Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.12:
"Low Temperature Overpressure Protection (LTOP)"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP)

LCO 3.4.12 LTOP shall be OPERABLE with no high head safety injection (HHSI) pumps capable of injecting into the RCS and the accumulator discharge isolation valves closed and de-energized, and either of the following:

-----------------------------Note-----------------------------
LCO 3.4.12.a and LCO 3.4.12.b are not Applicable when all RCS cold leg temperatures are ≥ 319°F. NYPA
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a. The Overpressure Protection System (OPS) OPERABLE with two power operated relief valves (PORVs) with lift settings within the limit specified in Figure 3.4.12-1; RAI 42

<u>OR</u>

b. The RCS depressurized with an RCS vent of ≥ 2.00 square inches.

-----------------------------NOTES-----------------------------
1. Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the coldest existing RCS cold leg temperature allowed by the P/T limit curve in Figure 3.4.12-1. RAI 42

2. One HHSI pump may be made capable of injecting into the RCS as needed to support emergency boration or to respond to a loss of RHR cooling.

3. One HHSI pump may be made capable of injecting into the RCS for pump testing for a period not to exceed 8 hours.

APPLICABILITY: Whenever the RHR System is not isolated from the RCS,
MODE 4 when any RCS cold leg temperature is < 319°F,
MODE 5,
MODE 6 when the reactor vessel head is on. NYPA

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more HHSI pump(s) capable of injecting into the RCS .	A.1	Initiate action to verify no HHSI pumps are capable of injecting into the RCS.	Immediately
	OR		
	A.2.1	Verify RCS is vented with opening ≥ 2.00 square inches.	Immediately
	AND		
	A.2.2	Verify pressurizer level is ≤ 0%.	Immediately AND Once per 12 hours
	AND		
	A.2.3	Verify no more than two HHSI pumps are capable of injecting into the RCS.	Immediately AND Once per 12 hours
	OR		
	A.3.1	Verify RCS is vented with opening greater than or equal to one pressurizer code safety valve flange.	Immediately
	AND		
	A.3.2	Verify no more than two HHSI pumps are capable of injecting into the RCS	Immediately AND Once per 12 hours

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ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. An accumulator discharge isolation valve not closed and de-energized when the accumulator pressure is greater than or equal to the maximum RCS pressure for the coldest existing cold leg temperature specified in Figure 3.4.12-1.	B.1	Close and de-energize isolation valve for affected accumulator.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1.1	Increase all RCS cold leg temperatures to ≥ 319°F.	12 hours
	<u>AND</u>		
	C.1.2	Isolate the RHR System from the RCS.	12 hours
	<u>OR</u>		
	C.2	Depressurize affected accumulator to less than the maximum RCS pressure for coldest existing cold leg temperature specified in Figure 3.4.12-1.	12 hours
D. One required PORV inoperable.	D.1	Restore required PORV to OPERABLE status.	7 days

RAI 42

NYPA

RAI 42

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ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Two required PORVs inoperable. OR Required Action and associated Completion Time of Condition C or D not met.	E.1	Depressurize RCS and establish RCS vent of ≥ 2.00 square inches.	8 hours
	OR		
	E.2.1	Increase all RCS cold leg temperatures to ≥ 319°F.	8 hours
	AND		
	E.2.2	Isolate the RHR System from the RCS.	8 hours
	OR		
	E.3	Verify pressurizer level, RCS pressure, and RCS injection capability are within limits specified in Figure 3.4.12-2 and Figure 3.4.12-3 for OPS not OPERABLE.	8 hours AND Once per 12 hours thereafter
F. LTOP inoperable for any reason other than Condition A, B, C, D, or E.	F.1	Depressurize RCS and establish RCS vent of ≥ 2.00 square inches.	8 hours

NYPA

RAI 42

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.12.1	Verify no HHSI pumps are capable of injecting into the RCS.	12 hours
SR 3.4.12.2	Verify each accumulator discharge isolation valve is closed and de-energized; OR Verify each accumulator pressure is less than the maximum RCS pressure for the coldest existing RCS cold leg temperature allowed by the P/T limit curve in Figure 3.4.12-1.	12 hours 12 hours
SR 3.4.12.3	-----------------NOTE----------------- Only required to be met when complying with LCO 3.4.12.b. -------------------------------------- Verify RCS vent ≥ 2.00 square inches established.	12 hours for unlocked open vent valve(s) AND 31 days for locked open vent valve(s)

RAI 42

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.4	----------------NOTE------------------ Only required to be met when complying with LCO 3.4.12.a. --- Perform CHANNEL CHECK of Overpressure Protection (OPS) instrument channels.	24 hours
SR 3.4.12.5	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.6	------------------NOTE-------------------- Not required to be performed until 12 hours after decreasing any RCS cold leg temperature to < 319°F. --- Perform a COT on each required PORV, excluding actuation.	24 months
SR 3.4.12.7	Perform CHANNEL CALIBRATION for each required OPS channel as follows:	
	a. OPS actuation channels; and	18 months
	b. RCS pressure and temperature instruments.	24 months

NYPA

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.8	------------------NOTES------------------ 1. Not required to be met when all RCS cold leg temperatures are ≥ 319°F. 2. Not required to be met if SR 3.4.12.9 is met. --- Verify each of the following conditions are satisfied prior to starting any RCP: a. Secondary side water temperature of the hottest steam generator (SG) is less than or equal to the coldest RCS cold leg temperature; and b. RCS makeup is less than or equal to RCS losses; and c. Steam generator pressure is not decreasing; and d.1 Overpressure Protection System (OPS) is OPERABLE; <u>OR</u> d.2.1 RCS pressure less than nominal OPS setpoint specified in Figure 3.4.12-1; and d.2.2 Pressurizer level, RCS pressure, and RCS injection capability are within limits specified in Figure 3.4.12-2 and Figure 3.4.12-3 for OPS not OPERABLE.	Within 15 minutes prior to starting any RCP

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RAI 42

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.9	-------------------NOTES------------------- 1. Not required to be met when all RCS cold leg temperatures are ≥ 319°F. 2. Not required to be met if SR 3.4.12.8 is met. --	
	Verify each of the following conditions are satisfied prior to starting any RCP: a. Secondary side water temperature of the hottest steam generator is ≤ 64°F above the coldest RCS cold leg temperature; and b. RCS makeup is less than or equal to RCS losses; and c. Overpressure Protection System (OPS) is OPERABLE; and d. Pressurizer level is ≤ 73%; and e. Coldest RCS cold leg temperature is within limits specified in Figure 3.4.12-4.	Within 15 minutes prior to starting any RCP

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RAI 42

FIGURE 3.4.12-1

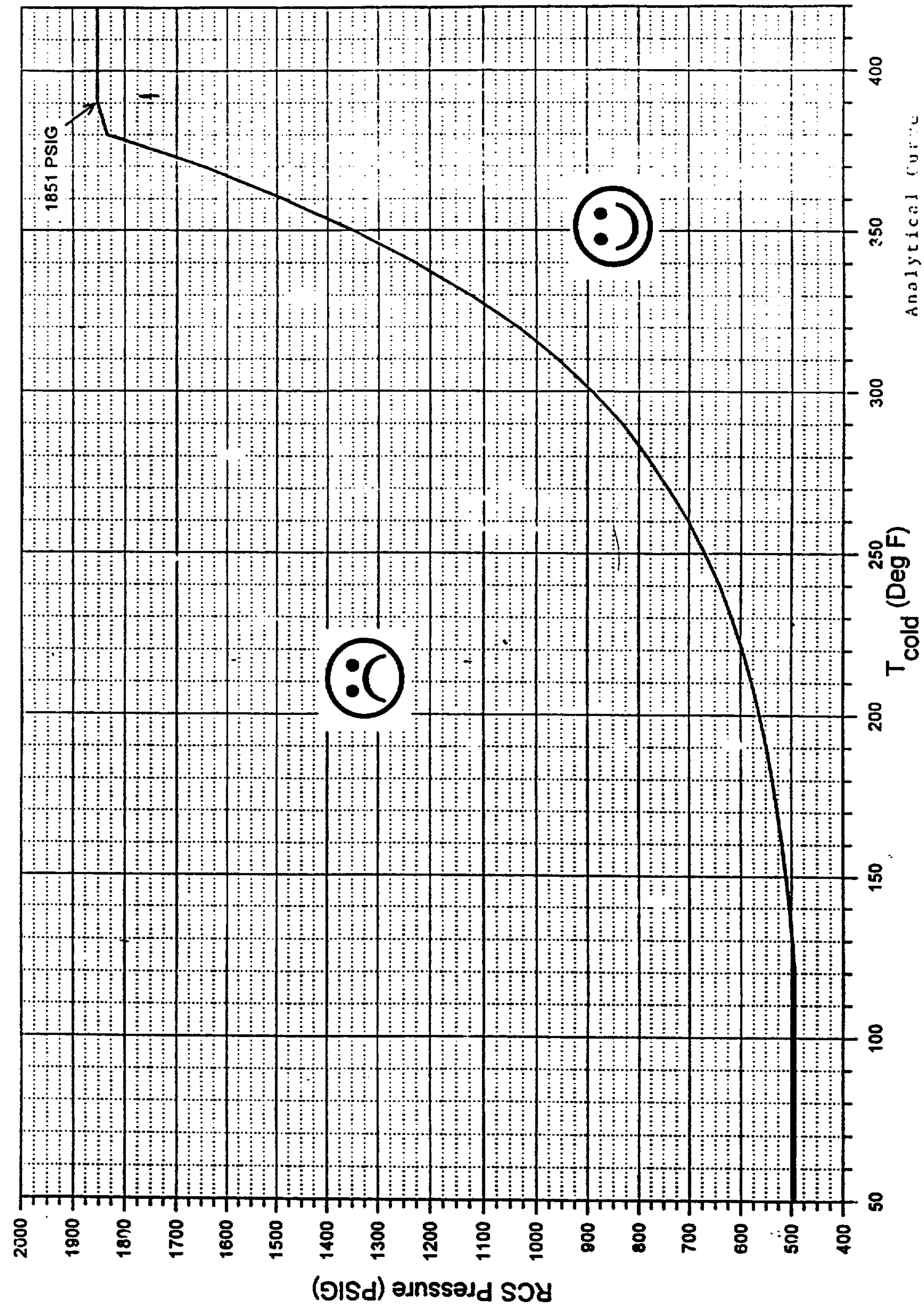

Figure 3.4.12-1: Maximum Allowable Nominal PORV Setpoint for LTOP (OPS), 13.3 EFPY

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FIGURE 3.4.12-2

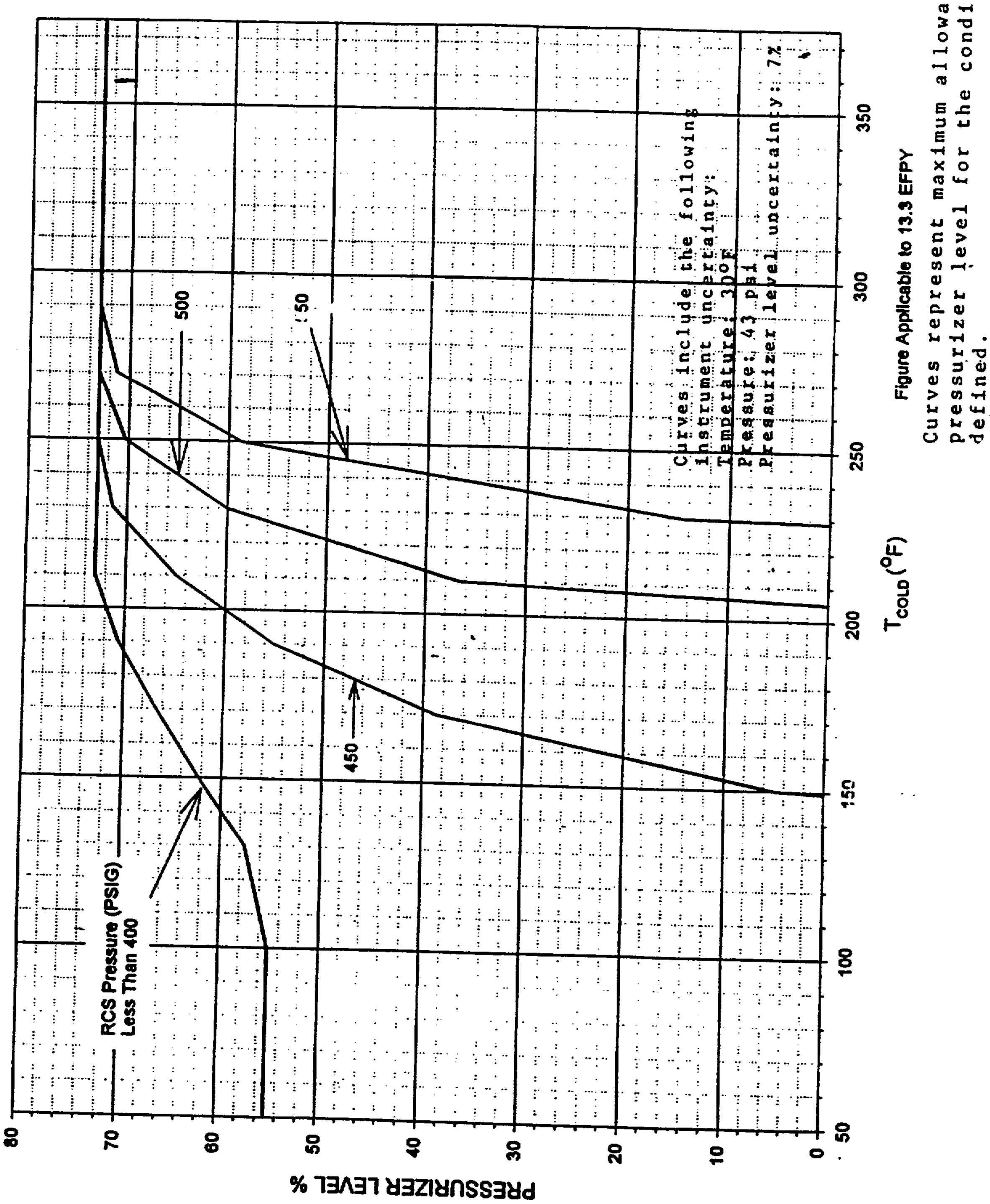

Figure 3.4.12-2: Pressurizer Limitations for OPS Inoperable, 13.3 EFPY
(Up to one charging pump capable of feeding the RCS)

RAI 42

FIGURE 3.4.12-3

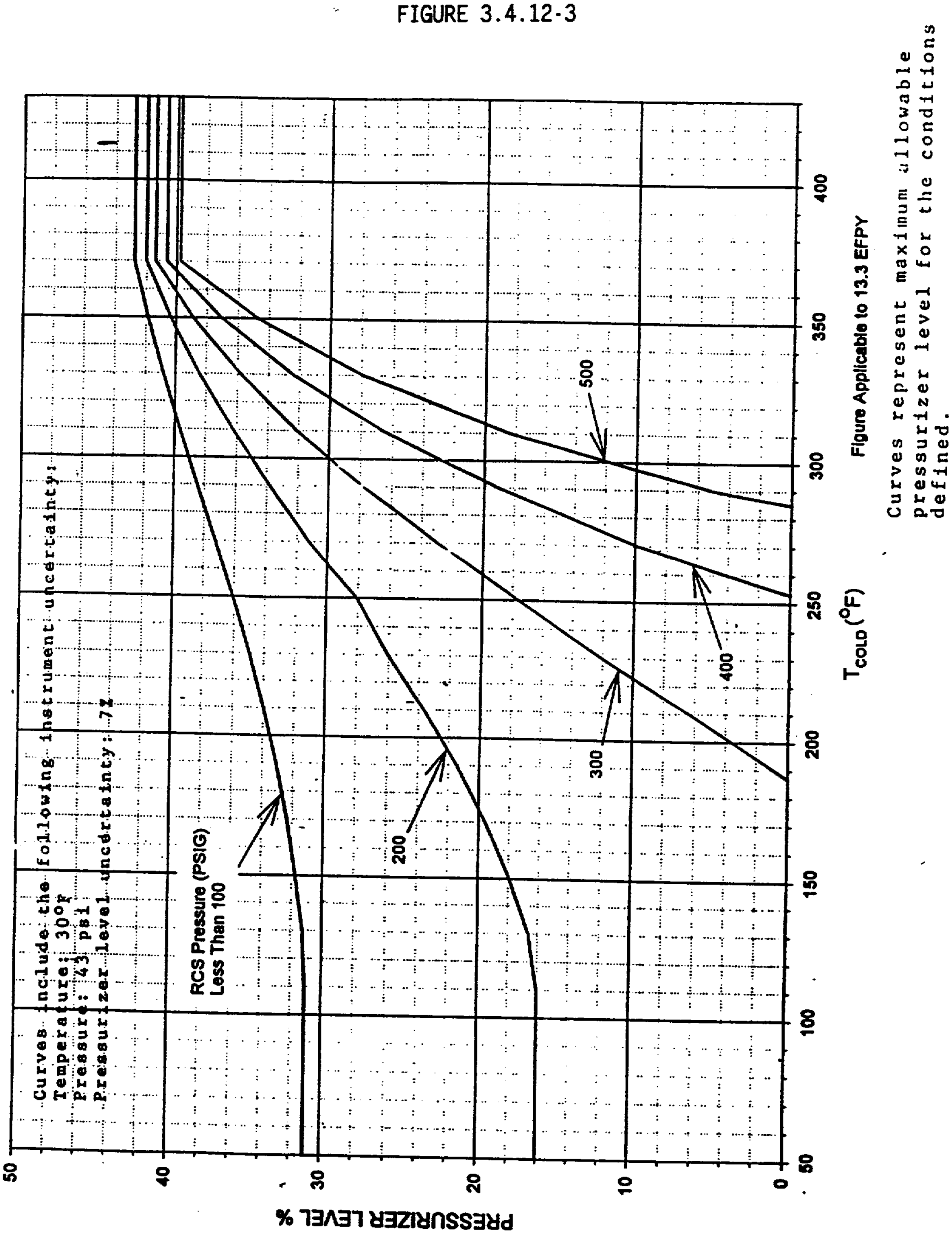

Figure 3.4.12-3: Pressurizer Limitations for OPS Inoperable, 13.3 EFPY
(Up to three charging pumps and/or one safety injection pump capable of feeding RCS)

