HYDROGEN WATER CHEMISTRY
TECHNICAL SPECIFICATION PAGES
UNIT 1

9001170247 900105
PDR ADOCK 05000324
P PDC

TABLE 2.2.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Intermediate Range Monitor, Neutron Flux - High[a]	≤ 120 divisions of full scale	≤ 120 divisions of full scale
2. Average Power Range Monitor		
a. Neutron Flux - High, 15%[b]	≤ 15% of RATED THERMAL POWER	≤ 15% of RATED THERMAL POWER
b. Flow-Biased Neutron Flux - High[c][d]	≤ (0.66 W + 54%)	≤ (0.66 W + 54%)
c. Fixed Neutron Flux - High[d]	≤ 120% of RATED THERMAL POWER	≤ 120% of RATED THERMAL POWER
3. Reactor Vessel Steam Dome Pressure - High	≤ 1045 psig	≤ 1045 psig
4. Reactor Vessel Water Level - Low, Level 1	≥ +162.5 inches[g]	≥ +162.5 inches[g]
5. Main Steam Line Isolation Valve - Closure[e]	≤ 10% closed	≤ 10% closed
6. Main Steam Line Radiation - High[h]	≤ 3 x full power background	≤ 3.5 x full power background
7. Drywell Pressure - High	≤ 2 psig	≤ 2 psig
8. Scram Discharge Volume Water Level - High	≤ 109 gallons	≤ 109 gallons
9. Turbine Stop Valve - Closure[f]	≤ 10% closed	≤ 10% closed
10. Turbine Control Valve Fast Closure, Control Oil Pressure - Low[f]	≥ 500 psig	≥ 500 psig

TABLE 2.2.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

NOTES

(a) The Intermediate Range Monitor scram functions are automatically bypassed when the reactor mode switch is placed in the Run position and the Average Power Range Monitors are on scale.

(b) This Average Power Range Monitor scram function is a fixed point and is increased when the reactor mode switch is placed in the Run position.

(c) The Average Power Range Monitor scram function is varied, Figure 2.2.1-1, as a function of recirculation loop flow (W). The trip setting of this function must be maintained in accordance with Specification 3.2.2.

(d) The APRM flow-biased high neutron flux signal is fed through a time constant circuit of approximately 6 seconds. The APRM fixed high neutron flux signal does not incorporate the time constant, but responds directly to instantaneous neutron flux.

(e) The Main Steam Line Isolation Valve-Closure scram function is automatically bypassed when the reactor mode switch is in other than the Run position.

(f) These scram functions are bypassed when THERMAL POWER is less than 30% of RATED THERMAL POWER.

(g) Vessel water levels refer to REFERENCE LEVEL ZERO.

(h) The Hydrogen Water Chemistry (HWC) system shall not be placed in service until reactor power reaches 20% of RATED THERMAL POWER. After reaching 20% of RATED THERMAL POWER, the normal full power background radiation level and associated trip setpoints may be increased to compensate for increased radiation levels as a result of full power operation with hydrogen injection. Prior to decreasing power below 20% of RATED THERMAL POWER and after the HWC system has been shut off, the background level and associated setpoint shall be returned to the normal full power values. Control rod motion shall be suspended, when the reactor power is below 20% of RATED THERMAL POWER, until the necessary adjustment is made (except for scram or other emergency action).

3. Reactor Vessel Steam Dome Pressure-High (Continued)

pressure measurement compared to the highest pressure that occurs in the system during a transient. This setpoint is effective at low power/flow conditions when the turbine stop valve closure is bypassed. For a turbine trip under these conditions, the transient analysis indicates a considerable margin to the thermal hydraulic limit.

4. Reactor Vessel Water Level-Low, Level #1

The reactor water level trip point was chosen far enough below the normal operating level to avoid spurious scrams but high enough above the fuel to assure that there is adequate water to account for evaporation losses and displacement of cooling following the most severe transients. This setting was also used to develop the thermal-hydraulic limits of power versus flow.

