United States Nuclear Regulatory Commission
Enclosure 2 to Serial: RNP-RA/97-0021
(31 Pages)

H. B. ROBINSON STEAM ELECTRIC PLANT
UNIT NO. 2

MARKED UP PAGES FROM CURRENT TECHNICAL SPECIFICATIONS, PROPOSED ITS 3.4.12, AND ITS 3.4.12 BASES PERTAINING TO LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP) REQUIREMENTS

ITS

A1

3.1.2 Heatup and Cooldown

3.1.2.1 The reactor coolant pressure and the system heatup and cooldown rates (with the exception of the pressurizer) shall be limited in accordance with Figure 3.1-1 and Figure 3.1-2 (for vessel exposure up to 24 EFPY). These limitations are as follows:

a. Over the temperature range from cold shutdown to hot operating conditions, the heatup rate shall not exceed 60°F/hr. in any one hour.

See 3.4.3

b. Allowable combinations of pressure and temperature for a specific cooldown rate are below and to the right of the limit lines for that rate as shown on Figure 3.1-2. This rate shall not exceed 100°F/hr. in any one hour. The limit lines for cooling rates between those shown in Figure 3.1-2 may be obtained by interpolation.

c. Primary system hydrostatic leak tests may be performed as necessary, provided the temperature limitation as noted on Figure 3.1-1 is not violated. Maximum hydrostatic test pressure should remain below 2350 psia.

[LCO 3.4.12.a.1] d. The overpressure protection system shall be OPERABLE[1], with both power operated relief valves OPERABLE with a lift setting of less than or equal to 420 psi whenever any RCS

400

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[1] The overpressure protection system shall not be considered inoperable solely because either the normal or emergency power source for the PORV block valves is inoperable.

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ITS

Specification 3.4.12

[LCO 3.4.12.c] With a maximum of two RCPs operating when the RCS temperature is ≥ 175°F (A1) M25

[LCO 3.4.12.a.1] cold leg temperature is less than or equal to 350°F and when the head is on the reactor vessel and the RCS is not vented to the containment.

[ACTION G]

1. With one PORV inoperable and T_{avg} greater than 200°F and any RCS cold leg temperature less than 350°F:

   A. Restore the inoperable PORV to OPERABLE status within 7 days: or

   B. Depressurize and vent the RCS to the CV within the next 8 hours

[ACTION I] [ACTION H]

2. With one PORV inoperable and T_{avg} less than or equal to 200°F:

   A. Restore the inoperable PORV to OPERABLE status within 24 hours: or

   B. Complete depressurization and venting of the RCS to the CV within an additional 8 hours.

[ACTION I]

[ACTION I]

3. With both PORVs inoperable, complete depressurization and venting of the RCS to the CV within 8 hours. M24

[SR 3.4.12.6] [NOTE]

4. With the RCS vented per 1, 2, or 3, verify the vent pathway:

   A. At least once per 31 days when the pathway is provided by a valve(s) that is locked, sealed, or otherwise secured in the open position; or

   B. At least once per 12 hours.

Add LCO 3.4.12.b
Add Applicability "NOTE"
ACTIONS A, B, C, D, E, F
SR 3.4.12.1
SR 3.4.12.2
SR 3.4.12.3
SR 3.4.12.4
SR 3.4.12.5

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Add LCO 3.4.12.d
Add LCO "NOTE"

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Add LCO 3.4.12.a.2

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Specification 3.4.12

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3.3.1.3 When the reactor is in the hot shutdown condition, the requirements of 3.3.1.1 and 3.3.1.2 shall be met. Except that the accumulators may be isolated or otherwise inoperable relative to the requirements of 3.3.1.1.b. In addition, any one component as defined in 3.3.1.2 may be inoperable for a period equal to the time period specified in the subparagraphs of 3.3.1.2 plus 48 hours, after which the plant shall be placed in the cold shutdown condition utilizing normal operating procedures. The safety injection pump power supply breakers must be racked out when the reactor coolant system temperature is below 350°F and the system is not vented to containment atmosphere.

See 3.5.1, 3.5.2, 3.5.3, 3.5.4

All but one

LB

with the RCS temperature ≥175°

[LCO 3.4.12.c]

3.3.1.4 When the reactor is in the cold shutdown condition (except refueling operation when Specification 3.8.1.e applies), both residual heat removal loops must be operable. Except that either the normal or emergency power source to both residual heat removal loops may be inoperable.