RAI 42

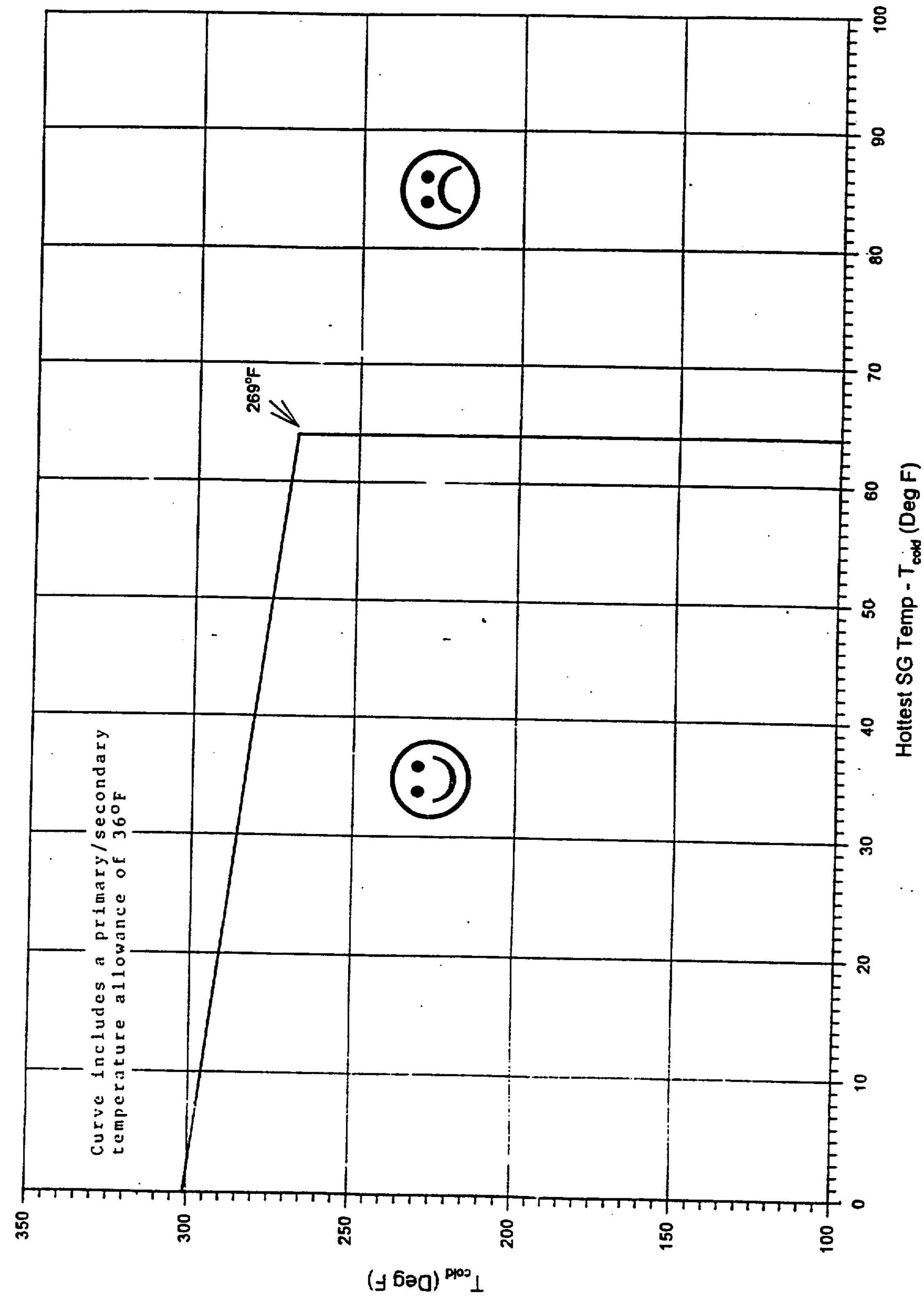

Figure 3.4.12-4: Secondary Side Limitations for RCP Start
With Secondary Side Hotter than Primary Side

RAI-42

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Low Temperature Overpressure Protection (LTOP)

BASES

BACKGROUND

LTOP is established to limit 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. LCO 3.4.12, Figure 3.4.12-1 provides the maximum allowable nominal actuation logic setpoints for the power operated relief valves (PORVs) and the maximum RCS pressure for the coldest existing RCS cold leg temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the LTOP MODES.

RAI 42

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 because 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 limits in Figure 3.4.12-1 .

RAI 42

When the RHR System is isolated from the RCS, the RHR System is protected from overpressure by two spring loaded relief valves (SI-733A and SI-733B). When the RHR System is not isolated from the RCS, the RHR System is protected from overpressure by spring loaded relief valve (i.e., AC-1836) which has sufficient capacity to accommodate all 3 charging pumps. However, this relief valve

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BASES

BACKGROUND (continued)

does not have sufficient capacity to ensure that the RHR system does not exceed design pressure limits during a mass addition resulting from an inadvertent injection of one or more high head safety injection (HHSI) pumps. Therefore, LTOP requirements are used to protect the RHR System whenever the RHR System is not isolated from the RCS.

This LCO provides RCS overpressure protection by limiting maximum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability is achieved by not permitting any High Head Safety Injection (HHSI) pumps to be capable of injection into the RCS and isolating the accumulators. The pressure relief capacity requires either two redundant power operated relief valves (PORVs) or a depressurized RCS and an RCS vent of sufficient size. One PORV or the open RCS vent is sufficient to provide overpressure protection to terminate an increasing pressure event. Alternately, if redundant PORVs are not Operable or an RCS vent cannot be established, LTOP protection may be established by limiting the pressurizer level to within limits specified in Figure 3.4.12-2 and Figure 3.4.12-3 consistent with the number of charging pumps and number of high head safety injection (HHSI) pumps capable of injecting into the RCS. This approach is acceptable because pressurizer level can be maintained such that it will either accommodate any anticipated pressure surge or allow operators time to react to any unanticipated pressure surge. When pressurizer level is used to satisfy LTOP requirements, operator action is assumed to terminate the unplanned HHSI pump injection within 10 minutes. RAI 42

With high pressure coolant input capability limited, the ability to create an overpressure condition by coolant addition is restricted. The LCO does not require the makeup control system deactivated or the safety injection (SI) actuation circuits blocked. Due to the lower pressures in the LTOP MODES and the expected core decay heat levels, the makeup system can provide adequate flow via the makeup control valve. There is no restriction on the status of charging pumps when LTOP is established using either a PORV or an RCS vent. If conditions require the use of more than one HHSI pump for makeup in the

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BASES

BACKGROUND (continued)

event of loss of inventory, then pumps can be made available through manual actions. Charging pumps and low pressure injection systems are available to provide makeup even when LTOP requirements are applicable.

When configured to provide low temperature overpressure protection, the PORVs are part of the Overpressure Protection System (OPS). LTOP for pressure relief can consist of either the OPS (two PORVs with reduced lift settings), or a depressurized RCS and an RCS vent of sufficient size. Two PORVs are required for redundancy. One PORV has adequate relieving capability to keep from overpressurization for the required coolant input capability.

PORV Requirements

The Overpressure Protection System (OPS) provides the low temperature overpressure protection by controlling the Power Operated Relief Valves (PORVs) and their associated block valves with pressure setpoints that vary with RCS cold leg temperature. Specifically, cold leg temperature signals from three RCS loops are supplied to three associated function generators that calculate the maximum RCS pressures allowed at those temperatures. The maximum RCS pressure limits at any RCS temperature correspond to the 10 CFR 50, Appendix G, limit curve maintained in the Pressure and Temperature Limits Report and are used as the OPS pressure setpoint. Having the setpoints of both valves within the limits in Figure 3.4.12-1 ensures that the Reference 1 limits will not be exceeded in any analyzed event. RAI 42

In addition to generating the OPS pressure setpoint, the same cold leg temperature signals are used to "arm" the OPS when RCS temperature falls below the temperature at which low temperature overpressure protection is required (319°F). Each PORV opens when a two-out-of-two (temperature and pressure) coincidence logic is satisfied. OPS is "armed" when RCS temperature falls below the temperature that satisfies one half of the two-out-of-two (temperature-pressure) coincidence logic. When OPS is enabled, the PORVs will open if RCS pressure exceeds the calculated pressure setpoint that varies with RCS temperature.

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BASES

BACKGROUND (continued)

The PORV block valves open when the RCS temperature falls below the OPS arming temperature. Note that the control switches for the PORV and PORV block valves must be in the AUTO position and the OPS states links closed for OPS signals to actuate the PORVs.

Three channels of RCS cold leg temperature are used in the two-out-of-three coincidence logic to satisfy the temperature portion of the two-out-of-two (temperature and pressure) coincidence logic for each PORV. Three channels of RCS pressure are used in a two-out-of-three coincidence logic to satisfy the pressure portion of the two-out-of-two (temperature-pressure) coincidence logic for each PORV. Use of a two-out-of-three coincidence logic for pressure and for temperature ensures that a single failure will not cause or prevent an OPS actuation. Use of two PORVs, each with adequate relieving capability to prevent overpressurization, ensures that a single failure will not prevent an OPS actuation.

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.

Multiple methods exist for establishing the required RCS vent capacity including removing or blocking open a PORV and disabling its block valve in the open position. An RCS vent of ≥ 2.00 square inches when no HHSI pump is capable of injecting into the

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BASES

BACKGROUND (continued)

RCS; or, an RCS vent with opening greater than or equal to one pressurizer code safety valve flange and up to two HHSI pumps capable of injecting into the RCS will satisfy LTOP requirements because either configuration ensures pressure limits are not exceed during a transient. Alternately, an RCS vent of ≥ 2.00 square inches coupled with a pressurizer level ≤ 0% and up to two HHSI pumps capable of injecting into the RCS will satisfy LTOP requirements because it ensures a minimum of 10 minutes for operator action before pressure limits are exceeded during a transient. 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, with RCS cold leg temperature exceeding 411°F, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At 319°F and below, overpressure prevention falls to two OPERABLE PORVs in conjunction with the Overpressure Protection System (OPS) or to a depressurized RCS and a sufficient sized RCS vent. Each of these means has a limited overpressure relief capability. Alternately, if redundant PORVs are not Operable, Low Temperature Overpressure protection may be maintained by limiting the pressurizer level to within limits specified in Figure 3.4.12-2 and Figure 3.4.12-3 consistent with the number of charging pumps and number of high head safety injection (HHSI) pumps capable of injecting into the RCS. This approach is acceptable because pressurizer level can be established to either accommodate any anticipated pressure surge or allow operators time to react to any unanticipated pressure surge. RAI 42

When the RCS temperature is greater than the LTOP arming temperature (i.e., ≥ 319°F) but below the minimum temperature at which the pressurizer safety valves lift prior to violation of the 10 CFR 50, Appendix G, limits (i.e., ≤ 411°F), administrative controls in the Technical Requirements Manual (TRM) (Ref. 4) are used to limit the potential for exceeding 10 CFR 50, Appendix G,

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BASES

APPLICABLE SAFETY ANALYSES (continued)

limits. These administrative controls may include operating with a bubble in the pressurizer and/or otherwise limiting plant time or activities when the RCS temperature is in the specified range. The use of administrative controls to govern operation above the LTOP arming temperature but below the minimum temperature at which the pressurizer safety valves lift prior to violation of the 10 CFR 50, Appendix G, limits is consistent with the guidance provided in Generic Letter 88-011, NRC Position on Radiation Embrittlement of Reactor Vessel Materials and its Impact on Plant Operations (Ref.2). GL 88-011 states that automatic, or passive, protection of the P-T limits will not be required but administratively controlled when in the upper end of the 10 CFR 50, Appendix G, temperature range.

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 Figure 3.4.12-1 curves are revised, LTOP must be re-evaluated to ensure its functional requirements can still be met using the OPS (PORVs) method or the depressurized and vented RCS condition. RAI 42

Figure 3.4.12-1 contains the acceptance limits that define the LTOP requirements. Any change to the RCS must be evaluated against the Ref. 3 analyses to determine the impact of the change on the LTOP acceptance limits. RAI 42

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

<u>Mass Input Type Transients</u>

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

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BASES

APPLICABLE SAFETY ANALYSES (continued)

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 are required during the LTOP MODES to ensure that mass and heat input transients do not occur. This is accomplished by the following:

a. Rendering all HHSI pumps incapable of injection;

b. Deactivating the accumulator discharge isolation valves in their closed positions or maintaining accumulator pressure less than the maximum RCS pressure for the coldest existing RCS cold leg temperature allowed by the P/T limit curves provided in Figure 3.4.12-1; and

RAI 42

c. Disallowing start of an RCP unless conditions are established that ensure a RCP pump start will not cause a pressure excursion that will exceed LTOP limits. Required conditions for starting a RCP when LTOP is required include a combination of primary and secondary water temperature differences and Overpressure Protection System (OPS) status or pressurizer level. Meeting the LTOP RCP starting surveillances ensures that theses conditions are satisfied prior to a RCP pump start.

The Ref. 3 analyses demonstrate that either one PORV or the depressurized RCS and RCS vent can maintain RCS pressure below limits when no HHSI pump is capable of injecting into the RCS. This assumes an RCS vent of ≥ 2.00 square inches. The same protection can be provided when up to two HHSI pumps are capable of injecting into the RCS assuming an RCS vent with opening

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BASES

APPLICABLE SAFETY ANALYSES (continued)

greater than or equal to one code pressurizer safety valve flange. Alternately, LTOP requirements can be satisfied by various combinations of pressurizer level, RCS pressure, and RCS injection capability (i.e., maximum number of HHSI pumps and/or charging pumps) shown in Figure 3.4.12-2 and 3.4.12-3. These combinations of pressurizer level, RCS pressure, and RCS injection capability satisfy LTOP requirements by ensuring a minimum of 10 minutes for operator action to terminate an unplanned event prior to exceeding maximum allowable RCS pressure. None of the analyses addressed the pressure transient need from accumulator injection, therefore, when RCS temperature is low, the LCO also requires the accumulator isolation when accumulator pressure is greater than or equal to the maximum RCS pressure for the coldest existing RCS cold leg temperature allowed in Figure 3.4.12-1. RAI 42 RAI 42

If the accumulators are isolated and not depressurized, then the accumulators must have their discharge valves closed and the valve power supply breakers fixed in their open positions.

Fracture mechanics analyses established the temperature of LTOP Applicability at 319°F.

The consequences of a loss of coolant accident (LOCA) in LTOP MODE 4 conform to 10 CFR 50.46 and 10 CFR 50, Appendix K (Refs. 5 and 6) requirements by having ECCS OPERABLE in accordance with requirements in LCO 3.5.3, ECCS-Shutdown.

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORVs are set to open at or below the limit shown in Figure 3.4.12-1. The setpoints are derived by analyses that model the performance of the LTOP System, assuming the limiting LTOP transient with HHSI not 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 RAI 42

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BASES

APPLICABLE SAFETY ANALYSES (continued)

limit ensures the Reference 1 P/T limits will be met. The OPS setpoint is based on a comparative analysis of Reference 3, with allowances for metal/fluid temperature differences, static head due to elevation differences, and dynamic head from the operation of the reactor coolant pumps and RHR pumps.

The PORV setpoints in Figure 3.4.12-1 will be updated when the revised 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. RAI 42

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 1.4 square inches is capable of mitigating the allowed LTOP overpressure transient assuming no HHSI pump and no accumulator injects into the RCS. The LCO limit for an RCS vent is conservatively established at 2.00 square inches. The capacity of a vent this size is greater than the flow of the limiting transient for the LTOP configuration, maintaining RCS pressure less than the maximum pressure on the P/T limit curve. An RCS vent with opening greater than or equal to one pressurizer code safety valve flange and up to two HHSI pumps capable of injecting into the RCS will satisfy LTOP requirements because it ensures pressure limits are not exceed during a transient. An RCS vent of ≥ 2.00 square inches coupled with a pressurizer level ≤ 0% and up to two HHSI pumps capable of injecting into the RCS will

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BASES

APPLICABLE SAFETY ANALYSES (continued)

satisfy LTOP requirements because it ensures a minimum of 10 minutes for operator action before pressure limits are exceeded during a transient.

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.

LTOP satisfies Criterion 2 of 10 CFR 50.36.

LCO

This LCO requires that LTOP is OPERABLE. LTOP 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, the LCO requires that no HHSI pumps be capable of injecting into the RCS and all accumulator discharge isolation valves closed and de-energized if accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in Figure 3.4.12-1, Maximum Allowable Nominal PORV Setpoint for LTOP (OPS), 13.3 EFPY. RAI 42

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

a. Two OPERABLE PORVs configured as part of an OPERABLE Overpressure Protection System (OPS); or

b. A depressurized RCS and an RCS vent.

A PORV is OPERABLE for LTOP when its block valve is open, its lift setpoint is set to the limit required by Figure 3.4.12-1 and testing proves its ability to open at this setpoint, and motive RAI 42

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BASES

LCO (continued)

power is available to the two valves and their control circuits. The OPS is OPERABLE for LTOP when there are three OPERABLE RCS pressure channels and three OPERABLE RCS temperature channels. The OPS is still OPERABLE when an inoperable RCS pressure or temperature channel is in the tripped condition. OPS is considered OPERABLE for meeting LCO 3.4.12 requirements even if one or two RCS cold leg temperatures is above the LTOP Applicability limit.

NYPA

An RCS vent is OPERABLE when open with an area of ≥ 2.00 square inches.

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

APPLICABILITY

This LCO is applicable whenever the RHR System is not isolated from the RCS to protect the RHR system piping. When all RCS cold leg temperatures are ≥ 319°F, RHR system piping is adequately protected by making the accumulators and all HHSI pumps incapable of injecting into the RCS. Therefore, a Note in the LCO specifies that requirements for the OPS System and/or an RCS vent are not Applicable when all RCS cold leg temperatures are ≥ 319°F. NYPA NYPA

This LCO is applicable to provide protection for the RCS pressure boundary in MODE 4 when any RCS cold leg temperature is < 319°F, in 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 319°F. When the reactor vessel head is off, overpressurization cannot occur. Although LTOP is not Applicable when the RCS temperature is greater than the LTOP arming temperature (i.e., ≥ 319°F) but below the minimum temperature at which the pressurizer safety valves lift prior to violation of the 10 CFR 50, Appendix G, limits (i.e., ≤ 411°F), administrative controls in the Technical Requirements Manual (TRM) (Ref. 4) are used to limit the potential for exceeding 10 CFR 50, Appendix G, limits. NYPA

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BASES

APPLICABILITY (continued)

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, and MODE 4 above 319°F when the RHR system is isolated from the RCS.

NYPA

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 three Notes, Note 1 states that accumulator isolation is only required when the accumulator pressure is more than 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.