5. Main Steam Line Isolation Valve-Closure

The low-pressure isolation of the main steam line trip was provided to give protection against rapid depressurization and resulting cooldown of the reactor vessel. Advantage was taken of the shutdown feature in the run mode which occurs when the main steam line isolation valves are closed, to provide for reactor shutdown so that high power operation at low pressures does not occur. Thus, the combination of the low-pressure isolation and isolation valve closure reactor trip with the mode switch in the Run position assures the availability of neutron flux protection over the entire range of the Safety Limits. In addition, the isolation valve closure trip with the mode switch in the Run position anticipates the pressure and flux transients which occur during normal or inadvertent isolation valve closure.

6. Main Steam Line Radiation - High

The Main Steam Line Radiation detectors are provided to detect a gross failure of the fuel cladding. When the high radiation is detected, a scram is initiated to reduce the continued failure of fuel cladding. At the same time, the Main Steam Line Isolation Valves are closed to limit the release of fission products. The trip setting is high enough above background radiation levels to prevent spurious scrams, yet low enough to promptly detect gross failures in the fuel cladding.

The Main Steam Line Radiation detectors setpoints may be adjusted prior to placing the hydrogen water chemistry (HWC) system in service. If the setpoints are adjusted, the HWC system shall be placed in service or the setpoints shall be returned to the normal full power values within 24 hours. If the HWC system is not placed in service and the setpoints are not readjusted within 24 hours, control rod motion shall be suspended (except for scram or other emergency action) until the necessary adjustments are made. Hydrogen injection may cause the radiation levels in the main steam lines to increase. After shutting off the HWC system or decreasing power, the setpoints shall be returned to the normal full power values.

The Technical Specification wording was derived using the EPRI "Guidelines for Permanent BWR Hydrogen Water Chemistry Installations, 1987 Revision".

TABLE 3.3.2-2

ISOLATION ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. PRIMARY CONTAINMENT ISOLATION		
a. Reactor Vessel Water Level -		
1. Low Level 1	$\geq$ + 162.5 inches[a]	$\geq$ + 162.5 inches[a]
2. Low Level 2	$\geq$ + 112 inches[a]	$\geq$ + 112 inches[a]
3. Low Level 3	$\geq$ + 2.5 inches[a]	$\geq$ + 2.5 inches[a]
b. Drywell Pressure - High	$\leq$ 2 psig	$\leq$ 2 psig
c. Main Steam Line		
1. Radiation - High	$\leq$ 3 x full power background[c]	$\leq$ 3.5 x full power background[c]
2. Pressure - Low	$\geq$ 825 psig	$\geq$ 825 psig
3. Flow - High	$\leq$ 140% of rated flow	$\leq$ 140% of rated flow
d. Main Steam Line Tunnel Temperature - High	$\leq$ 200°F	$\leq$ 200°F
e. Condenser Vacuum - Low	$\geq$ 7 inches Hg vacuum	$\geq$ 7 inches Hg vacuum
f. Turbine Building Area Temp - High	$\leq$ 200°F	$\leq$ 200°F
g. Main Stack Radiation - High	(b)	(b)

TABLE 3.3.2-2 (Continued)

ISOLATION ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
5. SHUTDOWN COOLING SYSTEM ISOLATION		
a. Reactor Vessel Water Level - Low Level 1	$\geq$ 162.5 inches(a)	$\geq$ 162.5 inches(a)
b. Reactor Steam Dome Pressure - High	$\leq$ 140 psig	$\leq$ 140 psig

(a) Vessel water levels refer to REFERENCE LEVEL ZERO.

(b) Establish alarm/trip setpoints per the methodology contained in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

(c) The Hydrogen Water Chemistry (HWC) system shall not be placed in service until reactor power reaches 20% of RATED THERMAL POWER. After reaching 20% of RATED THERMAL POWER, the normal full power background radiation level and associated trip setpoints may be increased to compensate for increased radiation levels as a result of full power operation with hydrogen injection. Prior to decreasing power below 20% of RATED THERMAL POWER and after the HWC system has been shut off, the background level and associated setpoint shall be returned to the normal full power values. Control rod motion shall be suspended, when the reactor power is below 20% of RATED THERMAL POWER, until the necessary adjustment is made (except for scram or other emergency action).