M26

MODE 4, 5, 6 (heaton)

3.4.7
3.4.8

a. If one residual heat removal loop becomes inoperable during cold shutdown operation, within 24 hours verify the existence of a method to add make-up water to the reactor coolant system such as charging pumps, safety injection pumps (under adequate operator control to prevent system overpressurization), or primary water (if the reactor coolant system is open for maintenance) as back-up decay heat removal method. Restore the inoperable RHR loop to operable status within 14 days or prepare and submit a Special Report to the Commission within the next 30 days outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the loop to operable status.

b. If both residual heat removal loops become inoperable during cold shutdown operation, close all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere prior to the reactor coolant average temperature exceeding 200°F, restore at least one residual

and only one charging pump is capable of injecting into the RCS

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ITS

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c. Operating the solenoid air control valves and check valves for their associated accumulators in PORV control systems through one complete cycle of full travel or function testing of individual components.

4.2.4.2 Each block valve shall be demonstrated OPERABLE at least once per 92 days by operating the valve through one complete cycle of full travel unless the block valve is closed in order to meet the requirements of Specification 3.1.1.5.b. or c.

See 3.4.11

4.2.4.3 The accumulator for the PORVs shall be demonstrated OPERABLE at each refueling by isolating the normal air and nitrogen supplies and operating the valves through a complete cycle of full travel.

4.2.5 Low-Temperature Overpressure Protection

4.2.5.1 Each PORV shall be demonstrated OPERABLE by:

[SR 3.4.12.8]

a. Performance of an ANALOG CHANNEL OPERATIONAL TEST on the actuation channel, but excluding valve operation, within 31 days prior to entering a condition in which the PORV is required OPERABLE and at least once per 31 days thereafter when the PORV is required OPERABLE; and

[SR 3.4.12.9]

b. Performance of a CHANNEL CALIBRATION at ~~each refueling shutdown~~ 18 months and

[SR 3.4.12.7]

c. Verifying the PORV block valve is open at least once per 72 hours when the PORV is being used for overpressure protection.

Specification 3.4.12

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5. In the event the PORVs or the RCS vent(s) are used to mitigate an RCS pressure transient, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.3 within 30 days. The report shall describe the circumstances initiating the transient, the effect of the PORVs or RCS vent(s) on the transient and any corrective action necessary to prevent recurrence.

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6. For this specification, reactor startup, heatup and entry into operational conditions with T_{avg} greater than or equal to 350°F may continue so long as the limits of the associated action statements are met.

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ITS

TABLE 4.1-1 (Continued)

	Channel Description	Check	Calibrate	Test		Remarks
30.	Reactor Trip Breakers	N.A.	N.A..	M(1)	(1)	The reactor trip breaker trip actuating device operational test shall verify the operability of the UV trip attachment and the shunt trip attachment, individually.
[SR3.4.12.8] [SR3.4.12.9] 31.	Overpressure Protection System	~~N.A.~~	R (18 months)	M (31 days)		

See 3.3.1

A1

Specification 3.4.12

ITS

A1

TABLE 4.1-3 (Continued)
FREQUENCIES FOR EQUIPMENT TESTS

		Check	Frequency	Maximum Time Between Test
13.	Deleted			
14.	Fans and associated charcoal and Absolute Filters for Residual Heat Removal Compartments (HVE-5a and 5b)	Fans functioning. Laboratory tests on charcoal must show ≥ 99% iodine removal. In-place test must show ≥ 99% removal of polydispersed DOP particles by the HEPA filters and Freon by the charcoal filters.	Once per operating cycle.	NA
15.	Isolation Seal Water System	Functioning	Each refueling shutdown	NA
16.	Overpressure Protection System	Functioning	Each refueling shutdown	NA
17.	Primary Coolant System check valves	Functioning	1. Periodic leakage testing[a][b] on each [c]valve listed in Table 3.1-1 shall be accomplished prior to entering reactor operation condition (1) after every time the plant is placed in the cold shutdown condition for refueling, (2) after each time the plant is placed in a cold shutdown condition for 72 hours if testing has not been accomplished in the preceding 9 months, (3) after maintenance, repair or replacement work is performed.	

[a] To satisfy ALARA requirements, leakage may be measured indirectly (as from the performance of pressure indicators) if accomplished in accordance with approved procedures and supported by computations showing that the method is capable of demonstrating valve compliance with the leakage criteria.

[b] Minimum test differential pressure shall not be less than 150 psid.

[c] More than one valve may be tested in parallel. The combined leakage shall not exceed 5.0 gpm. Redundant valves in each line shall not be tested in series.