Note 2 ensures that LCO 3.4.12 will not prohibit a HHSI pump being energized and aligned to the RCS as needed to support emergency boration or to respond to a loss of RHR cooling.

Note 3 specifies that one HHSI pump may be made capable of injecting into the RCS for a period not to exceed 8 hours to perform pump testing. During testing, administrative controls are used to ensure that HHSI testing will not result in exceeding RCS or RHR system pressure limits.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.3.1 and A.3.2

When one or more HHSI pumps are capable of injecting into the RCS, LTOP assumptions regarding limits on mass input capability may not be met. Therefore, immediate action is required to limit injection capability consistent with the LTOP analysis assumptions and the existing combination of pressurizer level and RCS venting capacity. Required Action A.1 requires restoration

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.3.1 and A.3.2 (continued)

with LCO requirements. Required Actions A.2 and A.3 require verification and periodic re-verification that alternate LTOP configurations are met. The Completion Times of immediately reflects the urgency that one of the acceptable LTOP configurations is established as soon as possible.

B.1, C.1 and C.2

To be considered isolated, an accumulator must have its discharge valves closed and the valve power supply breakers fixed in the open position.

An unisolated 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 C.1 and Required Action C.2 provide two options, either of which must be performed in the next 12 hours. By increasing the RCS temperature to ≥ 319°F, an accumulator pressure of 700 psig cannot exceed the LTOP limits if the accumulators are injected. Isolating the RHR system from the RCS ensures that the RHR system is not subjected to accumulator pressure. Depressurizing the accumulators below the LTOP limit from Figure 3.4.12-1 also gives this protection. Additionally, the RHR System must be isolated from the RCS to protect RHR piping from a potential mass addition event. RAI 42

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.

(continued)

BASES

ACTIONS (continued)

D.1

When any RCS cold leg temperature is < 319°F, 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. RAI 31

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.

E.1

When both required PORVs are inoperable or the Required Action and associated Completion Time of Condition C or D is not met, an alternate method of low temperature overpressure protection must be established within 8 hours. The acceptable alternate methods of LTOP include the following:

a. Depressurize the RCS and establish an RCS vent path; or

b. Increase all RCS cold leg temperatures to ≥ 319°F and isolate the RHR system from the RCS; or RAI 31

If the option selected is to depressurize the RCS and establish an RCS vent path, the vent must be sized ≥ 2.00 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.

(continued)

BASES

ACTIONS (continued)

F.1

If LTOP requirements are not met for reasons other than Conditions A, B, C, D or E, LTOP requirements must be re-established by depressurizing the RCS and establishing an RCS vent of ≥ 2.00 square inches within 8 hours.

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

To minimize the potential for a low temperature overpressure event by limiting the mass input capability, all HHSI pumps are verified incapable of injecting into the RCS. Additionally, the accumulator discharge isolation valves are verified closed and locked out or the accumulator pressure less than the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in Figure 3.4.12-1. RAI 42

The HHSI pumps are rendered incapable of injecting into the RCS through removing the power from the pumps by racking the breakers out under administrative control. Other methods may be employed using at least two independent means to prevent a pump start such that a single failure or single action will not result in an injection into the RCS. This may be accomplished through the pump control switch being placed in Trip Pullout 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 3.4.12.3

The RCS vent of ≥ 2.00 square inches is proven OPERABLE by verifying its open condition either:

a. Once every 12 hours for a valve that is not locked.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.3 (continued)

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

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

SR 3.4.12.4

Performance of the CHANNEL CHECK of the Overpressure Protection System (OPS) RCS pressure and temperature channels every 24 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.4 (continued)

operational use of the displays associated with the LCO required channels. This SR is required only when LCO 3.4.12.a is used to establish LTOP protection.

SR 3.4.12.5

The PORV block valve opens automatically when RCS cold leg temperature is below the OPS arming temperature; however, the valves must be verified open every 72 hours to provide the flow path for each required PORV to perform its function when actuated. The valve may be remotely verified open in the control room. This Surveillance is performed only if the PORV is being used to satisfy LCO 3.4.12.a.

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. If closed, the block valve must be de-energized to prevent the valve from re-opening automatically.

The 72 hour Frequency is considered adequate because the PORV block valves are opened automatically by the OPS when below the OPS arming temperature if the valve control is positioned to auto and 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 3.4.12.6

Performance of a COT is required within 12 hours after decreasing all RCS temperatures to < 319°F and every 31 days on each required PORV to verify and, as necessary, adjust its lift

NYPA

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.6 (continued)

setpoint. The COT will verify the setpoint is within the allowed maximum limits in Figure 3.4.12-1. PORV actuation could depressurize the RCS and is not required. RAI 42

The 31 day Frequency considers the demonstrated reliability of the Overpressure Protection System and the PORVs.

A Note has been added indicating that this SR is required to be met 12 hours after decreasing RCS cold leg temperature to < 319 °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 3.4.12.7

Performance of a CHANNEL CALIBRATION on each required PORV actuation channel is required every 18 months. Performance of a CHANNEL CALIBRATION of RCS pressure and temperature instruments that support the Overpressure Protection System is required every 24 months. These calibrations verify both the OPS and PORV function and ensure the OPERABILITY of the whole channel so that it responds and the valve opens within the required range and accuracy to known input.

SR 3.4.12.8 and SR 3.4.12.9

The RCP starting prerequisites must be satisfied prior to starting or jogging any reactor coolant pump (RCP) when low temperature overpressure protection is required. The RCP starting prerequisites prevent an overpressure event due to thermal transients when an RCP is started. Plant conditions prior to the RCP start determines whether SR 3.4.12.8 or SR 3.4.12.9 must be satisfied prior to starting any RCP.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.8 and SR 3.4.12.9 (continued)

The principal contributor to an RCP start induced thermal and pressure transient is the difference between RCS cold leg temperatures and secondary side water temperature of any SG prior to the start of an RCP. The RCP starting prerequisites vary depending on plant conditions but include the following: reactor coolant temperature relative to the LTOP enable temperature; secondary side water temperature of the hottest SG relative to the temperature of the coldest RCS cold leg temperature; and, status of the Overpressure Protection System (OPS). When the OPS is inoperable, additional compensatory requirements are required including limits for the pressurizer level and RCS pressure and temperature. When a pressurizer level is specified as a requirement, the level specified is sufficient to prevent the RCS from going water solid for 10 minutes which is sufficient time for operator action to terminate the pressure transient.

SR 3.4.12.8 is used if secondary side water temperature of the hottest steam generator (SG) is less than or equal to the coldest RCS cold leg temperature. SR 3.4.12.9 is more restrictive and is used if the secondary side water temperature of the hottest steam generator is ≤ 64°F above the coldest RCS cold leg temperature.

RCP starting is prohibited if the hottest steam generator is > 64°F above RCS cold leg temperature or if neither of the RCP starting prerequisites SRs can be satisfied. The steam generator temperature may be measured using the Control Room instrumentation or, as a backup, from a contact reading off the steam generator's shells. Pressurizer level may be determined using control room instrumentation or alternate methods.

The FREQUENCY of the RCP starting prerequisites SRs is Within 15 minutes prior to starting any RCP. This means that each of the required verifications must be performed within 15 minutes prior to the pump start and must be met at the time of the pump start.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.8 and SR 3.4.12.9 (continued)

SR 3.4.12.8 and SR 3.4.12.9 are each modified by two Notes. Note 1 specifies that these SRs are required as a condition for pump starting only when the RCS is below the LTOP arming temperature. Note 2 specifies that meeting either SR 3.4.12.8 or SR 3.4.12.9 ensures that pump starting prerequisites are met.

REFERENCES

1. 10 CFR 50, Appendix G.
2. Generic Letter 88-011, NRC Position on Radiation Embrittlement of Reactor Vessel Materials and its Impact on Plant Operations.
3. IP3 Low Temperature Overpressurization System Analysis Final Report, August 24, 1984, in conjunction with ASME Code Case N-514, Low Temperature Overpressure Protection, February 12, 1992.
4. IP3 Technical Requirements Manual.
5. 10 CFR 50, Section 50.46.
6. 10 CFR 50, Appendix K.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.12:
"Low Temperature Overpressure Protection (LTOP)"

PART 5:

NUREG-1431
Annotated to show differences between NUREG-1431 and ITS

3.4 REACTOR COOLANT SYSTEM (RCS)

⟨3.1.A.8⟩ ⟨3.3.A.8⟩

3.4.12 Low Temperature Overpressure Protection (LTOP) System

⟨3.1.A.8⟩ ⟨3.3.A.8⟩ ⟨DOC M.1⟩ ⟨DOC A.11⟩

LCO 3.4.12 An LTOP System shall be OPERABLE with a maximum of [one] [high pressure injection (HPI)] pump [and one charging pump] capable of injecting into the RCS and the accumulators isolated and either a or b below: of the following: (CLB.1)

Insert: 3.4-27-01

Insert: 3.4-27-02

Insert: 3.4-27-03

a. Two RCS relief valves, as follows:

1. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or

[2. Two residual heat removal (RHR) suction relief valves with setpoints ≥ [436.5] psig and ≤ [463.5] psig, or]

[3. One PORV with a lift setting within the limits specified in the PTLR and one RHR suction relief valve with a setpoint ≥ [436.5] psig and ≤ [463.5] psig].

b. The RCS depressurized and an RCS vent of ≥ [2.07] square inches.

(CLB.1)

Insert: 3.4-27-04

⟨3.1.A.8⟩ ⟨3.3.A.8⟩ ⟨DOC A.4⟩ ⟨DOC M.1⟩

APPLICABILITY: MODE 4 when all (any) RCS cold leg temperature is ≤ (<) [275] (319) °F,
MODE 5,
MODE 6 when the reactor vessel head is on.

R.1 DB.1

(1.) -----------------------------NOTE (S)-----------------------------
Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing (coldest) RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR (in Figure 3.4.12-1).

Insert: 3.4-27-05

R.1

NUREG-1431 Markup Inserts

ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT: 3.4-27-01

<3.3.A.8> no high head safety injection (HHSI) pumps

INSERT: 3.4-27-02

<DOC M.1> discharge isolation valves closed and de-energized

INSERT: 3.4-27-03

<3.3.A.8> <DOC M.4>

-----------------------------Note-----------------------------

LCO 3.4.12.a and LCO 3.4.12.b are not Applicable when ~~average~~ all RCS cold leg temperature ~~is~~ are ≥ 319°F. R.1

<3.1.A.8.a.1> ~~<DOC LA.1>~~ <DOC A.6>

a. The Overpressure Protection System (OPS) OPERABLE with two power operated relief valves (PORVs) with lift settings within the limits ~~specified in the PTLR~~ specified in Figure 3.4.12-1 R.1

OR

<3.1.A.8.a.2>

b. The RCS depressurized with an RCS vent of ≥ 2.00 square inches.

INSERT: 3.4-27-04

<3.3.A.8> Whenever the RHR System is not isolated from the RCS.

INSERT: 3.4-27-05

<3.3.A.9.a> <3.3.A.9.c>

2. One HHSI pump may be made capable of injecting into the RCS as needed to support emergency boration or to respond to a loss of RHR cooling.

<3.3.A.9.b>

3. One HHSI pump may be made capable of injecting into the RCS for a period not to exceed 8 hours to perform pump testing.

Insert: 3.4-28-01

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Two or more [HPI] pumps capable of injecting into the RCS.	A.1	Initiate action to verify a maximum of [one] [HPI] pump is capable of injecting into the RCS.	Immediately
B. Two or more charging pumps capable of injecting into the RCS.	B.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.	Immediately
C. B An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for the coldest existing cold leg temperature allowed in the PTLR. specified in Figure 3.4.12-1 Insert: 3.4-28-02	C.1 B	Isolate affected accumulator. Insert: 3.4-28-03	1 hour

(DOC M.1)

(continued)

R.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<DOC M.1> D. C B Required Action and associated Completion Time of Condition C not met. Insert: 3.4-29-01	D.1 C .1 Increase all RCS cold leg temperature to ≥ 2 275 319 °F.	12 hours R.1
	OR	
<DOC M.1>	D.2 C Depressurize affected accumulator to less than the maximum RCS pressure for the lowest existing cold leg temperature allowed in the PTLR specified in Fig 3.4.12-1.	12 hours
<3.1.A.8.b> E. D One required RCS relief valve PORV inoperable in MODE 4.	E.1 Restore required RCS relief valve PORV to OPERABLE status.	7 days
F. One required RCS relief valve inoperable in MODE 5 or 6.	F.1 Restore required RCS relief valve to OPERABLE status.	24 hours CLB.1

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT: 3.4-30-01

	<u>OR</u>			
<3.1.A.8.c.2> <DOC LA.4>	E.2	Increase [all] RCS cold leg temperature to ≥ 319°F.	8 hours	R.1
	<u>OR</u>			
<3.1.A.8.c.3> <DOC M.5>	E.3	Verify pressurizer level, RCS pressure, and RCS injection capability are within limits specified in PTLR for OPS not OPERABLE.	8 hours <u>AND</u> Once per 12 hours thereafter	

INSERT: 3.4-30-02

<3.1.A.8.c>	F.1	Depressurize RCS and establish RCS vent of ≥ 2.00 square inches.	8 hours

INSERT: 3.4-30-03

discharge isolation valve is closed and de-energized;

INSERT: 3.4-30-04

	<u>OR</u>		
<DOC M.1>	Verify each accumulator pressure is less than the maximum RCS pressure for the existing [coldest] RCS cold leg temperature allowed by the P/T limit curves ~~provided in the PTLR~~ [in Figure 3.4.12-1].	12 hours	R.1

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.4.12.4	Verify RHR suction valve is open for each required RHR suction relief valve.	12 hours
SR 3.4.12.5 3	------NOTE------ Only required to be performed met when complying with LCO 3.4.12.b. ------ Verify RCS vent ≥ 2.07 2.00 square inches open established.	12 hours for unlocked open vent valve(s) **AND** 31 days for locked open vent valve(s)
SR 3.4.12.6 5	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.7	Verify associated RHR suction isolation valve is locked open with operator power removed for each required RHR suction relief valve.	31 days
SR 3.4.12.8 6	------NOTE------ Not required any to be met until 12 hours after decreasing RCS cold leg temperature to ≤ < 275 319 °F. ------ Perform a COT on each required PORV, excluding actuation.	31 days 24 months

⟨DOC M.6⟩ PA.1
Insert: 3.4-31-01
⟨DOC M.7⟩ ⟨DOC A.6⟩
⟨DOC L.1⟩ R.1 CLB.1
⟨Table 4.1-1, Item 38⟩

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT 3.4-32-02:

	SR 3.4.12.8	-------------------NOTES------------------- 1. Not required to be met when ~~average~~ all RCS cold leg temperature[s] ~~is~~ are ≥ 319°F. 2. Not required to be met if SR 3.4.12.9 is met. --	R.1
<3.1.A.1.h>		1. Not required to be met when ~~average~~ all RCS cold leg temperature[s] ~~is~~ are ≥ 319°F.	
<3.1.A.1.h>		2. Not required to be met if SR 3.4.12.9 is met.	
<3.1.A.1.h> <DOC M.4>		Verify each of the following conditions are satisfied prior to starting any RCP:	Within 15 minutes prior to starting any RCP
<3.1.A.1.h.1> <3.1.A.1.h.3>		a. Secondary side water temperature of the hottest steam generator (SG) is less than or equal to the coldest RCS cold leg temperature; and	
<3.1.A.1.h>		b. RCS makeup is less than or equal to RCS losses; and	
<3.1.A.1.h.1> <3.1.A.1.h.3>		c. Steam generator pressure is not decreasing; and	
<3.1.A.1.h.1>		d.1 Overpressure Protection System (OPS) is OPERABLE; OR	
<3.1.A.1.h.3>		d.2.1 RCS pressure less than nominal OPS setpoint specified in the PTLR; and	
<3.1.A.1.h.3> <DOC M.3>		d.2.2 Pressurizer level, RCS pressure, and RCS injection capability are within limits specified in PTLR for OPS not OPERABLE.	

NUREG-1431 Markup Inserts

ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

<u>INSERT 3.4-32-03:</u>

SR 3.4.12.9 <3.1.A.1.h> <3.1.A.1.h>	----------NOTES---------- [all] 1. Not required to be met when ~~average~~ RCS cold leg temperature, T is ≥ 319°F. [is] [are] 2. Not required to be met if SR 3.4.12.8 is met. ----------------------------------	
<3.1.A.1.h> <DOC M.4>	Verify each of the following conditions are satisfied prior to starting any RCP:	Within 15 minutes prior to starting any RCP
<3.1.A.1.h.2>	a. Secondary side water temperature of the hottest steam generator is ≤ 64°F above the coldest RCS cold leg temperature; and	
<3.1.A.1.h>	b. RCS makeup is less than or equal to RCS losses; and	
<3.1.A.1.h.2>	c. Overpressure Protection System (OPS) is OPERABLE; and	
<3.1.A.1.h.2>	d. Pressurizer level is ≤ 73%; and	
<3.1.A.1.h.2>	e. Coldest RCS cold leg temperature is within limits specified in PTLR for RCP start with OPS OPERABLE and SG temperature greater than RCS cold leg temperature.	

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 PTLR provides the maximum allowable actuation logic setpoints for the power operated relief valves (PORVs) and the maximum RCS pressure for the existing RCS cold leg temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the LTOP MODES.

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 PTLR limits.

This LCO provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability requires all but [one] [high pressure injection (HPI)] pump [and one charging pump]] incapable of injection into the RCS and isolating the accumulators. 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.

(continued)

NUREG-1431 Markup Inserts

ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT: B 3.4-58-01

When the RHR System is isolated from the RCS, the RHR System is protected from overpressure by two spring loaded relief valves (SI-733A and SI-733B). When the RHR System is not isolated from the RCS, the RHR System is protected from overpressure by spring loaded relief valve (i.e., AC-1836) which has sufficient capacity to accommodate all 3 charging pumps. However, this relief valve does not have sufficient capacity to ensure that the RHR system does not exceed design pressure limits during a mass addition resulting from an inadvertent injection of one or more high head safety injection (HHSI) pumps. Therefore, LTOP requirements are used to protect the RHR System whenever the RHR System is not isolated from the RCS.