HYDROGEN WATER CHEMISTRY
TECHNICAL SPECIFICATION PAGES
UNIT 2

TABLE 2.2.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Intermediate Range Monitor, Neutron Flux - High[a]	≤ 120 divisions of full scale	≤ 120 divisions of full scale
2. Average Power Range Monitor		
a. Neutron Flux - High, 15%[b]	≤ 15% of RATED THERMAL POWER	≤ 15% of RATED THERMAL POWER
b. Flow Biased Neutron Flux - High[c][d]	≤ (0.66 W + 54%)	≤ (0.66 W + 54%)
c. Fixed Neutron Flux - High[d]	≤ 120% of RATED THERMAL POWER	≤ 120% of RATED THERMAL POWER
3. Reactor Vessel Steam Dome Pressure - High	≤ 1045 psig	≤ 1045 psig
4. Reactor Vessel Water Level - Low, Level 1	≥ +162.5 inches[g]	≥ +162.5 inches[g]
5. Main Steam Line Isolation Valve - Closure[e]	≤ 10% closed	≤ 10% closed
6. Main Steam Line Radiation - High[h]	≤ 3 x full power background	≤ 3.5 x full power background
7. Drywell Pressure - High	≤ 2 psig	≤ 2 psig
8. Scram Discharge Volume Water Level - High	≤ 109 gallons	≤ 109 gallons
9. Turbine Stop Valve - Closure[f]	≤ 10% closed	≤ 10% closed
10. Turbine Control Valve Fast Closure, Control Oil Pressure - Low[i]	≥ 500 psig	≥ 500 psig

TABLE 2.2.1-1 (Continued)

REACTOR PROTECTION SYSTEM INSTRUMENTATION SETPOINTS

NOTES

(a) The Intermediate Range Monitor scram functions are automatically bypassed when the reactor mode switch is placed in the Run position and the Average Power Range Monitors are on scale.

(b) This Average Power Range Monitor scram function is a fixed point and is increased when the reactor mode switch is placed in the Run position.

(c) The Average Power Range Monitor scram function is varied, Figure 2.2.1-1, as a function of recirculation loop flow (W). The trip setting of this function must be maintained in accordance with Specification 3.2.2.

(d) The APRM flow-biased high neutron flux signal is fed through a time constant circuit of approximately 6 seconds. The APRM fixed high neutron flux signal does not incorporate the time constant, but responds directly to instantaneous neutron flux.

(e) The Main Steam Line Isolation Valve-Closure scram function is automatically bypassed when the reactor mode switch is in other than the Run position.

(f) These scram functions are bypassed when THERMAL POWER is less than 30% of RATED THERMAL POWER.

(g) Vessel water levels refer to REFERENCE LEVEL ZERO.

(h) The Hydrogen Water Chemistry (HWC) system shall not be placed in service until reactor power reaches 20% of RATED THERMAL POWER. After reaching 20% of RATED THERMAL POWER, the normal full power background radiation level and associated trip setpoints may be increased to compensate for increased radiation levels as a result of full power operation with hydrogen injection. Prior to decreasing power below 20% of RATED THERMAL POWER and after the HWC system has been shut off, the background level and associated setpoint shall be returned to the normal full power values. Control rod motion shall be suspended, when the reactor power is below 20% of RATED THERMAL POWER, until the necessary adjustment is made (except for scram or other emergency action).

3. Reactor Vessel Steam Dome Pressure-High (Continued)

pressure measurement compared to the highest pressure that occurs in the system during a transient. This setpoint is effective at low power/flow conditions when the turbine stop valve closure is bypassed. For a turbine trip under these conditions, the transient analysis indicates a considerable margin to the thermal hydraulic limit.

4. Reactor Vessel Water Level-Low, Level #1

The reactor water level trip point was chosen far enough below the normal operating level to avoid spurious scrams but high enough above the fuel to assure that there is adequate water to account for evaporation losses and displacement of cooling following the most severe transients. This setting was also used to develop the thermal-hydraulic limits of power versus flow.