LA8

See 3.6.8

SR 3.4.12.9

18 MO

See 3.4.14

Specification 3.4.12

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6.9.2 Deleted

6.9.3 Special Reports

6.9.3.1 Special reports shall be submitted to the NRC within the time period specified for each report. These reports shall be submitted covering the activities identified below pursuant to the requirements of the applicable reference specification:

	Area	Reference	Submittal Date	
a)	Containment Leak Rate Testing	4.4	Upon completion of each test.	See 5.5
b)	Containment Sample Tendon Surveillance	4.4	Upon completion of the inspection at 25 years of operation.	See 5.6
c)	Post-Operational Containment Structural Test	4.4	Upon completion of the test at 20 years of operation.	See 5.5
d)	~~DELETED~~			
e)	Overpressure Protection System Operation	3.1.2.1.e	Within 30 days of operation.	A19
f)	Auxiliary Feedwater Pump	3.4	Within 30 days after becoming inoperable.	See 3.7.4

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with the following requirements met:

a. 1. Two power operated relief valves (PORVs) with the lift settings of ≤ 400 psig,

OR

2. The RCS depressurized and an RCS vent of ≥ 3 square inches;

b. The accumulators isolated;

c. A maximum of one Safety Injection (SI) pump and one charging pump capable of injecting into the RCS and a maximum of two Reactor Coolant Pumps (RCPs) in operation when all cold leg temperatures are ≥ 175°F; and

d. No SI pumps capable of injecting into the RCS when any cold leg temperature is < 175°F.

---NOTE---
When no SI pumps are capable of injecting into the RCS, all charging pumps may be capable of injecting into the RCS and all RCPs may be in operation.

APPLICABILITY: MODES 4 and 5,
MODE 6 when the reactor vessel head is on.

---NOTE---
Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in Figures 3.4.3-1 and 3.4.3-2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Two or more SI pumps capable of injecting into the RCS with all RCS cold leg temperatures ≥ 175°F.	A.1 Initiate action to verify a maximum of one SI pump is capable of injecting into the RCS.	Immediately
B. One or more SI pumps capable of injecting into the RCS with any RCS cold leg temperature < 175°F.	B.1 Initiate action to verify no SI pumps capable of injecting into the RCS.	Immediately
C. Two or more charging pumps capable of injecting into the RCS. AND One SI pump capable of injecting into the RCS.	C.1 --------NOTE-------- Two charging pumps may be capable of injecting into the RCS during pump swap operation for ≤ 15 minutes. ---------- Initiate action to verify a maximum of one charging pump is capable of injecting into the RCS. OR C.2 Initiate action to verify no SI pumps capable of injecting into the RCS.	 Immediately Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. Three RCPs operating with all RCS cold leg temperatures ≥ 175°F. AND One SI pump capable of injecting into the RCS.	D.1	--------NOTE-------- Three RCPs may be operating during pump swap operation for ≤ 15 minutes. ---------- Initiate action to verify a maximum of two RCPs operating.	Immediately
	OR		
	D.2	Initiate action to verify no SI pumps capable of injecting into the RCS.	Immediately
E. An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for existing cold leg temperature allowed in Figures 3.4.3-1 and 3.4.3-2.	E.1	Isolate affected accumulator.	1 hour

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time of Condition E not met.	F.1 Increase RCS cold leg temperature to > 350°F. OR F.2 Depressurize affected accumulator to less than the maximum RCS pressure for existing cold leg temperature allowed in Figures 3.4.3-1 and 3.4.3-2.	12 hours 12 hours
G. One required PORV inoperable in MODE 4.	G.1 Restore required PORV to OPERABLE status.	7 days
H. One required PORV inoperable in MODE 5 or 6.	H.1 Restore required PORV to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
I. Two required PORVs inoperable. OR Required Action and associated Completion Time of Condition A, B, C, D, F, G, or H not met. OR LTOP System inoperable for any reason other than Condition A, B, C, D, E, F, G, or H.	I.1 Depressurize RCS and establish RCS vent of ≥ 3 square inches.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.12.1	----------NOTE---------- Only required to be met when all RCS cold leg temperatures ≥ 175°F. ----------	
	Verify a maximum of one SI pump is capable of injecting into the RCS.	12 hours

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.2	----------NOTE---------- Only required to be met when one SI pump is capable of injecting into the RCS. ---------- Verify a maximum of one charging pump is capable of injecting into the RCS.	12 hours
SR 3.4.12.3	Verify each accumulator is isolated.	12 hours
SR 3.4.12.4	----------NOTE---------- Only required to be met when one SI pump is capable of injecting into the RCS. ---------- Verify a maximum of two RCPs operating.	12 hours
SR 3.4.12.5	----------NOTE---------- Only required to be met when any RCS cold leg temperature < 175°F. ---------- Verify no SI pumps capable of injecting into the RCS.	12 hours