INSERT: B 3.4-58-02

is achieved by not permitting any High Head Safety Injection (HHSI) pumps to be

INSERT: B 3.4-58-03

Figure 3.4.12-2 and Figure 3.4.12-3 | R.1

Alternately, if redundant PORVs are not Operable or an RCS vent cannot be established, LTOP protection may be established by limiting the pressurizer level to within limits specified in the PTLR consistent with the number of charging pumps and number of high head safety injection (HHSI) pumps capable of injecting into the RCS. This approach is acceptable because pressurizer level can be maintained such that it will either accommodate any anticipated pressure surge or allow operators time to react to any unanticipated pressure surge. When pressurizer level is used to satisfy LTOP requirements, operator action is assumed to terminate the unplanned HHSI pump injection within 10 minutes.

INSERT: B 3.4-59-04

The Overpressure Protection System (OPS) provides the low temperature overpressure protection by controlling the Power Operated Relief Valves (PORVs) and their associated block valves with pressure setpoints that vary with RCS cold leg temperature. Specifically, cold leg temperature signals from three RCS loops are supplied to three associated function generators that calculate the maximum RCS pressures allowed at those temperatures. The maximum RCS pressure limits at any RCS temperature correspond to the 10 CFR 50, Appendix G, limit curve maintained in the Pressure and Temperature Limits Report and are used as the OPS pressure setpoint. Having the setpoints of both valves within the limits in the PTLR Fig 3.4.12-1 ensures that the Reference 1 limits will not be exceeded in any analyzed event. R.1

In addition to generating the OPS pressure setpoint, the same cold leg temperature signals are used to "arm" the OPS when RCS temperature falls below the temperature at which low temperature overpressure protection is required (319°F). Each PORV opens when a two-out-of-two (temperature and pressure) coincidence logic is satisfied. OPS is "armed" when RCS temperature falls below the temperature that satisfies one half of the two-out-of-two (temperature-pressure) coincidence logic. When OPS is enabled, the PORVs will open if RCS pressure exceeds the calculated pressure setpoint that varies with RCS temperature. The PORV block valves open when the RCS temperature falls below the OPS arming temperature. Note that the control switches for the PORV and PORV block valves must be in the AUTO position and the OPS states links closed for OPS signals to actuate the PORVs.

Three channels of RCS cold leg temperature are used in the two-out-of-three coincidence logic to satisfy the temperature portion of the two-out-of-two (temperature and pressure) coincidence logic for each PORV. Three channels of RCS pressure are used in a two-out-of-three coincidence logic to satisfy the pressure portion of the two-out-of-two (temperature-pressure) coincidence logic for each PORV. Use of a two-out-of-three coincidence logic for pressure and for temperature ensures that a single failure will not cause or prevent an OPS actuation. Use of two PORVs, each with adequate relieving capability to prevent overpressurization, ensures that a single failure will not prevent an OPS actuation.

BASES

BACKGROUND

RCS Vent Requirements (continued)

position, or similarly establishing a vent by opening an RCS vent valve. 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. 4) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits. In MODES 1, 2, and 3, and in MODE 4 with RCS cold leg temperature exceeding [275]°F, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At about [275]°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.

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 PTLR 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.

The PTLR contains the acceptance limits that define the LTOP requirements. Any change to the RCS must be evaluated against the Reference 4 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.

(continued)

INSERT: B 3.4-61-01

An RCS vent of ≥ 2.00 square inches when no HHSI pump is capable of injecting into the RCS; or, an RCS vent with opening greater than or equal to one pressurizer code safety valve flange and up to two HHSI pumps capable of injecting into the RCS will satisfy LTOP requirements because either configuration ensures pressure limits are not exceed during a transient. Alternately, an RCS vent of ≥ 2.00 square inches coupled with a pressurizer level ≤ 0% and up to two HHSI pumps capable of injecting into the RCS will satisfy LTOP requirements because it ensures a minimum of 10 minutes for operator action before pressure limits are exceeded during a transient.

INSERT: B 3.4-61-02

PORVs in conjunction with the Overpressure Protection System (OPS)

INSERT: B 3.4-61-03

Alternately, if redundant PORVs are not Operable, Low Temperature Overpressure protection may be maintained by limiting the pressurizer level to within limits specified in the PTLR consistent with the number of charging pumps and number of high head safety injection (HHSI) pumps capable of injecting into the RCS. This approach is acceptable because pressurizer level can be established to either accommodate any anticipated pressure surge or allow operators time to react to any unanticipated pressure surge.

Figure 3.4.12-2 and Figure 3.4.12-3

BASES

APPLICABLE SAFETY ANALYSES (continued)

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 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] [HPI] pump [and one charging pump] incapable of injection; (HHSI pumps)

b. Deactivating the accumulator discharge isolation valves in their closed positions; and (Insert: B3.4-62-01)

c. Disallowing start of an RCP 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. (Insert: B3.4-62-02)

The Reference ④ (3) analyses demonstrate that either one RCS relief valve (PORVs) or the depressurized RCS and RCS vent can maintain RCS pressure below limits when only one [HPI] pump [and one charging pump are] is [are] actuated. Thus, the LCO allows only [one] [HPI] pump [and one charging pump] OPERABLE during the LTOP MODES. (Insert: B3.4-62-03) Since neither one RCS relief valve nor the RCS vent can handle (therefore,) the pressure transient need from accumulator injection, when RCS temperature is low, the LCO also requires the accumulators isolation when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS (coldest) cold leg temperature allowed in the PTLR (Figure 3.4.12-1). (Insert: B3.4-62-04)

The isolated (If the accumulators are isolated and not depressurized, then) accumulators must have their discharge valves closed and the valve power supply breakers fixed in their open positions. The analyses show the effect of accumulator discharge is over a narrower RCS temperature range ([175]°F and below) than that of the LCO ([275]°F and below).

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT: B 3.4-62-01 coldest | R.1

or maintaining accumulator pressure less than the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR; Figure 3.4.12-1 | R.1

INSERT: B 3.4-62-02

unless conditions are established that ensure a RCP pump start will not cause a pressure excursion that will exceed LTOP limits. Required conditions for starting a RCP when LTOP is required include a combination of primary and secondary water temperature differences and Overpressure Protection System (OPS) status or pressurizer level. Meeting the LTOP RCP starting surveillances ensures that theses conditions are satisfied prior to an RCP pump start.

INSERT: B 3.4-62-03

when no HHSI pump is capable of injecting into the RCS. This assumes an RCS vent of ≥ 2.00 square inches. The same protection can be provided when up to two HHSI pumps are capable of injecting into the RCS assuming an RCS vent with opening greater than or equal to one code pressurizer safety valve flange. Alternately, LTOP requirements can be satisfied by various combinations of pressurizer level, RCS pressure, and RCS injection capability (i.e., maximum number of HHSI pumps and/or charging pumps) shown in the PTLR. These combinations of pressurizer level, RCS pressure, and RCS injection capability satisfy LTOP requirements by ensuring a minimum of 10 minutes for operator action to terminate an unplanned event prior to exceeding maximum allowable RCS pressure.

INSERT: B 3.4-62-04

None of the analyses addressed

BASES

APPLICABLE SAFETY ANALYSES

Heat Input Type Transients (continued)

Fracture mechanics analyses established the temperature of LTOP Applicability at [275]°F. 319

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. 5 and 6) 5 and 6, requirements by having a maximum of [one] [HPI] pump [and one charging pump] OPERABLE and SI actuation enabled. Insert: B 3.4-63-01

PORV Performance

The fracture mechanics analyses show that the vessel is protected when the PORVs are set to open at or below the limit shown in ~~the PTLR~~ Figure 3.4.12-1. The setpoints are derived by analyses that model the performance of the LTOP System, assuming the limiting LTOP transient ~~of [one] [HPI] pump [and one charging pump]~~ with HHSI not 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. Insert: B 3.4-63-02 | R.1

The PORV setpoints in the ~~PTLR~~ Figure 3.4.12-1 will be updated when the revised 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.

(continued)

INSERT: B 3.4-65-01

configured as part of an OPERABLE Overpressure Protection System (OPS)

INSERT: B 3.4-65-02

The OPS is OPERABLE for LTOP when there are three OPERABLE RCS pressure channels and three OPERABLE RCS temperature channels. The OPS is still OPERABLE when an inoperable RCS pressure or temperature channel is in the tripped condition. OPS is considered OPERABLE for meeting LCO 3.4.12 requirements even if one or two RCS cold leg temperatures is above the LTOP Applicability limit.

BASES

APPLICABLE SAFETY ANALYSES

RCS Vent Performance (continued)

The LTOP System satisfies Criterion 2 of the NRC Policy Statement. 10 CFR 50.36

LCO

This LCO requires that the LTOP System is 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, the LCO requires that no HHSI pumps be one [HPI] pump [and one charging pump] capable of injecting into the RCS and all accumulator discharge isolation valves closed and immobilized de-energized if When accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the PTLR Figure 3.4.12-1. R.1

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

a. Two RCS relief valves, as follows:

1. Two OPERABLE PORVs; or

Insert: B3.4-65-01

A PORV is OPERABLE for LTOP when its block valve is open, its lift setpoint is set to the limit required by the PTLR and testing proves its ability to open at this setpoint, and motive power is available to the two valves and their control circuits.

Insert: B3.4-65-02

[2. Two OPERABLE RHR suction relief valves; or]

[An RHR suction relief valve is OPERABLE for LTOP when its RHR suction isolation valve and its RHR suction valve are open, its setpoint is at or between [436.5] psig and [463.5] psig, and testing has proven its ability to open at this setpoint.]

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.4.12 - Low Temperature Overpressure Protection (LTOP)

INSERT: B 3.4-66-01

This LCO is applicable whenever the RHR System is not isolated from the RCS to protect the RHR system piping. When all RCS cold leg temperatures are ≥ 319°F, RHR system piping is adequately protected by making the accumulators and all HHSI pumps incapable of injecting into the RCS. Therefore, a Note in the LCO specifies that requirements for the OPS System and/or an RCS vent are not Applicable when all RCS cold leg temperatures are ≥ 319°F.

INSERT: B 3.4-66-02

to provide protection for the RCS pressure boundary

INSERT: B 3.4-66-03

Although LTOP is not Applicable when the RCS temperature is greater than the LTOP arming temperature (i.e., ≥ 319°F) but below the minimum temperature at which the pressurizer safety valves lift prior to violation of the 10 CFR 50, Appendix G, limits (i.e., ≤ 411°F), administrative controls in the Technical Requirements Manual (TRM) (Ref. 4) are used to limit the potential for exceeding 10 CFR 50, Appendix G, limits.

INSERT: B 3.4-66-04

Note 2 ensures that LCO 3.4.12 will not prohibit a HHSI pump being energized and aligned to the RCS as needed to support emergency boration or to respond to a loss of RHR cooling.

Note 3 specifies that one HHSI pump may be made capable of injecting into the RCS for a period not to exceed 8 hours to perform pump testing. During testing, administrative controls are used to ensure that HHSI testing will not result in exceeding RCS or RHR system pressure limits.

BASES (continued)

ACTIONS

A.1 [and B.1]

Insert: B 3.4-67-01

With two or more HPI pumps 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 B.1 is modified by a Note that permits two charging pumps capable of RCS injection for ≤ 15 minutes to allow for pump swaps.

B C C
C.1, D.1, and D.2

Insert B 3.4-67-02

An unisolated 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 D.1 and Required Action D.2 provide two options, either of which must be performed in the next 12 hours. By increasing the RCS temperature to > [275] °F (≥ 319), an accumulator pressure of [600] (700) psig cannot exceed the LTOP limits if the accumulators are fully injected. Depressurizing the accumulators below the LTOP limit from the PTLR also gives this protection.

(C)

Insert B 3.4-67-03

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.

D E.1

In MODE 4 When any RCS cold leg temperature is ≤ [275] (< 319) °F, with one required RCS relief valve (PORV) inoperable, the RCS relief valve (PORV) must be restored to OPERABLE status within a Completion Time of 7 days. Two RCS relief valves [in any combination of the PORVS and the RHR suction relief valves] (PORVs) are required to provide low temperature overpressure mitigation while withstanding a single failure of an active component. R.1

(continued)

INSERT: B 3.4-68-01

When both required PORVs are inoperable or the Required Action and associated Completion Time of Condition C or D is not met, an alternate method of low temperature overpressure protection must be established within 8 hours. The acceptable alternate methods of LTOP include the following:

a. Depressurize the RCS and establish an RCS vent path; or

b. Increase all ~~average~~ RCS cold leg temperatures to ≥ 319°F; or R.1

c. Establish a combination of pressurizer level, RCS pressure, and RCS injection capability within limits specified in PTLR for OPS not OPERABLE. This combination will ensure at least 10 minutes for operator intervention to prevent overpressurization following a transient.

INSERT: B 3.4-68-02

If the option selected is to depressurize the RCS and establish an RCS vent path,

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.6 (continued)

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 3.4.12.7

Each required RHR suction relief valve shall be demonstrated OPERABLE by verifying its RHR suction valve and RHR suction isolation valve are open and by testing it in accordance with the Inservice Testing Program. (Refer to SR 3.4.12.4 for the RHR suction valve Surveillance and for a description of the requirements of the Inservice Testing Program.) This Surveillance is only performed if the RHR suction relief valve is being used to satisfy this LCO.

Every 31 days the RHR suction isolation valve is verified locked open, with power to the valve operator removed, to ensure that accidental closure will not occur. The "locked open" valve must be locally verified in its open position with the manual actuator locked in its inactive position. The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve position.

SR 3.4.12.8

Performance of a COT is required within 12 hours after decreasing RCS temperature to ≤ [275]°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 PTLR allowed maximum limits in the PTLR. PORV actuation could depressurize the RCS and is not required.

The 12 hour Frequency considers the unlikelihood of a low temperature overpressure event during this time.

A Note has been added indicating that this SR is required to be met 12 hours after decreasing RCS cold leg temperature to ≤ [275]°F. The COT cannot be performed until in the LTOP MODES when the PORV lift setpoint can be reduced to the LTOP

(continued)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.13:
"RCS OPERATIONAL LEAKAGE"

PART 2:

CURRENT TECHNICAL SPECIFICATION PAGES

Annotated to show differences between CTS and ITS

CTS PAGE	AMENDMENT FOR REV O SUBMITTAL	AMENDMENT FOR REV 1 SUBMITTAL	COMMENT
3.1-31	121	121	
3.1-32	121	121	
3.1-33	121	121	
3.1-34	121	121	
T4.1-3(1)	178;97-156,98-043	200	Deleted City Water Connections to Charging Pumps and Boric Acid Piping

No impact on ITS 3.4.13

Add SR 3.4.13.2

A.5

TABLE 4.1-3 (Sheet 1 of 2)

FREQUENCIES FOR EQUIPMENT TESTS

	Check	Frequency
1. Control Rods	Rod drop times of all control rods	24M
2. Control Rods	Movement of at least 10 steps in any one direction of all control rods	Every 31 days during reactor critical operations
3. Pressurizer Safety Valves	Set Point	24M*
4. Main Steam Safety Valves	Set Point	24M
5. Containment Isolation System	Automatic actuation	24M
6. Refueling System Interlocks	Functioning	Each refueling, prior to movement of core components
7. Primary System Leakage	Evaluate (Add SR 3.4.13.1 Note)	~~5 days/week~~ 72 hours
8. Diesel Generators Nos. 31, 32 & 33 Fuel Supply	Fuel Inventory	Weekly
9. Turbine Steam Stop And Control Valves	Closure	Not to exceed 6 months**
10. L.P. Steam Dump System (6 lines)	Closure	Monthly
11. Service Water System	Each pump starts and operates for 15 minutes (unless already operating)	Monthly
12. City Water Connections to Charging Pumps and Boric Acid Piping	Temporary connections available and valves operable	24M

SEE CTS MASTER MARKUP (items 1–6)

SR 3.4.13.1 (item 7)

SEE CTS MASTER MARKUP (items 8–12 and notes)

A.7 | R.1

L.7

L.6

* ~~Pressurizer Safety Valve setpoint test due no later than May 1996 may be deferred until the next refueling outage but no later than May 31, 1997.~~ TSCR 97-156

** The turbine steam stop and control valves shall be tested at a frequency determined by the methodology presented in WCAP-11525, "Probabilistic Evaluation of Reduction in Turbine Valve Test Frequency," as updated by Westinghouse Report, WOG-TVTF-93-17, "Update of BB-95/96 Turbine Valve Failure Rates and Effect on Destructive Overspeed Probabilities." The maximum test interval for these valves shall not exceed six months. Surveillance interval extension as per Technical Specification 1.12 is not applicable to the maximum test interval.

TSCR 98-043

TSCR 97-156

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.13:
"RCS Operational LEAKAGE"

PART 5:

NUREG-1431
Annotated to show differences between NUREG-1431 and ITS

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.13 RCS Operational LEAKAGE

BASES

BACKGROUND

Components that contain or transport the coolant to or from the reactor core make up the RCS. Component joints are made by welding, bolting, rolling, or pressure loading, and valves isolate connecting systems from the RCS.

During plant life, the joint and valve interfaces can produce varying amounts of reactor coolant LEAKAGE, through either normal operational wear or mechanical deterioration. The purpose of the RCS Operational LEAKAGE LCO is to limit system operation in the presence of LEAKAGE from these sources to amounts that do not compromise safety. This LCO specifies the types and amounts of LEAKAGE.

(mo ¶) → 10 CFR 50, Appendix A, GDC 30 (Ref. 1), requires means for detecting and, to the extent practical, identifying the source of reactor coolant LEAKAGE. ~~Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting leakage detection systems.~~ CLB.2 | R.1

The safety significance of RCS LEAKAGE varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring reactor coolant LEAKAGE into the containment area is necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE is necessary to provide quantitative information to the operators, allowing them to take corrective action should a leak occur that is detrimental to the safety of the facility and the public.

A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100% leaktight. Leakage from these systems should be detected, located, and isolated from the containment atmosphere, if possible, to not interfere with RCS leakage detection.

This LCO deals with protection of the reactor coolant pressure boundary (RCPB) from degradation and the core from inadequate cooling, in addition to preventing the accident analyses radiation release assumptions from being exceeded. The consequences of violating this LCO include the possibility of a loss of coolant accident (LOCA).

