Low Water Level	≥9" indicated level (3)	A and D
1	1	Reactor High Pressure	≤110 psig	D
2	2	Reactor Low-Low Water Level	at or above -49 in. indicated level (4)	A
2	2	Reactor High Water Level	≤48" indicated level (5)	B
2(7)	2	High Drywell Pressure	≤2.5 psig	A
2	2	High Radiation Main Steam Line Tunnel (9)	≤7 times normal rated full power background	B
2	2	Low Pressure Main Steam Line	≥~~880~~ 810 psig (8)	B
2(6)	2	High Flow Main Steam Line	≤140% of rated steam flow	B
2	2	Main Steam Line Tunnel Exhaust Duct High Temperature	≤170°F	B
2	2	Turbine Basement Exhaust Duct High Temperature	≤150°F	B
1	1	Reactor Cleanup System High Flow	≤300% of rated flow	C
2	2	Reactor Cleanup System High Temperature	≤150°F	C

3.2 BASES (Cont'd)

dent. With the established setting of 7 times normal background, and main steam line isolation valve closure, fission product release is limited so that 10 CFR 100 guidelines are not exceeded for this accident. Reference FSAR Section 14.5.1 and Appendix R.3.2.5. 8

~~Pressure instrumentation is provided to close the main steam isolation valves in Run Mode when the main steam line pressure drops below 880 psig. In the Refuel and Startup Mode this function is replaced by high reactor water level. This function is provided primarily to provide protection against a pressure regulator malfunction which results in the control and/or bypass valves opening. With the trip settings specified, inventory loss is limited so that fuel is not uncovered.~~

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The HPCI high flow and temperature instrumentation are provided to detect a break in the HPCI steam piping. Tripping of this instrumentation results in actuation of HPCI isolation valves. Tripping logic for the high flow is a 1 out of 2 logic, and all sensors are required to be operable.

Temperature is monitored at three (3) locations with four (4) temperature sensors at each location. Two (2) sensors at each location are powered by "A" direct current control bus and two (2) by "B" direct current control bus. Each pair of sensors, e.g., "A" or "B", at each location are physically separated and the tripping of either "A" or "B" bus sensor will actuate HPCI isolation valves.

The trip settings of $\leq$ 300% of design flow for high flow and 200°F or 170°F, depending on sensor location, for high temperature are such that core uncovery is prevented and fission product release is within limits.

The RCIC high flow and temperature instrumentation are arranged the same as that for the HPCI. The trip setting of $\leq$ 300% for high flow and 200°F, 170°F and 150°F, depending on sensor location, for temperature are based on the same criteria as the HPCI.

The Reactor Water Cleanup System high flow and temperature instrumentation are arranged similar as that for the HPCI. The trip settings are such that core uncovery is prevented and fission product release is within limits.

The instrumentation which initiates CSCS action is arranged in a dual bus system. As for other vital instrumentation arranged in this fashion, the Specification preserves the effectiveness of the system even during periods when maintenance or testing is being performed. An exception to this is when logic functional testing is being performed. 8

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Pressure instrumentation is provided to close the main steam isolation valves in RUN mode before the reactor pressure drops below 785 psig. This function is primarily intended to prevent excessive vessel depressurization in the event of a malfunction of the nuclear system pressure regulator. This function also provides automatic protection of the low-pressure core-thermal-power safety limit (25% of rated core thermal power for reactor pressure < 785 psig). In the Refuel or Startup Mode, the inventory loss associated with such a malfunction would be limited by closure of the Main Steam Isolation Valves due to either high or low reactor water level; no fuel would be uncovered. This function is not required to satisfy any safety design bases.

Attachment D to BECo Letter #93-