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.6	----------NOTE---------- Only required to be met when complying with LCO 3.4.12.b. ---------- Verify RCS vent ≥ 3 square inches open.	12 hours for unlocked open vent valve(s) AND 31 days for locked open vent valve(s)
SR 3.4.12.7	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.8	Perform a COT on each required PORV, excluding actuation.	Once within 31 days prior to entering MODE 4, 5, or 6, when reactor vessel head is on AND 31 days thereafter
SR 3.4.12.9	Perform CHANNEL CALIBRATION for each required PORV actuation channel.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Low Temperature Overpressure Protection (LTOP) System

BASES

BACKGROUND

The LTOP System controls RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) limits of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for demonstrating such protection. The maximum allowed PORV setpoint for LTOP is derived by analyses which model the performance of the LTOP System, assuming various mass input and heat input transients. Operation with a PORV setpoint less than or equal to the maximum setpoint ensures that Reference 1 criteria will not be violated with consideration for a maximum pressure over-shoot beyond the PORV setpoint which can occur as a result of time delays in signal processing and valve opening, instrument uncertainties, and single failure. The maximum allowed PORV setpoint for the LTOP is updated based on the results of examinations of reactor vessel material irradiation surveillance specimens performed as required by 10 CFR 50, Appendix H.

The reactor vessel material is less tough at low temperatures than at normal operating temperature. As the vessel neutron exposure accumulates, the material toughness decreases and becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure, therefore, is maintained low at low temperatures and is increased only as temperature is increased.

The potential for vessel overpressurization is most acute when the RCS is water solid, occurring only while shutdown; a pressure fluctuation can occur more quickly than an operator can react to relieve the condition. Exceeding the RCS P/T limits by a significant amount could cause brittle cracking of the reactor vessel. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," requires administrative control of RCS pressure and temperature during heatup and cooldown to prevent exceeding the P/T limits.

This LCO provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability

(continued)

BACKGROUND (continued)

requires compliance with the requirements of LCO 3.4.12, items b, c, and d. The pressure relief capacity requires either two redundant RCS relief valves or a depressurized RCS and an RCS vent of sufficient size. One RCS relief valve or the open RCS vent is the overpressure protection device that acts to terminate an increasing pressure event.

With minimum coolant input capability, the ability to provide core coolant addition is restricted. The LCO does not require the Chemical and Volume Control System (CVCS) deactivated or the SI actuation circuits blocked. Due to the lower pressures in the LTOP MODES and the expected core decay heat levels, the single SI pump and charging pump can provide adequate makeup and core cooling in the event of a loss of inventory or core cooling. If conditions require the use of more than one SI or charging pump for makeup in the event of loss of inventory, then pumps can be made available through manual actions.

The LTOP System for pressure relief consists of two PORVs with reduced lift settings, or a depressurized RCS and an RCS vent of sufficient size. Two RCS relief valves are required for redundancy. One RCS relief valve has adequate relieving capability to keep from overpressurization for the required coolant input capability.

PORV Requirements

As designed for the LTOP System, each PORV is signaled to open if the RCS pressure approaches a limit determined by the LTOP actuation logic. The LTOP actuation logic monitors both RCS temperature and RCS pressure and determines when a condition not acceptable in the P/T limits is approached. The LTOP setpoint is biased to a minimum value at 350°F. The reduction in temperature below 350°F does not result in a lower setpoint. The wide range RCS temperature indications are auctioneered to select the lowest temperature signal.

The lowest temperature signal is processed through a function generator that calculates a pressure limit for that

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BASES

BACKGROUND

PORV Requirements (continued)

temperature. The calculated pressure limit is then compared with the indicated RCS pressure from a wide range pressure channel. If the indicated pressure meets or exceeds the calculated value, a PORV is signaled to open.

When a PORV is opened in an increasing pressure transient, the release of coolant will cause the pressure increase to slow and reverse. As the PORV releases coolant, the RCS pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

RCS Vent Requirements

Once the RCS is depressurized, a vent exposed to the containment atmosphere will maintain the RCS at containment ambient pressure in an RCS overpressure transient, if the relieving requirements of the transient do not exceed the capabilities of the vent. Thus, the vent path must be capable of relieving the flow resulting from the limiting LTOP mass or heat input transient, and maintaining pressure below the P/T limits. The required vent capacity may be provided by one or more vent paths.

For an RCS vent to meet the flow capacity requirement, it requires removing a pressurizer safety valve, removing a PORV's internals or physically blocking the valve stem of the PORV in the open position, and disabling its block valve in the open position. The vent path(s) must be above the level of reactor coolant, so as not to drain the RCS when open.