(continued)

Typical

BASES

LCO (continued)

b. Unidentified LEAKAGE

One gallon per minute (gpm) of unidentified LEAKAGE is allowed as a reasonable minimum detectable amount that the containment air monitoring and containment sump level monitoring equipment can detect within a reasonable time period. Violation of this LCO could result in continued degradation of the RCPB, if the LEAKAGE is from the pressure boundary.

and is consistent with the capability of the equipment required by LCO 3.4.15, RCS Leakage Detection Instrumentation.

c. Identified LEAKAGE

Up to 10 gpm of identified LEAKAGE is considered allowable because LEAKAGE is from known sources that do not interfere with detection of identified LEAKAGE and is well within the capability of the RCS Makeup System. Identified LEAKAGE includes LEAKAGE to the containment from specifically known and located sources, but does not include pressure boundary LEAKAGE or controlled reactor coolant pump (RCP) seal leakoff (a normal function not considered LEAKAGE). Violation of this LCO could result in continued degradation of a component or system.

unidentified

T.1

CLB.2 | R.1

, the leakage into closed systems

d. Primary to Secondary LEAKAGE through All Steam Generators (SGs)

(1440 gpd)

Total primary to secondary LEAKAGE amounting to 1 gpm through all SGs produces acceptable offsite doses in the SLB accident analysis. Violation of this LCO could exceed the offsite dose limits for this accident. Primary to secondary LEAKAGE must be included in the total allowable limit for identified LEAKAGE.

e. Primary to Secondary LEAKAGE through Any One SG

(0.3 gpm)

432

The 500 gallons per day limit on one SG is based on the assumption that a single crack leaking this amount would not propagate to a SGTR under the stress conditions of a LOCA or a main steam line rupture. If leaked through many cracks, the cracks are very small, and the above assumption is conservative.

(continued)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.14:
"RCS Pressure Isolation Valve (PIV) Leakage"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

LCO 3.4.14 Leakage from each RCS PIV shall be within limit;

AND

The RHR System autoclosure interlocks (ACI) and open permissive interlocks (OPI) shall be OPERABLE.

NYPA

APPLICABILITY: MODES 1, 2, and 3,
MODE 4, except for leakage limits for valves in the residual heat removal (RHR) flow path when in, or during the transition to or from, the RHR mode of operation.

ACTIONS

----------------------------------- NOTES -----------------------------------

1. Separate Condition entry is allowed for each flow path.
2. Separate Condition entry is allowed for each ACI and OPI.
3. Enter applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV.

NYPA

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more flow paths with leakage from one or more RCS PIVs not within limit.	-------------NOTE------------- Each valve used to satisfy Required Action A.1 and Required Action A.2 must have been verified to meet SR 3.4.14.1 and be in the reactor coolant pressure boundary or the high pressure portion of the system. ------------------------------	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.1	Isolate the high pressure portion of the affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve.	4 hours
	<u>AND</u>		
	A.2.1	Isolate the high pressure portion of the affected system from the low pressure portion by use of a second closed manual, deactivated automatic, or check valve.	72 hours
	<u>OR</u>		
	A.2.2	Restore RCS PIV to within limits.	72 hours
B. Required Action and associated Completion Time for Condition A not met.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 5.	36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more RHR System autoclosure interlocks or open permissive interlocks inoperable.	-------------NOTE------------- RHR System suction isolation valves with inoperable ACIs or OPIs may be opened for 7 days following entry into MODE 4 from MODE 3. -------------------------------	
	C.1 Close and de-activate the affected RHR isolation valve.	7 days
	<u>AND</u>	
	C.2 Verify the affected RHR isolation valves are closed and de-activated.	Once per 31 days thereafter

NYPA

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.14.1	------------------NOTES------------------ 1. Not required to be performed in MODES 3 and 4. 2. Not required to be performed on the RCS PIVs located in the RHR flow path when in the shutdown cooling mode of operation. 3. RCS PIVs actuated during the performance of this Surveillance are not required to be tested more than once if a repetitive testing loop cannot be avoided. --- Verify leakage from each RCS PIV is equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure ≥ 2215 psig and ≤ 2255 psig.	24 months AND Prior to entering MODE 2 whenever the unit has been in MODE 5 for 7 days or more, if leakage testing has not been performed in the previous 9 months AND Within 24 hours following valve actuation due to automatic or manual action or flow through the valve

RAI-50

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.14.2	Verify RHR System open permissive interlock prevents the valves from being opened with a simulated or actual RCS pressure signal ≥ 450 psig.	24 months
SR 3.4.14.3	Verify RHR System autoclosure interlock causes the valves to close automatically with a simulated or actual RCS pressure signal ≥ 550 psig.	24 months

NYPA

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

BASES

BACKGROUND

10 CFR 50.2, 10 CFR 50.55a(c), and GDC 55 of 10 CFR 50, Appendix A (Refs. 1, 2, and 3), define RCS PIVs as any two normally closed valves in series within the reactor coolant pressure boundary (RCPB), which separate the high pressure RCS from an attached low pressure system. During their lives, these valves can produce varying amounts of reactor coolant leakage through either normal operational wear or mechanical deterioration. The RCS PIV Leakage LCO allows RCS high pressure operation when leakage through these valves exists in amounts that do not compromise safety. The RCS PIVs for which the leakage limits of this LCO apply are listed in FSAR Table 6.7-3. NYPA

The PIV leakage limit applies to each individual valve. Leakage through PIVs into closed systems is not included in the limits for either identified or unidentified LEAKAGE in LCO 3.4.13, RCS Operational LEAKAGE. Leakage past PIVs into closed systems is that leakage which can be accounted for and contained by a system not directly connected to the atmosphere.

Although this specification provides a limit on allowable PIV leakage rate, its main purpose is to prevent overpressure failure of the low pressure portions of connecting systems. The leakage limit is an indication that the PIVs between the RCS and the connecting systems are degraded or degrading. PIV leakage could lead to overpressure of the low pressure piping or components. Failure consequences could be a loss of coolant accident (LOCA) outside of containment, an unanalyzed accident, that could degrade the ability for low pressure injection.

(continued)

BASES

BACKGROUND (continued)

The basis for this LCO is the 1975 NRC "Reactor Safety Study" (Ref. 4) that identified potential intersystem LOCAs as a significant contributor to the risk of core melt. A subsequent study (Ref. 5) evaluated various PIV configurations to determine the probability of intersystem LOCAs.

PIVs are typically provided to isolate the RCS from the following connected systems:

a. Residual Heat Removal (RHR) System; and

b. Safety Injection System.

Violation of this LCO could result in continued degradation of a PIV, which could lead to overpressurization of a low pressure system and the loss of the integrity of a fission product barrier.

Residual Heat Removal System Valves 730 and 731 are the PIVs that isolate the RHR System from the RCS. A failure of valves 730 and 731 when the RCS is at normal operating temperature and pressure will result in an intersystem LOCA in which the containment's protective barrier is bypassed (i.e., a LOCA outside containment) because RCS pressure is significantly greater than RHR System design pressure and the RHR system is outside containment. Therefore, administrative controls ensure that both RHR 730 and 731 are closed and de-activated in MODES 1, 2 and 3 and in MODE 4 when the RHR System is not in operation. NYPA

Even though administrative controls provide a high degree of assurance that both RHR suction isolation valves are closed during normal plant operation, there is a significant concern that plant operation could proceed for an extended period of time with one of the RHR suction valves not closed. This situation could result from the failure of an operator to close both valves or inadvertent opening of one of the valves during operation. With this plant status, a single failure of the remaining RHR suction isolation valve will result in a LOCA outside containment (Ref. 10). Due to the potential significance of a LOCA outside containment, each of the RHR suction isolation valves is equipped with an autoclosure interlock (ACI) and an open permissive

(continued)

BASES

BACKGROUND (continued)

interlock (OPI). The purpose of the OPIs and ACIs is to provide a diverse backup to administrative requirements that ensure that both 730 and 731 are closed to provide a double barrier between the RCS and the RHR System when not in the RHR cooling mode and RCS pressure is above the RHR System design pressure (Ref. 10). NYPA

APPLICABLE SAFETY ANALYSES

Reference 4 identified potential intersystem LOCAs as a significant contributor to the risk of core melt. The dominant accident sequence in the intersystem LOCA category is the failure of the low pressure portion of the RHR System outside of containment.

The accident is the result of a postulated failure of the PIVs, which are part of the RCPB, and the subsequent pressurization of the RHR System downstream of the PIVs from the RCS. Because the low pressure portion of the RHR System is designed for 600 psig, overpressurization failure of the RHR low pressure line would result in a LOCA outside containment and subsequent risk of core melt.

Reference 5 evaluated various PIV configurations, leakage testing of the valves, and operational changes to determine the effect on the probability of intersystem LOCAs. This study concluded that periodic leakage testing of the PIVs can substantially reduce the probability of an intersystem LOCA.

The RHR isolation valve ACI and OPI provide a diverse backup to administrative requirements to ensure that both RHR suction isolation valves are closed to provide a double barrier between the RCS and the RHR System when not in the RHR cooling mode and RCS pressure is above the RHR System design pressure (Ref. 10). Although the OPI and ACI are not required to provide overpressure protection when RHR is in operation, the nominal setpoints are below the RHR System design pressure (i.e., 600 psig). Additionally, the applicable RHR system piping Code, USAS B3.1, allows an overpressure allowance above the design pressure under transient conditions (Ref. 6). Therefore, even when pump NYPA

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

discharge head and maximum instrument uncertainties are considered, the ACI will actuate before the RHR System pressure transient limit is exceeded.

RCS PIV leakage satisfies Criterion 2 of 10 CFR 50.36.

NYPA1

LCO

RCS PIV leakage is leakage into closed systems connected to the RCS. Leakage through PIVs into closed systems is not included in the limits for either identified or unidentified LEAKAGE in LCO 3.4.13, RCS Operational LEAKAGE. Leakage past PIVs into closed systems is that leakage which can be accounted for and contained by a system not directly connected to the atmosphere. Isolation valve leakage is usually on the order of drops per minute. Leakage that increases significantly suggests that something is operationally wrong and corrective action must be taken.

The LCO PIV leakage limit is 0.5 gpm per nominal inch of valve size with a maximum limit of 5 gpm. The previous criterion of 1 gpm for all valve sizes imposed an unjustified penalty on the larger valves without providing information on potential valve degradation and resulted in higher personnel radiation exposures. A study concluded a leakage rate limit based on valve size was superior to a single allowable value.

Reference 7 permits leakage testing at a lower pressure differential than between the specified maximum RCS pressure and the normal pressure of the connected system during RCS operation (the maximum pressure differential) in those types of valves in which the higher service pressure will tend to diminish the overall leakage channel opening. In such cases, the observed

(continued)

BASES

LCO (continued)

rate may be adjusted to the maximum pressure differential by assuming leakage is directly proportional to the pressure differential to the one half power.

The ACIs and OPIs for RHR System Valves 730 and 731 are OPERABLE when they will automatically close and prevent re-opening of the two RHR suction isolation valves when RCS pressure exceeds the setpoints specified in SR 3.4.14.2 and SR 3.4.14.3. The ACIs and OPIs are OPERABLE when the isolation valves are closed and the motor operators de-energized if the interlocks will function as soon as power is restored to the motor operator. NYPA

APPLICABILITY

In MODES 1, 2, 3, and 4, this LCO applies because the PIV leakage potential is greatest when the RCS is pressurized. In MODE 4, valves in the RHR flow path are not required to meet the leakage limit requirements of this LCO when in, or during the transition to or from, the RHR mode of operation. The ACI and OPI functions are required in MODES 1, 2 and 3 to ensure that both RHR suction valves are closed and remain closed in those MODES. The ACI and OPI functions are required in MODE 4 to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal. NYPA

In MODES 5 and 6, leakage limits and RHR ACI and OPI functions are not provided because the lower reactor coolant pressure results in a reduced potential for leakage and for a LOCA outside the containment.

ACTIONS

The Actions are modified by three Notes. Note 1 provides clarification that each flow path allows separate entry into a Condition. This is allowed based upon the functional independence of the flow path. Note 2 provides clarification that separate entry into Condition C is allowed for the ACI and the OPI on each RHR suction isolation valve. This is acceptable because these interlocks are a backup to administrative controls that ensure the valves are closed when required. Note 3 requires an evaluation of affected systems if a PIV is inoperable. The leakage may have affected system operability, or isolation of a NYPA NYPA

(continued)

BASES

ACTIONS (continued)

leaking flow path with an alternate valve may have degraded the ability of the interconnected system to perform its safety function.

A.1 and A.2

The flow path must be isolated by two valves. Required Actions A.1 and A.2 are modified by a Note that the valves used for isolation must meet the same leakage requirements as the PIVs and must be within the RCPB or the high pressure portion of the system.

Required Action A.1 requires that the isolation with one valve must be performed within 4 hours. Four hours provides time to reduce leakage in excess of the allowable limit and to isolate the affected system if leakage cannot be reduced. The 4 hour Completion Time allows the actions and restricts the operation with leaking isolation valves.

Required Action A.2 specifies that the double isolation barrier of two valves be restored by closing some other valve qualified for isolation or restoring one leaking PIV. The 72 hour Completion Time after exceeding the limit considers the time required to complete the Action and the low probability of a second valve failing during this time period. If use of a closed manual, deactivated automatic, or check valve to isolate leaking PIV renders a required system or component inoperable, then the Required Actions associated with the affected system or component are initiated when the valve is closed.

B.1 and B.2

If leakage cannot be reduced, the system isolated, or the other Required Actions accomplished, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. This Action may reduce the leakage and also reduces the potential for a LOCA outside the containment.

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

The allowed Completion Times are reasonable based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

The inoperability of one or more ACIs or OPIs renders the RHR suction isolation valves incapable of isolating in response to a high pressure condition and/or incapable of preventing inadvertent opening of the valves at RCS pressures in excess of the RHR systems design pressure. If one or more RHR ACIs or OPIs are inoperable, operation may continue as long as the affected RHR isolation valve is closed and de-activated within 7 days and that status re-verified every 31 days thereafter. These Required Actions and associated Completion Times are acceptable in MODES 1, 2 and 3 because the ACIs or OPIs are backups to administrative controls that ensure both RHR suction isolation valves are closed and de-activated during normal plant operation. These Required Actions and associated Completion Times are acceptable in MODE 4 because the ACIs and OPIs do not perform any safety function in MODE 4 and are required only to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal. When the ACIs and OPIs are inoperable in MODE 4, the 7 day Completion Time provides adequate time to repair the interlock or to complete a plant cooldown to place the plant outside the applicable MODES.

NYPA

NYPA

Required Action C.1 is modified by a Note that allows RHR System suction isolation valves that are closed in accordance with Required Action C.1 to be opened for 7 days following entry into MODE 4 from MODE 3. This allowance is needed so that the RHR system is available to support plant cooldown. This allowance is acceptable because the ACIs and OPIs do not perform any safety function in MODE 4 other than to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.4.14.1

Performance of leakage testing on each RCS PIV or isolation valve used to satisfy Required Action A.1 and Required Action A.2 is required to verify that leakage is below the specified limit and to identify each leaking valve. The leakage limit of 0.5 gpm per inch of nominal valve diameter up to 5 gpm maximum applies to each valve. Leakage testing requires a stable pressure condition.

For the two PIVs in series, the leakage requirement applies to each valve individually and not to the combined leakage across both valves. If the PIVs are not individually leakage tested, one valve may have failed completely and not be detected if the other valve in series meets the leakage requirement. In this situation, the protection provided by redundant valves would be lost.

Testing is to be performed every 24 months, a typical refueling cycle, if the plant does not go into MODE 5 for at least 7 days. The 24 month Frequency is consistent with 10 CFR 50.55a(g) (Ref. 8) as contained in the Inservice Testing Program, is within frequency allowed by the American Society of Mechanical Engineers (ASME) Code, Section XI (Ref. 7), and is based on the need to perform such surveillances under the conditions that apply during an outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

In addition, testing must be performed once after the valve has been opened by flow or exercised to ensure tight reseating. PIVs disturbed in the performance of this Surveillance should also be tested unless documentation shows that an infinite testing loop cannot practically be avoided. Testing must be performed within 24 hours after the valve has been reseated. Within 24 hours is a reasonable and practical time limit for performing this test after opening or reseating a valve.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.14.1 (continued)

The leakage limit is to be met at the RCS pressure associated with MODES 1 and 2. This permits leakage testing at high differential pressures with stable conditions not possible in the MODES with lower pressures.

Entry into MODES 3 and 4 is allowed to establish the necessary differential pressures and stable conditions to allow for performance of this Surveillance. The Note that allows this provision is complementary to the Frequency of prior to entry into MODE 2 whenever the unit has been in MODE 5 for 7 days or more, if leakage testing has not been performed in the previous 9 months. In addition, this Surveillance is not required to be performed on the RHR System when the RHR System is aligned to the RCS in the shutdown cooling mode of operation. PIVs contained in the RHR shutdown cooling flow path must be leakage rate tested after RHR is secured and stable unit conditions and the necessary differential pressures are established. RAI-50

SR 3.4.14.2 and SR 3.4.14.3

Verifying that ACI and OPI function at the required setpoints ensures that both RHR suction isolation valves will be closed and remain closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal. NYPA

The 24 month Frequency is based on the need to perform the Surveillance under conditions that apply during a plant outage. The 24 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment.

REFERENCES

1. 10 CFR 50.2.

2. 10 CFR 50.55a(c).

3. 10 CFR 50, Appendix A.

(continued)

REFERENCES (continued)

4. WASH-1400 (NUREG-75/014), Appendix V, October 1975.

5. NUREG-0677, May 1980.

6. FSAR Section 6.2.

7. ASME, Boiler and Pressure Vessel Code, Section XI.

8. 10 CFR 50.55a(g).

9. Generic Letter 87-006, Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves.

10. WCAP-11736-A, Residual Heat Removal System Autoclosure Interlock (ACI) Removal Report.

NYPA

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.14:
"RCS Pressure Isolation Valve (PIV) Leakage"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

DISCUSSION OF CHANGES
ITS SECTION 3.4.14 - RCS Pressure Isolation Valve (PIV) Leakage

ADMINISTRATIVE

A.1 In the conversion of the Indian Point Unit 3 Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes (either actual or interpretational). Additionally, editorial changes, reformatting, and revised numbering are adopted to make ITS consistent with the conventions in NUREG-1431, Standard Technical Specifications, Westinghouse Plants, Rev. 1, i.e., the improved Standard Technical Specifications.

The CTS Bases are deleted and replaced with comprehensive ITS Bases designed to support interpretation and implementation of the associated Technical Specifications. The Bases explain, clarify, and document the reasons (i.e., bases) for the associated Technical Specifications, and reflect the IP3 plant specific design, analyses, and licensing basis. In accordance with 10 CFR 50.36(a), the ITS Bases are included with the proposed ITS conversion application; however, deletion of the CTS Bases and the adoption of the ITS Bases is an administrative change with no impact on safety.

A.2 CTS Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) include statements of the objective and the applicability. The CTS statements of objective and applicability are deleted because these statements do not establish any requirements and do not provide any guidance for the application of CTS requirements. Therefore, deletion of these statements has no significant adverse impact on safety.