5. Main Steam Line Isolation Valve-Closure

The low-pressure isolation of the main steam line trip was provided to give protection against rapid depressurization and resulting cooldown of the reactor vessel. Advantage was taken of the shutdown feature in the run mode which occurs when the main steam line isolation valves are closed, to provide for reactor shutdown so that high power operation at low pressures does not occur. Thus, the combination of the low-pressure isolation and isolation valve closure reactor trip with the mode switch in the Run position assures the availability of neutron flux protection over the entire range of the Safety Limits. In addition, the isolation valve closure trip with the mode switch in the Run position anticipates the pressure and flux transients which occur during normal or inadvertent isolation valve closure.

6. Main Steam Line Radiation - High

The Main Steam Line Radiation detectors are provided to detect a gross failure of the fuel cladding. When the high radiation is detected, a scram is initiated to reduce the continued failure of fuel cladding. At the same time, the Main Steam Line Isolation Valves are closed to limit the release of fission products. The trip setting is high enough above background radiation levels to prevent spurious scrams, yet low enough to promptly detect gross failures in the fuel cladding.

The Main Steam Line Radiation detectors setpoints may be adjusted prior to placing the hydrogen water chemistry (HWC) system in service. If the setpoints are adjusted, the HWC system shall be placed in service or the setpoints shall be returned to the normal full power values within 24 hours. If the HWC system is not placed in service and the setpoints are not readjusted within 24 hours, control rod motion shall be suspended (except for scram or other emergency action) until the necessary adjustments are made. Hydrogen injection may cause the radiation levels in the main steam lines to increase. After shutting off the HWC system or decreasing power, the setpoints shall be returned to the normal full power values.

The Technical Specification wording was derived using the EPRI "Guidelines for Permanent BWR Hydrogen Water Chemistry Installations, 1987 Revision".

TABLE 3.3.2-2

ISOLATION ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. PRIMARY CONTAINMENT ISOLATION		
a. Reactor Vessel Water Level -		
1. Low, Level 1	$\geq$ + 162.5 inches[a]	$\geq$ + 162.5 inches[a]
2. Low, Level 2	$\geq$ + 112 inches[a]	$\geq$ + 112 inches[a]
3. Low, Level 3	$\geq$ + 2.5 inches[a]	$\geq$ + 2.5 inches[a]
b. Drywell Pressure - High	$\leq$ 2 psig	$\leq$ 2 psig
c. Main Steam Line		
1. Radiation - High	$\leq$ 3 x full power background[c]	$\leq$ 3.5 x full power background[c]
2. Pressure - Low	$\geq$ 825 psig	$\geq$ 825 psig
3. Flow - High	$\leq$ 140% of rated flow	$\leq$ 140% of rated flow
4. Flow - High	$\leq$ 40% of rated flow	$\leq$ 40% of rated flow
d. Main Steam Line Tunnel Temperature - High	$\leq$ 200°F	$\leq$ 200°F
e. Condenser Vacuum - Low	$\geq$ 7 inches Hg vacuum	$\geq$ 7 inches Hg vacuum
f. Turbine Building Area Temp - High	$\leq$ 200°F	$\leq$ 200°F
g. Main Stack Radiation - High	(b)	(b)

TABLE 3.3.2-2 (Continued)

ISOLATION ACTUATION INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
5. SHUTDOWN COOLING SYSTEM ISOLATION		
a. Reactor Vessel Water Level - Low Level 1	$\geq$ 162.5 inches[(a)]	$\geq$ 162.5 inches[(a)]
b. Reactor Steam Dome Pressure - High	$\leq$ 140 psig	$\leq$ 140 psig

(a) Vessel water levels refer to REFERENCE LEVEL ZERO.

(b) Establish alarm/trip setpoints per the methodology contained in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

(c) The Hydrogen Water Chemistry (HWC) system shall not be placed in service until reactor power reaches 20% of RATED THERMAL POWER. After reaching 20% of RATED THERMAL POWER, the normal full power background radiation level and associated trip setpoints may be increased to compensate for increased radiation levels as a result of full power operation with hydrogen injection. Prior to decreasing power below 20% of RATED THERMAL POWER and after the HWC system has been shut off, the background level and associated setpoint shall be returned to the normal full power values. Control rod motion shall be suspended, when the reactor power is below 20% of RATED THERMAL POWER, until the necessary adjustment is made (except for scram or other emergency action).