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 3) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits. In MODES 1, 2, and 3, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At about 350°F and below, overpressure prevention falls to two OPERABLE RCS relief valves or to a depressurized RCS and a sufficient sized RCS vent. Each of these means has a limited overpressure relief capability.

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BASES

APPLICABLE SAFETY ANALYSES (continued)

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as the reactor vessel material toughness decreases due to neutron embrittlement. Each time the P/T limit curves are revised, the LTOP System must be re-evaluated to ensure its functional requirements can still be met using the RCS relief valve method or the depressurized and vented RCS condition.

Any change to the RCS must be evaluated against the Reference 3 analyses to determine the impact of the change on the LTOP acceptance limits.

Transients that are capable of overpressurizing the RCS are categorized as either mass or heat input transients, examples of which follow:

Mass Input Type Transients

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

Heat Input Type Transients

a. Inadvertent actuation of pressurizer heaters;

b. Loss of RHR cooling; or

c. Reactor coolant pump (RCP) startup with temperature asymmetry within the RCS or between the RCS and steam generators.

The following restrictions are required during the LTOP MODES to ensure that mass and heat input transients do not occur, which either of the LTOP overpressure protection means cannot handle:

a. Rendering all but one SI pump and one charging pump incapable of injection with all RCS cold leg temperatures $\geq$ 175°F;

b. Deactivating the accumulator discharge isolation valves in their closed positions;

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APPLICABLE SAFETY ANALYSES

Heat Input Type Transients (continued)

c. Disallowing start of an RCP if there is no steam bubble in the pressurizer, or if secondary temperature is more than 50°F above primary temperature in any one loop. LCO 3.4.6, "RCS Loops – MODE 4," and LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled," provide this protection;

d. Rendering all SI pumps incapable of injection with any cold leg temperature < 175°F; and

e. Disallowing more than two RCPs to be operating with all RCS cold leg temperatures ≥ 175°F when an SI pump is capable of injecting into the RCS.

References 4, 5, 6, and 7 analyses demonstrate that either one RCS relief valve or the depressurized RCS and RCS vent can maintain RCS pressure below limits when the restrictions on mass and heat input described above are assumed. Thus, the LCO provides restrictions consistent with the mass and heat input assumptions of this analysis during the LTOP MODES. Since neither one RCS relief valve nor the RCS vent can handle the pressure transient need from accumulator injection, when RCS temperature is low, the LCO also requires the accumulators be isolated when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the LTOP analyses.

The analyses did not consider the accumulators as a credible mass input mechanism because there are multiple administrative controls to ensure isolation, including de-energizing valve control circuits (Ref. 7). Therefore, the accumulators must have their discharge valves closed and the valve power supply breakers in their open positions.

The P/T Limit Curve includes an instrument uncertainty margin of 60 psig. The P/T Limit Curve does not include static head and RCP dynamic head corrections from the reactor vessel beltline pressure to the pressure transmitter. The actual instrument uncertainty has been determined to be less than 30 psig. Therefore, a limitation of two RCPs operating is imposed to assure that instrument uncertainty, static head correction, and dynamic head

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APPLICABLE SAFETY ANALYSES

Heat Input Type Transients (continued)

correction, are less than the 60 psig margin in the P/T Limit Curve.

The consequences of a small break loss of coolant accident (LOCA) in LTOP MODE 4 conform to 10 CFR 50.46 and 10 CFR 50, Appendix K (Refs. 8 and 9), requirements by having a maximum of one SI pump and one charging pump OPERABLE and SI actuation enabled.

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORVs are set to open at or below 400 psig. The setpoints are derived by analyses that model the performance of the LTOP System, assuming the limiting LTOP transient of one SI pump and one charging pump injecting into the RCS. These analyses consider pressure overshoot and undershoot beyond the PORV opening and closing, resulting from signal processing and valve stroke times. The PORV setpoints at or below the derived limit ensures the Reference 1 P/T limits will be met.

The PORV setpoints will be updated when the revised reactor vessel P/T limits conflict with the LTOP analysis limits. The P/T limits are periodically modified as the reactor vessel material toughness decreases due to neutron embrittlement caused by neutron irradiation. Revised limits are determined using neutron fluence projections and the results of examinations of the reactor vessel material irradiation surveillance specimens. The Bases for LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," discuss these examinations.

The PORVs are considered active components. Thus, the failure of one PORV is assumed to represent the worst case, single active failure.