A.3 CTS 4.5.B.2.c and CTS 4.5.B.2.d establish requirements for leak testing RCS pressure isolation valves (PIVs) and CTS Table 4.1-3, Item 13, establishes requirements for testing the residual heat removal (RHR) System autoclosure Interlocks (ACI) and open permissive interlocks (OPI) function; however, there is no specific statement of when these tests must be met. ITS LCO 3.4.14 maintains these requirements and includes a specific Applicability statement that the requirements must be met in

Modes 1, 2, and 3, and in Mode 4. The Applicability statement for ITS LCO 3.4.14 requires the PIVs to function as pressure isolation barriers whenever the plant is above 200°F. This is an administrative change with no impact on safety because it is a reasonable interpretation of the existing requirements and identical to requirements in the FSAR.

A.4 CTS 4.5.B.2.c and CTS 4.5.B.2.d establish requirements for leak testing reactor coolant system PIVs. ITS LCO 3.4.14 maintains this requirement and includes two new Notes that clarify the application of these requirements:

ITS LCO 3.4.14, Note 1, specifies that separate condition entry is allowed for each flow path. In conjunction with ITS Specification 1.3, "Completion Times," this Note provides direction consistent with the intent of the CTS for inoperable PIVs. Specifically, this note allows separate entry into an LCO 3.4.14 Condition for each PIV and separate tracking of Completion Times based on a PIV's time of entry into the Condition. This is acceptable because the Required Actions for each Condition provide appropriate compensatory actions for each inoperable PIV. Complying with the Required Actions for one inoperable PIV may allow continued operation, and subsequent inoperable PIVs are governed by separate Condition entry and application of associated Required Actions. This is an administrative change with no impact on safety because any differences between the existing requirements and ITS 3.4.14 are described and justified elsewhere in this discussion of changes.

ITS LCO 3.4.14, Note 3, requires entry into applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV or the Action taken in response to an inoperable PIV. This note requires an evaluation of affected systems if a PIV is inoperable because the leakage may have affected system Operability, or isolation of a leaking flow path with an alternate valve may have degraded the ability of the interconnected system to perform its safety function. This is an administrative change with no impact on safety because it is a reasonable interpretation of the existing requirements.

A.5 CTS 4.5.B.2.d includes a requirement for selected PIVs that gross leakage testing must also be performed following valve maintenance, repair or other work that could unseat check valves. This requirement is not included in ITS because ITS SR 3.4.14.1 requires leakage testing within 24 hours following valve actuation due to automatic or manual action or flow through the valve. Additionally, ITS SR 3.0.1 requires that SRs are met whenever equipment is required to be Operable. The Bases for SR 3.0.1 include the clarification that upon completion of maintenance, appropriate post maintenance testing is required to declare equipment Operable. This includes ensuring applicable Surveillances are not failed. Therefore, CTS statements establishing requirements to verify SRs are met following maintenance can be deleted. This is an administrative change with no adverse impact on safety.

MORE RESTRICTIVE

M.1 CTS 4.5.B.2.c and CTS 4.5.B.2.d establish requirements for leak testing RCS pressure isolation valves (PIVs); however, no actions are specified for the failure to meet these requirements.

ITS 3.4.14, Required Actions A.1 and A.2, are added to address one or more flow paths with leakage from one or more PIVs not within limits. These Actions require isolating the high pressure portion of an affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve that meet required leakage limits within 4 hours and isolated with a second valve within 72 hours. If these Required Actions and associated Completion Times are not met, then ITS 3.4.14, Required Actions B.1 and B.2, require the plant be placed in Mode 3 within 6 hours and Mode 5 within 36 hours. The associated Bases provide the clarification that if use of a closed manual, deactivated automatic, or check valve to isolate leaking PIV renders a required system or component inoperable, then the Required Actions associated with the affected system or component are initiated when the valve is closed.

These changes are needed because isolating the high pressure portion of an affected system from the low pressure portion satisfies the safety function of the PIV (i.e., prevents overpressure failure of the low pressure portions of connecting systems). This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed while requiring a more conservative response than is currently required when PIV leakage is not within required limits. Therefore, this change has no significant adverse impact on safety.

M.2 CTS Table 4.1-3, Item 13, establishes requirements for testing the residual heat removal (RHR) System autoclosure Interlocks (ACI) and open permissive interlocks (OPI) function; however, there is no LCO statement and no actions are specified if the ACI or OPI functions are not Operable.

ITS 3.4.14 adds a statement that RHR System autoclosure Interlocks (ACI) and open permissive interlocks (OPI) shall be OPERABLE in Modes 1, 2, 3 and 4. Additionally, Required Actions C.1 and C.2, are added to address inoperability of the RHR ACIs and OPIs. Specifically, if one or more RHR ACIs or OPIs are inoperable, operation may continue as long as the affected RHR isolation valve is closed and de-activated within 7 days and that status re-verified every 31 days thereafter. These Required Actions and associated Completion Times are acceptable in MODES 1, 2 and 3 because the ACIs or OPIs are backups to administrative controls that ensure both RHR suction isolation valves are closed and de-activated during normal plant operation. These Required Actions and associated Completion Times are acceptable in MODE 4 because the ACIs and OPIs do not perform any safety function in MODE 4 and are required only to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal. When the ACIs and OPIs are inoperable in MODE 4, the 7 day Completion Time provides adequate time to repair the interlock or to complete a plant cooldown to place the plant outside the applicable MODES.

ITS 3.4.14, Actions Note 2, provides clarification that separate entry into Condition C is allowed for the ACI and the OPI on each RHR suction isolation valve. This is acceptable because these interlocks are a backup to administrative controls that ensure the valve are closed when required.

Required Action C.1 is modified by a Note that allows RHR System suction isolation valves that are closed in accordance with Required Action C.1

to be opened for 7 days following entry into MODE 4 from MODE 3. This allowance is needed so that the RHR system is available to support plant cooldown. This allowance is acceptable because the ACIs and OPIs do not perform any safety function in MODE 4 other than to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal.

This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed while requiring a more conservative response than is currently required when the RHR OPI or ACI functions are not Operable. Therefore, this change has no significant adverse impact on safety.

M.3 CTS Table 4.1-3, Item 13, requires that the automatic isolation and interlock function for RHR valves 730 and 731 be verified every 24 months; however, acceptance criteria (allowable values) for the function are not specified in the CTS.

ITS SR 3.4.14.2 and SR 3.4.14.3 maintain the requirement to verify the automatic isolation and interlock function for RHR isolation valves every 24 months; however, the ITS includes the acceptance criteria that the autoclosure interlock prevents the valves from being opened with an RCS pressure signal ≥ 450 psig, and that the autoclosure interlock causes the valves to close automatically with RCS pressure signal ≥ 550 psig. This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed while requiring periodic verification of the function and setpoints assumed in the design for the overpressure protection of the RHR system. Therefore, this change has no significant adverse impact on safety.

M.4 CTS 4.5.B.2.c and CTS 4.5.B.2.d require that PIVs (See ITS 3.4.14, DOC LA.1) be checked periodically for gross leakage; however, no acceptance criteria for leakage is included in the CTS.

ITS SR 3.4.14.1 maintains the requirement that PIVs be checked periodically for gross leakage; however, ITS SR 3.4.14.1 includes the acceptance criteria that leakage from each RCS PIV is equivalent to ≤

0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure ≥ 2215 psig and ≤ 2255 psig. This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed while requiring specific acceptance criteria for PIV leakage that is consistent with ASME requirements. Therefore, this change has no significant adverse impact on safety.

M.5 CTS 4.5.B.2.c requires that PIVs (See ITS 3.4.14, DOC LA.1) be checked for gross leakage every 24 months. Additionally, CTS 4.5.B.2.d requires that PIVs in the injection flow path be checked for leakage whenever the reactor is shutdown and depressurized to less than 700 psig.

ITS SR 3.4.14.1 maintains the requirement that PIVs be checked for gross leakage every 24 months; however, ITS SR 3.4.14.1 requires that all PIVs be checked for leakage whenever the unit has been in Mode 5 for 7 days or more and only if leakage testing has not been performed in the previous 9 months (See ITS 3.4.14, DOC L.2). This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed while requiring more frequent testing of selected PIVs. Therefore, this change has no significant adverse impact on safety.

M.6 CTS 4.5.B.2.c and CTS 4.5.B.2.d require that PIVs (See ITS 3.4.14, DOC LA.1) be checked periodically for gross leakage (See ITS 3.4.14, DOC M.5 and L.2).

ITS SR 3.4.14.1 maintains the requirement that PIVs be checked periodically for gross leakage; however, ITS SR 3.4.14.1 includes a new requirement that testing for gross leakage must be performed within 24 hours following any valve actuation due to automatic or manual action or after any flow through the valve. PIVs disturbed in the performance of this Surveillance must also be tested unless documentation shows that an infinite testing loop cannot practically be avoided. This change is needed because it provides greater assurance that PIVs are properly re-seated after any operation. This more restrictive change is acceptable because it does not introduce any operation which is un-analyzed. Therefore, this change has no significant adverse impact on safety.

LESS RESTRICTIVE

L.1 CTS 4.5.B.2.c and CTS 4.5.B.2.d require that PIVs (See ITS 3.4.14, DOC LA.1) be checked periodically for gross leakage.

ITS SR 3.4.14.1 maintains the requirement that PIVs be checked periodically for gross leakage; however, ITS SR 3.4.14.1 includes three Notes that provide needed relaxations from certain testing requirements as follows:

ITS SR 3.4.14.1, Note 1, specifies that PIV leak testing is not required to be performed in Modes 3 and 4 although the SR is required to be met. This Note is needed because entry into Modes 3 and 4 is allowed to establish the necessary differential pressures and stable conditions to allow for performance of this Surveillance. The Note is acceptable because the SR must be met in Modes 3 and 4 although not performed and the SR must be performed prior to entering Modes 1 and 2. Therefore, there is a low probability that the change will prevent timely identification of a PIV with excessive leakage.

ITS SR 3.4.14.1, Note 2, specifies that PIV leak testing is not required to be performed on the PIVs located in the RHR flow path when in the shutdown cooling mode of operation. This change is needed and is acceptable because the exempted PIVs are open to maintain the RHR flowpath and the SR must be performed after RHR is secured. Therefore, there is a low probability that the change will prevent timely identification of a PIV with excessive leakage.

ITS SR 3.4.14.1, Note 3, specifies that PIVs actuated during the performance of SR 3.4.14.1 are not required to be tested more than once if a repetitive testing loop cannot be avoided. This change is needed and is acceptable because it recognizes that plant configuration may not support not disturbing a valve after it has been satisfactorily tested.

L.2 CTS 4.5.B.2.d requires that PIVs in the injection flow path (See ITS 3.4.14, DOC M.5) be checked for gross leakage whenever the reactor is shutdown and depressurized to less than 700 psig.

ITS SR 3.4.14.1 relaxes this requirement by limiting the leakage testing to prior to entering Mode 2 whenever the unit has been in Mode 5 for 7 days or more and only if leakage testing has not been performed in the previous 9 months. This change is needed so that PIV leakage testing is required only during significant plant shutdowns and only if the PIVs have not been tested recently. This change is acceptable because of the new requirement that PIVs must be tested for gross leakage within 24 hours following valve actuation due to automatic or manual action or flow through the valve (See ITS 3.4.14, DOC M.6). This change has no significant adverse impact on safety because the reduced Frequency for PIV leakage testing applies only to valves that have not been disturbed since the last satisfactory leakage test. Therefore, there is a low probability that the change will prevent timely identification of a PIV with excessive leakage.

<u>REMOVED DETAIL</u>

LA.1 CTS 4.5.B.2.c and CTS 4.5.B.2.d requires periodic leak tests of PIVs and includes a list of the applicable valves,

ITS SR 3.4.14.1 maintains the requirement to periodically leak test PIVs that are currently listed in the CTS but the list of PIVs governed by ITS SR 3.4.14.1 is relocated to the FSAR.

Maintaining the list of PIVs that must be tested as required by ITS SR 3.4.14.1 in the FSAR is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, are designed to assure that changes to the FSAR do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the possibility of a new or different kind of accident, and do not result in a significant reduction in a margin of safety. Additionally, IP3 programs that implement FSAR changes in accordance with 10 CFR 50.59 require periodic submittal of FSAR and Bases changes to the NRC for review.

This change is a less restrictive administrative change with no impact on safety because no requirements are being deleted from Technical

Specifications and an appropriate change control process and an appropriate level of regulatory oversight are maintained for the information being relocated out of the Technical Specifications.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.14:
"RCS Pressure Isolation Valve (PIV) Leakage"

PART 4:

No Significant Hazards Considerations
for
Changes between CTS and ITS
that are
Less Restrictive

No Significant Hazard Considerations for Changes that are Administrative, More Restrictive, and Removed Details are the same for all Packages. A Copy is included at the end of the Package.

whenever the unit has been in Mode 5 for 7 days or more and only if leakage testing has not been performed in the previous 9 months. This change is needed so that PIV leakage testing is required only during significant plant shutdowns and only if the PIVs have not been tested recently. This change will not result in a significant increase in the probability or consequences of an accident previously evaluated because of the new requirement that PIVs must be tested for gross leakage within 24 hours following valve actuation due to automatic or manual action or flow through the valve. Therefore, the reduced Frequency for PIV leakage testing applies only to valves that have not been disturbed since the last satisfactory leakage test and there is very little probability that the change will prevent timely identification of a PIV with excessive leakage.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed changes will not involve any physical changes to plant systems, structures, or components (SSC). The changes in normal Plant operation are consistent with the current safety analysis assumptions. Therefore, these changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

   This change does not involve a significant reduction in a margin of safety because of the new requirement that PIVs must be tested for gross leakage within 24 hours following valve actuation due to automatic or manual action or flow through the valve. Therefore, the reduced Frequency for PIV leakage testing applies only to valves that have not been disturbed since the last satisfactory leakage test and there is very little probability that the change will prevent timely identification of a PIV with excessive leakage.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.14:
"RCS Pressure Isolation Valve (PIV) Leakage"

PART 5:

NUREG-1431
Annotated to show differences between
NUREG-1431 and ITS

<CTS>

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

<4.5.B.2.c> <T4.1-3, #13>

LCO 3.4.14 Leakage from each RCS PIV shall be within limit. ③ ; Insert 3.4-35-01 | R.1

<DOC A.3>

APPLICABILITY: MODES 1, 2, and 3,
MODE 4, except valves in the residual heat removal (RHR) flow path when in, or during the transition to or from, the RHR mode of operation.
Insert 3.4-35-02 R.1

ACTIONS

---NOTES---

<DOC A.4>

1. Separate Condition entry is allowed for each flow path. Insert: 3.4-35-03 | R.1
2. ③ Enter applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV.

<DOC M.1>

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more flow paths with leakage from one or more RCS PIVs not within limit.	---NOTE--- Each valve used to satisfy Required Action A.1 and Required Action A.2 must have been verified to meet SR 3.4.14.1 and be in the reactor coolant pressure boundary [or the high pressure portion of the system].	(continued)

INSERT: 3.4-35-01

AND

(DOC M.2) The RHR System autoclosure Interlocks (ACI) and open permissive interlocks (OPI) shall be OPERABLE. R.1

INSERT: 3.4-35-02

for leakage limits for

INSERT: 3.4-35-03

(DOC M 2) 2. Separate Condition entry is allowed for each ACI and OPI. R.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.1 Isolate the high pressure portion of the affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve.	4 hours
	<u>AND</u>	
	A.2.1 Isolate the high pressure portion of the affected system from the low pressure portion by use of a second closed manual, deactivated automatic, or check valve.	72 hours
	<u>OR</u>	
	A.2.2 Restore RCS PIV to within limits.	72 hours
B. Required Action and associated Completion Time for Condition A not met.	B.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	B.2 Be in MODE 5.	36 hours
C. RHR System autoclosure interlock function inoperable.	C.1 Isolate the affected penetration by use of one closed manual or deactivated automatic valve.	4 hours

<DOC M.1> <DOC M.1> <DOC M.1> <DOC M.2> (X.1) Insert: 3.4-36-01

INSERT: 3.4-36-01

C.1 One or more RHR System autoclosure interlocks or open permissive interlocks inoperable.	------------NOTE------------- RHR System suction isolation valves with inoperable ACIs or OPIs may be open for 7 days following entry into MODE 4 from MODE 3. ----------------------------	
	C.1 Close and de-activate the affected RHR isolation valve.	7 days
	AND	
	C.2 Verify the affected RHR isolation valves are closed and de-activated.	Once per 31 days thereafter

R.1

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.14.1	-------------------NOTES------------------- 1. Not required to be performed in MODES 3 and 4. <Doc L.1> 2. Not required to be performed on the RCS PIVs located in the RHR flow path when in the shutdown cooling mode of operation. <Doc L.1> 3. RCS PIVs actuated during the performance of this Surveillance are not required to be tested more than once if a repetitive testing loop cannot be avoided. <Doc L.1> --	
<4.5.B.2.d> <4.5.B.2.c> <Doc M.4>	Verify leakage from each RCS PIV is equivalent to ≤ 0.5 gpm per nominal inch of valve size up to a maximum of 5 gpm at an RCS pressure ≥ [2215] psig and ≤ [2255] psig.	~~In accordance with the Inservice Testing Program, and~~ ~~18~~ 24 months **AND** Prior to entering MODE 2 whenever the unit has been in MODE 5 for 7 days or more, if leakage testing has not been performed in the previous 9 months <Doc L.2> <Doc M.5> **AND** (continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.14.1 (continued)	Within 24 hours following valve actuation due to automatic or manual action or flow through the valve
SR 3.4.14.2 (DB.2) ------NOTE------ Not required to be met when the RHR System autoclosure interlock is disabled in accordance with SR 3.4.12.7. ------------ Verify RHR System autoclosure (open permissive) interlock prevents the valves from being opened with a simulated or actual RCS pressure signal ≥ [425] (450) psig.	[18] (24) months
SR 3.4.14.3 (DB.2) ------NOTE------ Not required to be met when the RHR System autoclosure interlock is disabled in accordance with SR 3.4.12.7. ------------ Verify RHR System autoclosure interlock causes the valves to close automatically with a simulated or actual RCS pressure signal ≥ [600] (550) psig.	[18] (24) months

⟨DOC M.6⟩

⟨Table 4.1-3, #13⟩ R.1

⟨Table 4.1-3, #13⟩ R.1

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

BASES

BACKGROUND

10 CFR 50.2, 10 CFR 50.55a(c), and GDC 55 of 10 CFR 50, Appendix A (Refs. 1, 2, and 3), define RCS PIVs as any two normally closed valves in series within the reactor coolant pressure boundary (RCPB), which separate the high pressure RCS from an attached low pressure system. During their lives, these valves can produce varying amounts of reactor coolant leakage through either normal operational wear or mechanical deterioration. The RCS PIV Leakage LCO allows RCS high pressure operation when leakage through these valves exists in amounts that do not compromise safety.