RCS Vent Performance

With the RCS depressurized, analyses show a vent size of 3 square inches is capable of mitigating the allowed LTOP overpressure transient. The capacity of a vent this size is greater than the flow of the limiting transient for the LTOP

(continued)

BASES

APPLICABLE SAFETY ANALYSES

RCS Vent Performance (continued)

configuration, one SI pump and one charging pump OPERABLE, maintaining RCS pressure less than the maximum pressure in the LTOP analysis.

The RCS vent size will be re-evaluated for compliance each time the P/T limit curves are revised based on the results of the vessel material surveillance.

The RCS vent is passive and is not subject to active failure.

The LTOP System satisfies Criterion 2 of the NRC Policy Statement.

LCO

This LCO requires that the LTOP System be OPERABLE. The LTOP System is OPERABLE when the minimum coolant input and pressure relief capabilities are OPERABLE. Violation of this LCO could lead to the loss of low temperature overpressure mitigation and violation of the Reference 1 limits as a result of an operational transient.

To limit the coolant input capability consistent with assumptions of the analysis, the LCO requires all accumulator discharge isolation valves closed and immobilized when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the LTOP analyses, no more than one SI pump and one charging pump be capable of injecting into the RCS with all RCS cold leg temperatures $\geq$ 175°F, and no SI pumps be capable of injecting into the RCS with any RCS cold leg temperature < 175°F. In addition, when no SI pumps are capable of injecting into the RCS, all charging pumps may be capable of injecting and all RCPs may be in operation.

The elements of the LCO that provide low temperature overpressure mitigation through pressure relief are:

a. Two OPERABLE PORVs; or

A PORV is OPERABLE for LTOP when its block valve is open, its lift setpoint is set to the limit required

(continued)

BASES

LCO (continued)

by the LTOP analyses and testing proves its ability to open at this setpoint, and motive power is available to the two valves and their control circuits.

b. A depressurized RCS and an RCS vent.

An RCS vent is OPERABLE when open with an area of ≥ 3 square inches.

Each of these methods of overpressure prevention is capable of mitigating the limiting LTOP transient.

APPLICABILITY

This LCO is applicable in MODE 4, MODE 5, and in MODE 6 when the reactor vessel head is on. The pressurizer safety valves provide overpressure protection that meets the Reference 1 P/T limits above 350°F. When the reactor vessel head is off, overpressurization cannot occur.

LCO 3.4.3 provides the operational P/T limits for all MODES. LCO 3.4.10, "Pressurizer Safety Valves," requires the OPERABILITY of the pressurizer safety valves that provide overpressure protection during MODES 1, 2, and 3.

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

The Applicability is modified by a Note stating that accumulator isolation is only required when the accumulator pressure is more than or at the maximum RCS pressure for the existing temperature, as allowed by the P/T limit curves. This Note permits the accumulator discharge isolation valve Surveillance to be performed only under these pressure and temperature conditions.

ACTIONS

A.1, B.1, C.1, and C.2

With two or more SI pumps capable of injecting into the RCS, and all RCS cold leg temperatures ≥ 175°F, or one or more SI

(continued)

BASES

ACTIONS

A.1, B.1, C.1, and C.2 (continued)

pumps capable of injecting into the RCS with any cold leg temperature < 175°F, RCS overpressurization is possible.

With two or more charging pumps capable of injecting into the RCS and one SI pump capable of injecting into the RCS, RCS overpressurization is possible.

To immediately initiate action to restore restricted coolant input capability to the RCS reflects the urgency of removing the RCS from this condition.

Required Action C.1 is modified by a Note that permits two charging pumps capable of RCS injection for ≤ 15 minutes to allow for pump swaps.

D.1 and D.2

With three RCPs operating with all RCS cold leg temperatures ≥ 175°F and one SI pump capable of injecting into the RCS, RCS overpressurization is possible.

To immediately initiate action to secure an RCP or restore restricted coolant input capability to the RCS, restores compliance with the assumptions of the analyses and reflects the urgency of removing the RCS from this condition.

Required Action D.1 is modified by a Note that permits three RCPs operating for ≤ 15 minutes to allow for pump swap. This short period of time is acceptable due to the low probability of an overpressurization event during the pump swap.

E.1, F.1, and F.2

An improperly isolated accumulator requires isolation within 1 hour. This is only required when the accumulator pressure is at or more than the maximum RCS pressure for the existing temperature allowed by the P/T limit curves.

If isolation is needed and cannot be accomplished in 1 hour, Required Action F.1 and Required Action F.2 provide two options, either of which must be performed in the next

(continued)

ACTIONS

E.1, F.1, and F.2 (continued)

12 hours. By increasing the RCS temperature to > 350°F, an accumulator pressure of 600 psig cannot exceed the LTOP limits if the accumulators are fully injected.

Depressurizing the accumulators below the LTOP limit also gives this protection.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and on engineering evaluations indicating that an event requiring LTOP is not likely in the allowed times.

G.1

In MODE 4, with one required PORV inoperable, the PORV must be restored to OPERABLE status within a Completion Time of 7 days. Two PORVs are required to provide low temperature overpressure mitigation while withstanding a single failure of an active component.

The Completion Time considers the facts that only one of the PORVs is required to mitigate an overpressure transient and that the likelihood of an active failure of the remaining valve path during this time period is very low.

H.1

The consequences of operational events that will overpressurize the RCS are more severe at lower temperature (Ref. 10). Thus, with one of the two PORVs inoperable in MODE 5 or in MODE 6 with the head on, the Completion Time to restore two valves to OPERABLE status is 24 hours.

The Completion Time represents a reasonable time to investigate and repair several types of relief valve failures without exposure to a lengthy period with only one OPERABLE PORV to protect against overpressure events.

(continued)

BASES

ACTIONS (continued)

I.1

The RCS must be depressurized and a vent must be established within 8 hours when:

a. Both required PORVs are inoperable; or

b. A Required Action and associated Completion Time of Condition A, B, C, D, F, G, or H is not met; or

c. The LTOP System is inoperable for any reason other than Condition A, B, C, D, E, F, G, or H.

The vent must be sized ≥ 3 square inches to ensure that the flow capacity is greater than that required for the worst case mass input transient reasonable during the applicable MODES. This action is needed to protect the RCPB from a low temperature overpressure event and a possible brittle failure of the reactor vessel.

The Completion Time considers the time required to place the plant in this Condition and the relatively low probability of an overpressure event during this time period due to increased operator awareness of administrative control requirements.

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1, SR 3.4.12.2, SR 3.4.12.3, SR 3.4.12.4, and SR 3.4.12.5

To minimize the potential for a low temperature overpressure event by limiting the mass input capability, a maximum of one SI pump and a maximum of one charging pump are verified capable of injecting into the RCS and the accumulator discharge isolation valves are verified closed and locked out and a maximum of two RCPs are verified operating. In addition when any RCS cold leg temperature is < 175°F, it must be verified that no SI pumps are capable of injecting into the RCS.

The SI pumps and charging pumps are rendered incapable of injecting into the RCS through removing the power from the pumps by racking the breakers out under administrative control. An alternate method of LTOP control may be employed using at least two independent means to prevent a

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1, SR 3.4.12.2, SR 3.4.12.3, SR 3.4.12.4, and SR 3.4.12.5 (continued)

pump start such that a single failure or single action will not result in an injection into the RCS. This may be accomplished through removal of control power fuses and at least one valve in the discharge flow path being closed.

The Frequency of 12 hours is sufficient, considering other indications and alarms available to the operator in the control room, to verify the required status of the equipment.

SR 3.4.12.1 is modified by a Note indicating that this SR is only required to be met when all RCS cold leg temperatures are ≥ 175°F. Below an RCS temperature of 175°F, all SI pumps must be incapable of injection into the RCS, as required by SR 3.4.12.5.

SR 3.4.12.2 and SR 3.4.12.4 are modified by Notes indicating that these SRs are only required to be met when one SI pump is capable of injection into the RCS. When all SI pumps are incapable of injection into the RCS, an overpressure event is not possible and no restrictions on the charging pumps and RCPs apply.

SR 3.4.12.5 is modified by a Note indicating that this SR is only required to be met when any RCS cold leg temperature is < 175°F. Below an RCS temperature of 175°F, all SI pumps must be incapable of injection into the RCS. Above an RCS temperature of 175°F, only one SI pump may be capable of injecting into the RCS as required by SR 3.4.12.1.

SR 3.4.12.6

The RCS vent of ≥ 3 square inches is proven OPERABLE by verifying its open condition either:

a. Once every 12 hours for a valve that cannot be locked.

b. Once every 31 days for a valve that is locked, sealed, or secured in position. A removed pressurizer safety valve fits this category.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.4.12.6 (continued)

The passive vent arrangement must only be open to be OPERABLE. This Surveillance is required to be met if the vent is being used to satisfy the pressure relief requirements of the LCO 3.4.12b.

SR 3.4.12.7

The PORV block valve must be verified open every 72 hours to provide the flow path for each required PORV to perform its function when actuated. The valve must be remotely verified open in the main control room. This Surveillance is performed if the PORV satisfies the LCO.