Insert: B 3.4-79-02

The PIV leakage limit applies to each individual valve. Leakage through both series PIVs in a line must be included as part of the identified LEAKAGE, governed by LCO 3.4.13, "RCS Operational LEAKAGE." This is true during operation only when the loss of RCS mass through two series valves is determined by a water inventory balance (SR 3.4.13.1). A known component of the identified LEAKAGE before operation begins is the least of the two individual leak rates determined for leaking series PIVs during the required surveillance testing; leakage measured through one PIV in a line is not RCS operational LEAKAGE if the other is leaktight.

Insert: B 3.4-79-01

CLB.1

Although this specification provides a limit on allowable PIV leakage rate, its main purpose is to prevent overpressure failure of the low pressure portions of connecting systems. The leakage limit is an indication that the PIVs between the RCS and the connecting systems are degraded or degrading. PIV leakage could lead to overpressure of the low pressure piping or components. Failure consequences could be a loss of coolant accident (LOCA) outside of containment, an unanalyzed accident, that could degrade the ability for low pressure injection.

The basis for this LCO is the 1975 NRC "Reactor Safety Study" (Ref. 4) that identified potential intersystem LOCAs as a significant contributor to the risk of core melt. A subsequent study (Ref. 5) evaluated various PIV configurations to determine the probability of intersystem LOCAs.

(continued)

INSERT: B 3.4-79-01 (CLB.1)

Leakage through PIVs into closed systems is not included in the limits for either identified or unidentified LEAKAGE in LCO 3.4.13, RCS Operational LEAKAGE. Leakage past PIVs into closed systems is that leakage which can be accounted for and contained by a system not directly connected to the atmosphere.

INSERT: B 3.4-79-02 (CLB.1)

This LCO establishes limits for Event V PIVs only. Event V PIVs are defined as two check valves in series at a low pressure/RCS interface whose failure may result in a LOCA that by-passes containment. Event V refers to the scenario described for this event in the WASH-1400 study (Refs 4 and 9). The Event V PIVs are listed in FSAR, Section 6 (Ref. 6).

BASES

BACKGROUND (continued)

PIVs are provided to isolate the RCS from the following typically connected systems:

a. Residual Heat Removal (RHR) System;

b. Safety Injection System; and

c. Chemical and Volume Control System.

The PIVs are listed in the FSAR, Section [ ] (Ref. 6).

Violation of this LCO could result in continued degradation of a PIV, which could lead to overpressurization of a low pressure system and the loss of the integrity of a fission product barrier.

APPLICABLE SAFETY ANALYSES

Reference 4 identified potential intersystem LOCAs as a significant contributor to the risk of core melt. The dominant accident sequence in the intersystem LOCA category is the failure of the low pressure portion of the RHR System outside of containment. The accident is the result of a postulated failure of the PIVs, which are part of the RCPB, and the subsequent pressurization of the RHR System downstream of the PIVs from the RCS. Because the low pressure portion of the RHR System is ~~typically~~ designed for 600 psig, overpressurization failure of the RHR low pressure line would result in a LOCA outside containment and subsequent risk of core melt.

Reference 5 evaluated various PIV configurations, leakage testing of the valves, and operational changes to determine the effect on the probability of intersystem LOCAs. This study concluded that periodic leakage testing of the PIVs can substantially reduce the probability of an intersystem LOCA.

RCS PIV leakage satisfies Criterion 2 of the NRC Policy Statement.

LCO

RCS PIV leakage is identified LEAKAGE into closed systems connected to the RCS. Isolation valve leakage is usually on the order of drops per minute. Leakage that increases

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.4.14 - RCS Pressure Isolation Valve (PIV) Leakage

<u>INSERT: B 3.4-80-01</u>

Residual Heat Removal System Valves 730 and 731 are the PIVs that isolate the RHR System from the RCS. A failure valves 730 and 731 when the RCS is at normal operating temperature and pressure will result in an intersystem LOCA in which the containment's protective barrier is bypassed (i.e., a LOCA outside containment) because RCS pressure is significantly greater than RHR System design pressure and the RHR system is outside containment. Therefore, administrative controls ensure that both RHR 730 and 731 are closed and de-activated in MODES 1, 2 and 3 and in MODE 4 when the RHR System is not in operation.

Even though administrative controls provide a high degree of assurance that both RHR suction isolation valves are closed during normal plant operation, there is a significant concern that plant operation could proceed for an extended period of time with one of the RHR suction valves not closed. This situation could result from the failure of an operator to close both valves or inadvertent opening of one of the valves during operation. With this plant status, a single failure of the remaining RHR suction isolation valve will result in a LOCA outside containment (Ref. 10). Due to the potential significance of a LOCA outside containment, each of the RHR suction isolation valves is equipped with an autoclosure interlock (ACI) and an open permissive interlock (OPI). The purpose of the OPIs and ACIs is to provide a diverse backup to administrative requirements that ensure that both 730 and 731 are closed to provide a double barrier between the RCS and the RHR System when the not in the RHR cooling mode and RCS pressure is above the RHR System design pressure (Ref. 10).

INSERT: B 3.4-80-02

The RHR isolation valve ACI and OPI provide a diverse backup to administrative requirements to ensure that both RHR suction isolation valves are closed to provide a double barrier between the RCS and the RHR System when the not in the RHR cooling mode and RCS pressure is above the RHR System design pressure (Ref. 10). Although the OPI and ACI are not required to provide overpressure protection when RHR is in operation, the nominal setpoints are below the RHR System design pressure (i.e., 600 psig). Additionally, the applicable RHR system piping Code, USAS B3.1, allows an overpressure allowance above the design pressure under transient conditions (Ref. 6). Therefore, even when pump discharge head and maximum instrument uncertainties are considered, the ACI will actuate before the RHR System pressure transient limit is exceeded.

INSERT: B 3.4-80-03

Leakage through PIVs into closed systems is not included in the limits for either identified or unidentified LEAKAGE in LCO 3.4.13, RCS Operational LEAKAGE. Leakage past PIVs into closed systems is that leakage which can be accounted for and contained by a system not directly connected to the atmosphere.

INSERT: B 3.4-80-04

This LCO establishes limits for Event V PIVs only. Event V PIVs are defined as two check valves in series at a low pressure/RCS interface whose failure may result in a LOCA that by-passes containment. Event V refers to the scenario described for this event in the WASH-1400 study (Refs 4 and 9). The Event V PIVs are listed in FSAR, Section 6 (Ref. 6).

BASES

LCO (continued)

significantly suggests that something is operationally wrong and corrective action must be taken.

The LCO PIV leakage limit is 0.5 gpm per nominal inch of valve size with a maximum limit of 5 gpm. The previous criterion of 1 gpm for all valve sizes imposed an unjustified penalty on the larger valves without providing information on potential valve degradation and resulted in higher personnel radiation exposures. A study concluded a leakage rate limit based on valve size was superior to a single allowable value.

Reference 7 permits leakage testing at a lower pressure differential than between the specified maximum RCS pressure and the normal pressure of the connected system during RCS operation (the maximum pressure differential) in those types of valves in which the higher service pressure will tend to diminish the overall leakage channel opening. In such cases, the observed rate may be adjusted to the maximum pressure differential by assuming leakage is directly proportional to the pressure differential to the one half power.

Insert B 3.4-81-01

APPLICABILITY

In MODES 1, 2, 3, and 4, this LCO applies because the PIV leakage potential is greatest when the RCS is pressurized. In MODE 4, valves in the RHR flow path are not required to meet the requirements of this LCO when in, or during the transition to or from, the RHR mode of operation.

Insert B 3.4-81-03

In MODES 5 and 6, leakage limits and RHR ACI and OPI functions are not provided because the lower reactor coolant pressure results in a reduced potential for leakage and for a LOCA outside the containment.

ACTIONS

The Actions are modified by two three Notes. Note 1 provides clarification that each flow path allows separate entry into a Condition. This is allowed based upon the functional independence of the flow path. Insert B 3.4-81-02 Note 2 3 requires an evaluation of affected systems if a PIV is inoperable. The leakage may have affected system operability, or isolation of a leaking flow path with an alternate valve may have R.1

(continued)

INSERT: B 3.4-81-01

The ACIs and OPIs for RHR System Valves 730 and 731 are OPERABLE when they will automatically close and prevent re-opening of the two RHR suction isolation valves when RCS pressure exceeds the setpoints specified in SR 3.4.14.2 and SR 3.4.14.3. The ACIs and OPIs are OPERABLE when the isolation valves are closed and the motor operators de-energized if the interlocks will function as soon as power is restored to the motor operator.

INSERT: B 3.4-81-02

Note 2 provides clarification that separate entry into Condition C is allowed for the ACI and the OPI on each RHR suction insolation valve. This is acceptable because these interlocks are a backup to administrative controls that ensure the valves are closed when required.

INSERT: B 3.4-81-03

leakage limit requirements of this LCO when in, or during the transition to or from, the RHR mode of operation. The ACI and OPI functions are required in MODES 1, 2 and 3 to ensure that both RHR suction valves are closed and remain closed in those MODES. The ACI and OPI functions are required in MODE 4 to ensue that both RHR suction valves are closed are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal.

BASES

ACTIONS (continued)

degraded the ability of the interconnected system to perform its safety function.

A.1 and A.2

The flow path must be isolated by two valves. Required Actions A.1 and A.2 are modified by a Note that the valves used for isolation must meet the same leakage requirements as the PIVs and must be within the RCPB [for the high pressure portion of the system].

Required Action A.1 requires that the isolation with one valve must be performed within 4 hours. Four hours provides time to reduce leakage in excess of the allowable limit and to isolate the affected system if leakage cannot be reduced. The 4 hour Completion Time allows the actions and restricts the operation with leaking isolation valves.

[Required Action A.2 specifies that the double isolation barrier of two valves be restored by closing some other valve qualified for isolation or restoring one leaking PIV. The 72 hour Completion Time after exceeding the limit considers the time required to complete the Action and the low probability of a second valve failing during this time period.

Insert: B3.4-82-01

or

The 72 hour Completion Time after exceeding the limit allows for the restoration of the leaking PIV to OPERABLE status. This timeframe considers the time required to complete this Action and the low probability of a second valve failing during this period. (Reviewer Note: Two options are provided for Required Action A.2. The second option (72 hour restoration) is appropriate if isolation of a second valve would place the unit in an unanalyzed condition.)]

B.1 and B.2

If leakage cannot be reduced, [the system isolated,] or the other Required Actions accomplished, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to MODE 3

(continued)

INSERT: B 3.4-82-01

If use of a closed manual, deactivated automatic, or check valve to isolate leaking PIV renders a required system or component inoperable, then the Required Actions associated with the affected system or component are initiated when the valve is closed.

BASES

ACTIONS

B.1 and B.2 (continued)

within 6 hours and MODE 5 within 36 hours. This Action may reduce the leakage and also reduces the potential for a LOCA outside the containment. The allowed Completion Times are reasonable based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

C.1

The inoperability of the [one or more] RHR autoclosure interlock [ACIs or OPIs] renders the RHR suction isolation valves incapable of isolating in response to a high pressure condition and [and/or incapable of] preventing inadvertent opening of the valves at RCS pressures in excess of the RHR systems design pressure. ~~If the RHR autoclosure interlock is inoperable, operation may continue as long as the affected RHR suction penetration is closed by at least one closed manual or deactivated automatic valve within 4 hours. This Action accomplishes the purpose of the autoclosure function.~~ [Insert: B 3.4-83-01]

R.1

SURVEILLANCE REQUIREMENTS

SR 3.4.14.1

Performance of leakage testing on each RCS PIV or isolation valve used to satisfy Required Action A.1 and Required Action A.2 is required to verify that leakage is below the specified limit and to identify each leaking valve. The leakage limit of 0.5 gpm per inch of nominal valve diameter up to 5 gpm maximum applies to each valve. Leakage testing requires a stable pressure condition.

For the two PIVs in series, the leakage requirement applies to each valve individually and not to the combined leakage across both valves. If the PIVs are not individually leakage tested, one valve may have failed completely and not be detected if the other valve in series meets the leakage requirement. In this situation, the protection provided by redundant valves would be lost.

Testing is to be performed every [18] [24] months, a typical refueling cycle, if the plant does not go into MODE 5 for at least 7 days. The ~~[18 month]~~ [24 month] Frequency is consistent with

(continued)

INSERT: B 3.4-83-01

If one or more RHR ACIs or OPIs are inoperable, operation may continue as long as the affected RHR isolation valve is closed and de-activated within 7 days and that status re-verified every 31 days thereafter. These Required Actions and associated Completion Times are acceptable in MODES 1, 2 and 3 because the ACIs or OPIs are backups to administrative controls that ensure both RHR suction isolation valves are closed and de-activated during normal plant operation. These Required Actions and associated Completion Times are acceptable in MODE 4 because the ACIs and OPIs do not perform any safety function in MODE 4 and are required only to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal. When the ACIs and OPIs are inoperable in MODE 4, the 7 day Completion Time provides adequate time to repair the interlock or to complete a plant cooldown to place the plant outside the applicable MODES.

Required Action C.1 is modified by a Note that allows RHR System suction isolation valves that are closed in accordance with Required Action C.1 to be opened for 7 days following entry into MODE 4 from MODE 3. This allowance is needed so that the RHR system is available to support plant cooldown. This allowance is acceptable because the ACIs and OPIs do not perform any safety function in MODE 4 other than to ensure that both RHR suction valves are closed when RCS pressure is increased after the RHR System is no longer being used for decay heat removal.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.14.1 (continued) The 24 month Frequency is consistent with R.1

10 CFR 50.55a(g) (Ref. 8) as contained in the Inservice Testing Program, is within frequency allowed by the American Society of Mechanical Engineers (ASME) Code, Section XI (Ref. 7), and is based on the need to perform such surveillances under the conditions that apply during an outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

In addition, testing must be performed once after the valve has been opened by flow or exercised to ensure tight reseating. PIVs disturbed in the performance of this Surveillance should also be tested unless documentation shows that an infinite testing loop cannot practically be avoided. Testing must be performed within 24 hours after the valve has been reseated. Within 24 hours is a reasonable and practical time limit for performing this test after opening or reseating a valve.

The leakage limit is to be met at the RCS pressure associated with MODES 1 and 2. This permits leakage testing at high differential pressures with stable conditions not possible in the MODES with lower pressures.

Entry into MODES 3 and 4 is allowed to establish the necessary differential pressures and stable conditions to allow for performance of this Surveillance. The Note that allows this provision is complementary to the Frequency of prior to entry into MODE 2 whenever the unit has been in MODE 5 for 7 days or more, if leakage testing has not been performed in the previous 9 months. In addition, this Surveillance is not required to be performed on the RHR System when the RHR System is aligned to the RCS in the shutdown cooling mode of operation. PIVs contained in the RHR shutdown cooling flow path must be leakage rate tested after RHR is secured and stable unit conditions and the necessary differential pressures are established.

SR 3.4.14.2 and SR 3.4.14.3

Verifying that the RHR autoclosure interlocks are OPERABLE ensures that RCS pressure will not pressurize the RHR system beyond 125% of its design pressure of [600] psig. The interlock setpoint that prevents the valves from being

Insert: B3.4-84-01

(continued)

INSERT: B 3.4-84-01

Verifying that ACI and OPI function at the required setpoints ensures that both RHR suction isolation valves will be closed and remain closed when the plant is at normal operating temperatures and pressures.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.14.2 and SR 3.4.14.3 (continued)

opened is set so the actual RCS pressure must be < [425] psig to open the valves. This setpoint ensures the RHR design pressure will not be exceeded and the RHR relief valves will not lift. The [18] month Frequency is based on the need to perform the Surveillance under conditions that apply during a plant outage. The [18] month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment.

These SRs are modified by Notes allowing the RHR autoclosure function to be disabled when using the RHR System suction relief valves for cold overpressure protection in accordance with SR 3.4.12.7.

(24)

REFERENCES

1. 10 CFR 50.2.
2. 10 CFR 50.55a(c).
3. 10 CFR 50, Appendix A, Section V, GDC 55.
4. WASH-1400 (NUREG-75/014), Appendix V, October 1975.
5. NUREG-0677, May 1980.
6. [Document containing list of PIVs.]
7. ASME, Boiler and Pressure Vessel Code, Section XI.
8. 10 CFR 50.55a(g).

PA.1

FSAR Section 6.2

Insert: B 3.4-85-01

NUREG-1431 Markup Inserts
ITS SECTION 3.4.14 - RCS Pressure Isolation Valve (PIV) Leakage

INSERT: B 3.4-85-01

9. Generic Letter 87-006, Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves.

10. WCAP-11736-A, Residual Heat Removal System Autoclosure Interlock (ACI) Removal Report. R.1

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.14:
"RCS Pressure Isolation Valve (PIV) Leakage"

PART 6:

Justification of Differences between

NUREG-1431 and IP3 ITS

JUSTIFICATION OF DIFFERENCES FROM NUREG-1431
ITS SECTION 3.4.14 - RCS Pressure Isolation Valve (PIV) Leakage

RETENTION OF EXISTING REQUIREMENT (CURRENT LICENSING BASIS)

CLB.1 IP3 LCO 3.4.14 Bases and the IP3 definition of Leakage differ from NUREG-1431, Rev 1, in that pressure isolation valve (PIV) leakage into closed systems is not included in determining reactor coolant system operational identified leakage.(Leakage into closed systems is leakage that can be accounted for and contained by a system not directly connected to the atmosphere. Leakage past the pressurizer safety valve seats and leakage past the safety injection pressure isolation valves are examples of reactor coolant system leakage into closed systems.

This change to NUREG-1431, Rev 1, maintain the requirements found in CTS 3.1.F.2 and CTS 3.1.F.3 which establish limits for unidentified and total (unidentified and identified) RCS Leakage and specifies that these limits do not apply to controlled leakage sources such as the reactor coolant pump controlled leakage seals and leakage into closed systems.