The block valve is a remotely controlled, motor operated valve. The power to the valve operator is not required removed, and the manual operator is not required locked in the inactive position. Thus, the block valve can be closed in the event the PORV develops excessive leakage or does not close (sticks open) after relieving an overpressure situation.

The 72 hour Frequency is considered adequate in view of other administrative controls available to the operator in the control room, such as valve position indication, that verify that the PORV block valve remains open.

SR 3.4.12.8

Performance of a COT is required within 12 hours after decreasing RCS temperature to ≤ 350°F and every 31 days on each required PORV to verify and, as necessary, adjust its lift setpoint. The COT will verify the setpoint is within the allowed maximum limits in the LTOP analyses. PORV actuation could depressurize the RCS and is not required.

The Frequency of "Once within 31 days prior to entering MODE 4, 5, or 6 when the reactor vessel head is on AND 31 days thereafter" ensures that SR 3.4.12.8 is performed prior to entry into the MODES or specified condition of the Applicability and has been proven to be acceptable based on operating experience.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.8 (continued)

A Note has been added indicating that this SR is required to be met 12 hours after decreasing RCS cold leg temperature to ≤ 350°F. The COT cannot be performed until in the LTOP MODES when the PORV lift setpoint can be reduced to the LTOP setting. The test must be performed within 12 hours after entering the LTOP MODES.

SR 3.4.12.9

Performance of a CHANNEL CALIBRATION on each required PORV actuation channel is required every 18 months to adjust the whole channel so that it responds and the valve opens within the required range and accuracy to known input.

REFERENCES

1. 10 CFR 50, Appendix G.

2. Generic Letter 88-11.

3. UFSAR, Chapter 5.

4. Letter, RNP-RA/96-0141, CP&L (R. M. Krich) to NRC, "Request for Technical Specifications Change, Conversion to Improved Standard Technical Specifications Consistent with NUREG-1431, 'Standard Technical Specifications-Westinghouse Plants,' Revision 1," August 30, 1996, Enclosure 5.

5. Letter, NG-77-1215, CP&L (B. J. Furr) to NRC (R. W. Reid), "Reactor Vessel Overpressurization Protection," October 31, 1977.

6. Letter, NG-77-1426, CP&L (E. E. Utley) to NRC (R. W. Reid), "Response to Overpressure Protection System Questions," December 15, 1977.

7. Report, "Pressure Mitigating Systems Transient Analysis Results," prepared by Westinghouse Electric Corporation for the Westinghouse Owners Group on Reactor Coolant System Overpressurization, July 1977, and Supplement, September 1977.

(continued)

BASES

REFERENCES (continued)

8. 10 CFR 50, Section 50.46.

9. 10 CFR 50, Appendix K.

10. Generic Letter 90-06.

United States Nuclear Regulatory Commission
Enclosure 3 to Serial: RNP-RA/97-0021
(3 Pages)

H. B. ROBINSON STEAM ELECTRIC PLANT
UNIT NO. 2

MARKED UP AND RETYPED PAGE 3.10-9 FROM CURRENT TECHNICAL SPECIFICATIONS PERTAINING TO REMOVAL OF ALLOWANCE FOR A SINGLE INOPERABLE CONTROL ROD.

3.10.6.2 No more than one inoperable control rod shall be permitted during power operation. (M)

3.10.6 (3) (2) If a full length control rod cannot be moved by its mechanism, boron concentration shall be changed to compensate for the withdrawn worth of the inoperable rod such that a shutdown margin equal to or greater than shown on Figure 3.10-2 results.

3.10.7 Power Ramp Rate Limits

3.10.7.1 During the return to power following a shutdown where fuel assemblies have been handled (e.g., refueling, inspection), the rate of reactor power increase shall be limited to 3 percent of rated power in an hour between 20 percent and 100 percent of rated power. This ramp rate requirement applies during the initial startup and may apply during subsequent power increases, depending on the maximum power level achieved and length of operation at that power level. Specifically, this requirement can be moved for reactor power levels below a power level P (20 percent < P $\leq$ 100 percent), provided that the plant has operated at or above power level P for at least 72 cumulative hours out of any seven-day operating period following the shutdown.

3.10.7.2 The rate of reactor power increases above the highest power level sustained for at least 72 cumulative hours during the preceding 30 cumulative days of reactor power operation shall be limited to 3 percent of rated power in an hour. Alternatively, reactor power increase can be accomplished by a single step increase less than or equal to 10 percent of rated power followed by a maximum ramp rate of 3 percent of rated power in an hour beginning three hours after the step increase.

3.10.8 Required Shutdown Margins

3.10.8.1 When the reactor is in the hot shutdown condition, the shutdown margin shall be at least that shown in Figure 3.10-2.

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