This change, which increases the allowable RCS identified leakage by not counting leakage into closed systems, is acceptable because leakage limits are action levels that are indicative of potentially significant RCS boundary deterioration. Leakage past PIVs is measured separately and subject to their own specific leakage limits. Therefore, leakage past PIVs is indicative of significant PIV leakage for which Conditions and Required Actions are established. This is an administrative change with no significant adverse impact on safety because there is no change to the existing requirement.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT

PA.1 Corrected typographical error or made a minor editorial improvement to improve clarity and ensure requirements are fully understood and consistently applied. There are no technical changes to requirements as specified in NUREG 1431, Rev. 1; therefore, this change is not a significant or generic deviation from NUREG 1431, Rev 1.

PA.2 Not Used.

PA.3 Not Used.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN OR DESIGN BASIS

DB.1 Design or implementation details are incorporated or revised as necessary to more precisely describe IP3 current design or practice. These changes are intended to describe the design, improve clarity, or ensure requirements are fully understood and consistently applied. Unless identified and described blow, these changes are self-explanatory. A detailed description of the design, accident analysis assumptions, and Operability requirements are incorporated into the IP3 ITS Bases. These changes maintain the IP3 current licensing basis except as identified and justified in the CTS/ITS discussion of changes.

DB.2 STS SR 3.4.14.2 and 3.4.14.3, which test the RHR suction auto closure interlock, includes a bracketed Note which states: "Not required to be met when the RHR System auto closure interlock is disabled in accordance with SR 3.4.12.7." This Note is needed in the STS because STS 3.4.12 provides an option that uses the RHR relief valves to be used as the LTOP relief valve(s). This Note cannot be included in the IP3 ITS because RHR relief valves can never be used to provide LTOP at IP3. The RHR relief valves at IP3 are sized to the capacity of 3 charging pumps and do not provide adequate vessel protection. In fact, IP3 requires that LTOP requirements be met whenever the RHR system is not isolated from the RCS even when above LTOP temperatures because LTOP requirements are used to protect the RHR system from over pressurization.

DIFFERENCE BASED ON A GENERIC CHANGE TRAVELER FOR NUREG-1431

None

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE

X.1 IP3 LCO 3.4.14, LCO, Applicability, Required Action C.1 and C.2, and all supporting Bases are modified to make the requirements for the RHR System autoclosure Interlocks (ACI) and open permissive interlocks (OPI) consistent with the IP3 FSAR and WCAP-11736-A, Residual Heat Removal System Autoclosure Interlock (ACI) Removal Report.

This change is necessary because the requirements for the RHR System ACI and OPI in NUREG-1431 are not complete and are not correct.

Specifically, NUREG-1431, LCO 3.4.14 Applicability, appears to state that the RHR System ACI and OPI functions are not required "when in, or during the transition to or from, the RHR mode of operation." This is not consistent with the IP3 FSAR and WCAP-11736-A. Additionally, NUREG-1431, LCO 3.4.14, Required Action C.1 and Bases, state that safety function is restored by isolating "the affected penetration by use of one closed manual or deactivated automatic valve." This is not correct. Finally, NUREG-1431, LCO 3.4.14 Bases, do not discuss the safety function of the ACI and OPI and does not reference WCAP-11736-A. Therefore, IP3 revised LCO 3.4.14 consistent with requirements in the IP3 FSAR and WCAP-11736-A.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.16:
"RCS Specific Activity"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	Verify reactor coolant gross specific activity ≤ 100/E(bar) μCi/gm.	7 days
SR 3.4.16.2	-----------------NOTE----------------- Only required to be performed in MODE 1. -- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm.	14 days AND Between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RTP within a 1 hour period
SR 3.4.16.3	-----------------NOTE----------------- Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours. -- Determine E(bar) from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.	184 days

NYPA

NYPA

BASES

APPLICABLE SAFETY ANALYSES (continued)

coolant at the LCO limit and an existing reactor coolant steam generator (SG) tube leakage rate of 1 gpm. The safety analysis assumes the specific activity of the secondary coolant at its limit of 0.1 μCi/gm DOSE EQUIVALENT I-131 from LCO 3.7.17, "Secondary Specific Activity."

The analysis for the SGTR accident establishes the acceptance limits for RCS specific activity. Reference to this analysis is used to assess changes to the unit that could affect RCS specific activity, as they relate to the acceptance limits.

The analysis is for two cases of reactor coolant specific activity. One case assumes specific activity at 1.0 μCi/gm DOSE EQUIVALENT I-131 with a concurrent large iodine spike that increases the I-131 activity in the reactor coolant by a factor of about 50 immediately after the accident. The second case assumes the initial reactor coolant iodine activity at 60.0 μCi/gm DOSE EQUIVALENT I-131 due to a pre-accident iodine spike caused by an RCS transient. In both cases, the noble gas activity in the reactor coolant assumes 1% failed fuel, which closely equals the LCO limit of 100/E(bar) μCi/gm for gross specific activity. NYPA

The analysis also assumes a loss of offsite power at the same time as the SGTR event. The SGTR causes a reduction in reactor coolant inventory. The reduction initiates a reactor trip from a low pressurizer pressure signal or an RCS overtemperature ΔT signal.

The coincident loss of offsite power causes the steam dump valves to close to protect the condenser. The rise in pressure in the ruptured SG discharges radioactively contaminated steam to the atmosphere through the SG atmospheric dump valves (ADVs) and the main steam safety valves. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends.

The safety analysis shows the radiological consequences of an SGTR accident are within a small fraction of the Reference 1 dose

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

guideline limits. Operation with iodine specific activity levels greater than the LCO limit is permissible, if the activity levels do not exceed the limits shown in Figure 3.4.16-1, in the applicable specification, for more than 48 hours. The safety analysis has concurrent and pre-accident iodine spiking levels up to 60.0 μCi/gm DOSE EQUIVALENT I-131.

The remainder of the above limit permissible iodine levels shown in Figure 3.4.16-1 are acceptable because of the low probability of a SGTR accident occurring during the established 48 hour time limit. The occurrence of an SGTR accident at these permissible levels could increase the site boundary dose levels, but still be within 10 CFR 100 dose guideline limits.

The limits on RCS specific activity are also used for establishing standardization in radiation shielding and plant personnel radiation protection practices.

RCS specific activity satisfies Criterion 2 of 10 CFR 50.36.

LCO

The specific iodine activity is limited to 1.0 μCi/gm DOSE EQUIVALENT I-131, and the gross specific activity in the reactor coolant is limited to the number of μCi/gm equal to 100 divided by E(bar) (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the 2 hour thyroid dose to an individual at the site boundary during the Design Basis Accident (DBA) will be a small fraction of the allowed thyroid dose. The limit on gross specific activity ensures the 2 hour whole body dose to an individual at the site boundary during the DBA will be a small fraction of the allowed whole body dose. NYPA

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline limits.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1 (continued)

Trending the results of this Surveillance allows proper remedial action to be taken before reaching the LCO limit under normal operating conditions. The Surveillance is applicable in MODES 1 and 2, and in MODE 3 with T_{avg} at least 500°F. The 7 day Frequency considers the low probability of a gross fuel failure during the time.

SR 3.4.16.2

This Surveillance is performed in MODE 1 only to ensure iodine remains within limit during normal operation and following fast power changes when fuel failure is more apt to occur. The 14 day Frequency is adequate to trend changes in the iodine activity level, considering gross activity is monitored every 7 days. The Frequency, between 2 and 6 hours after a power change ≥ 15% RTP within a 1 hour period, is established because the iodine levels peak during this time following fuel failure; samples at other times would provide inaccurate results.

SR 3.4.16.3

A radiochemical analysis for E(bar) determination is required every 184 days (6 months) with the plant operating in MODE 1 equilibrium conditions. The E(bar) determination directly relates to the LCO and is required to verify plant operation within the specified gross activity LCO limit. The analysis for E(bar) is a measurement of the average energies per disintegration for isotopes with half lives longer than 10 minutes, excluding iodines and non-gamma emitters. The 10 minute limit on half-lives ensures that Xenon-138 is included in the determination of E(bar). The Frequency of 184 days recognizes E(bar) does not change rapidly. NYPA

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.3 (continued)

This SR has been modified by a Note that indicates sampling is required to be performed within 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for at least 48 hours. This ensures that the radioactive materials are at equilibrium so the analysis for E(bar) is representative and not skewed by a crud burst or other similar event.

NYPA

REFERENCES

1. 10 CFR 100.11, 1973.

2. FSAR, Section 14.2.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.16:
"RCS SPECIFIC ACTIVITY"

PART 2:

CURRENT TECHNICAL SPECIFICATION PAGES

Annotated to show differences between CTS and ITS

CTS PAGE	AMENDMENT FOR REV O SUBMITTAL	AMENDMENT FOR REV 1 SUBMITTAL	COMMENT
3.1-26	121	121	
3.1-27	121	121	
3.1-28 (F3.1-3)	121	121	
T4.1-2(1)	139	200	Deleted Boric Acid Tank Sampling Requirement Frequencies
T4.1-2(2)	0	0	

No impact on ITS 3.4.16

TABLE 4.1-2 (Sheet 1 of 2)

FREQUENCIES FOR SAMPLING TESTS

Sample	Analysis	Frequency	Maximum Time Between Analysis
1. ~~Reactor Coolant~~ SR 3.4.16.1	~~Gross Activity~~[1]	~~5 days/week~~[2][4]	~~3 days~~[4] (M.3)
	Tritium Activity	Weekly[1]	10 days (LA.2)
	Boron concentration	2 days/week	5 days (LA.3)
	~~Radiochemical (gamma)~~[2] ~~Spectral Check~~	~~Monthly~~	~~45 days~~ (M.3)
	Oxygen and Chlorides Concentration	3 times per 7 days	3 days
	Fluorides Concentration	Weekly	10 days
SR 3.4.16.3	Ē Determination [3]	~~Semi-Annually~~ 184 days	~~30 weeks~~ SR 3.0.2 (L.1)
SR 3.4.16.2	Isotopic Analysis for I-131, I-133, I-135	Once per 14 days[3]	~~20 days~~ SR 3.0.2 (M.1)
2. Boric Acid Tank	Boron Concentration, Chlorides	Weekly	10 days
3. Spray Additive Tank	NaOH Concentration	Monthly	45 days
4. Accumulators	Boron Concentration	Monthly	45 days
5. Refueling Water Storage Tank	Boron Concentration pH, Chlorides	Monthly	45 days
	Gross Activity	Quarterly	16 weeks
6. Secondary Coolant	I-131 Equivalent (Isotopic Analysis)	Monthly	45 days
	Gross Activity	3 times per 7 days	3 days
7. Component Cooling Water	Gross Activity, Corrosion Inhibitor and pH	Monthly	45 days
8. Spent Fuel Pool (when fuel stored)	Gross Activity Boron Concentration, Chlorides	Monthly	45 days

(A.7)

R.1

R.1

R.1

SEE RELOCATED

SEE CTS MASTER MARKUP

Amendment No. 139

Superceded by Amendment 185.
No impact on ITS LCO 3.4.16
See attached

ITS 3.4.16

FREQUENCIES FOR SAMPLING TESTS

Sample	Analysis	Frequency	Maximum Time Between Analysis
1. Reactor Coolant	Gross Activity(1) Tritium Activity Boron Concentration Radiochemical (gamma)(2) Spectral Check Oxygen and Chlorides Concentration Fluorides Concentration Ē Determination (3) Isotopic Analysis for I-131, I-133, I-135	5 days/week(1)(4) Weekly(1) 2 days/week Monthly 3 times per 7 days Weekly Semi-Annually Once per 14 days(5)	3 day(4) 10 days 5 days 45 days 3 days 10 days 30 Weeks 20 days
2. Deleted			
3. Spray Additive Tank	NaOH Concentration	Monthly	45 days
4. Accumulators	Boron Concentration	Monthly	45 days
5. Refueling Water Storage Tank	Boron Concentration pH, Chlorides Gross Activity	Monthly Quarterly	45 days 16 weeks
6. Secondary Coolant	I-131 Equivalent (Isotopic Analysis) Gross Activity	Monthly 3 times per 7 days	45 days 3 days
7. Component Cooling Water	Gross Activity, Corrosion Inhibitor and pH	Monthly	45 days
8. Spent Fuel Pool (when fuel stored)	Gross Activity Boron Concentration, Chlorides	Monthly	45 days

ITS 3.4.16 | R.1

TABLE 4.1-2 *(Sheet 2 of 2)*

FREQUENCIES FOR SAMPLING TESTS

FOOTNOTES:

SR 3.4.16.1

(1) A gross activity analysis shall consist of the quantitative measurement of the total radioactivity of the primary coolant in units of μCi/cc.

(2) A radiochemical analysis shall consist of the quantitative measurement of each radionuclide with half life greater than 10 minutes making up at least 95% of the total activity of the primary coolant.

LA.1 M2 L.3

SR 3.4.16.3

(3) $\bar{E}$ determination will be started when the gross activity analysis indicates ≥ 10 μCi/cc and will be redetermined if the primary coolant gross radioactivity changes by more than 10 μCi/cc in accordance with Specification 3.1.D.

L.2 L.4

R.1 LA.4

(4) Whenever the Gross Failed Fuel Monitor is inoperable, the sampling frequency shall be increased to twice per day, five days per week. The maximum time between analyses shall be sixteen hours for the two samples taken on a given day and three days between daily analysis. This accelerated sampling frequency need only be performed until the Gross Failed Fuel Monitor is declared operable.

Reg. Act A.1
SR 3.4.16.2 Frequency

(5) Once per 4 hours whenever the DOSE EQUIVALENT I-131 exceeds 1.0 μCi/cc or one sample after two hours but before six hours following a thermal power change exceeding 15 percent of the rated thermal power within a one-hour period.

Note to SR 3.4.16.3

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.16:
"RCS Specific Activity"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

Mode 3 with RCS average temperature (Tavg) ≥ 500°F. However, minimum temperature for criticality limits which are significantly greater than 500 °F ensure that CTS requirements for primary coolant activity are applicable before the CTS allows the reactor to be placed in a status equivalent to the ITS Mode 2. Therefore, this is an administrative change with no impact on safety.

A.7 CTS 3.1.D.1.a establishes an LCO limit for Dose Equivalent Iodine-131. CTS 1.15 specifies that "DOSE EQUIVALENT I-131 shall be that concentration of I-131 (micro curie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present."

ITS SR 3.4.16.2 establishes an LCO limit for Dose Equivalent Iodine-131. ITS 1.0 specifies that "DOSE EQUIVALENT I-131 shall be that concentration of I-131 (micro curies/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present.

Therefore, CTS 3.1.D.1.a requirements are identical to ITS SR 3.4.16.2 requirements. There is no CTS requirement for periodic verification of CTS 3.1.D.1.a, Dose Equivalent Iodine-131: however, CTS Table 4.1-2, item 1, requires Isotopic Analysis for I-131, I-133, and I-135 at the identical Frequency that ITS SR 3.4.16.2 requires verification of Dose Equivalent Iodine-131. Therefore, NYPA has always considered CTS Table 4.1-2, item 1, to be the requirement or periodic verification of CTS 3.1.D.1.a requirements consistent with the definition of Dose Equivalent Iodine-131 in CTS 1.15.

The fact that CTS Table 4.1-2, item 1, does not mention I-132 and I-134 does not relax the CTS 3.1.D.1.a requirement for Dose Equivalent Iodine-131 consistent with the CTS definition and, therefore, is either a minor administrative error in the CTS or a shorthand notation for the Dose Equivalent Iodine-131 requirement. Therefore, this is an administrative change with no impact on safety.

DISCUSSION OF CHANGES
ITS SECTION 3.4.16 - RCS Specific Activity

MORE RESTRICTIVE

M.1 CTS Table 4.1-2, Item 1, establishes a surveillance Frequency for Isotopic Analysis for I-131, I-133, I-135 as once per 14 days with a "maximum time between analysis" of 20 days. ITS SR 3.4.16.2 also requires verification of reactor coolant dose equivalent I-131 specific activity every 14 days but the limit for the maximum time between analyses is based on ITS SR 3.0.2 which allows a 25% grace period (i.e., the maximum interval is 17.5 days). This change is not needed to satisfy technical requirements but is being adopted for consistency with the NUREG-1431 and to simplify application of ITS SR 3.0.2. This change has no impact on safety.

M.2 CTS 3.1.D.1 specifies that the acceptance criteria for reactor coolant gross activity, a function of E(bar), is limited to "noble gases with half-lives greater than 10 minutes." This is consistent with CTS 1.14, the definition of E(bar)-Average Disintegration Energy, which limits E(bar) to the Noble gas E(bar).

ITS LCO 3.4.16 and the acceptance criteria for ITS 3.4.16.1 are based on the ITS Definition, E(bar)-Average Disintegration Energy. ITS LCO 3.4.16 and the acceptance criteria for ITS 3.4.16.1 are based on the ITS Definition, E(bar)-Average Disintegration Energy. The ITS Definition of E(bar) differs from the CTS definition in that the ITS definition includes all isotopes (not just Noble gases) in the reactor coolant, other than iodines, with half lives > 10 minutes, making up at least 95% of the total non-iodine activity in the coolant. This change, including all isotopes except iodines when measuring gross specific activity, is needed because the ITS definition ensures that contributions from isotopes other than Noble gases, although typically not significant, are counted. (Maintaining the CTS allowance permitting the exclusion of isotopes with half lives > 10 minutes rather than adopting the ITS allowance permitting the exclusion of isotopes with half lives > 15 minutes is needed to ensure that Xenon-138 is included in E(bar)-Average Disintegration Energy consistent with current analysis assumptions.) This change, excluding iodines from the definition of E(bar) and gross specific activity, is acceptable because the dose contribution of iodines are limited by the ITS SR 3.4.16.2 limits for Dose Equivalent I-131. Therefore, this change has no significant adverse impact on safety.

M.3 CTS Table 4.1-2, Item 1, requires verification at least five days per week of the of "gross activity" and requires verification every month of gross specific activity using a "Radiochemical (gamma) Spectral Check." Gross activity and Radiochemical (gamma) Spectral Check are defined in Footnotes 1 and 2 of CTS Table 4.1-2. The Radiochemical (gamma) Spectral Check is equivalent (See ITS 3.4.16, DOC M.2) to the gross specific activity defined in the Based of ITS 3.4.16.

ITS SR 3.4.16.1 requires verification every 7 days of the gross specific activity. This change requires more Frequent verification (every 7 days versus monthly) of the gross specific activity (See ITS 3.4.16. DOC M.2) and eliminates the explicit requirement to verify gross activity at least five days per week.

This change is acceptable because this check was intended to provide an indication of fuel failure by monitoring for an increase in gross activity. Extending the SR Frequency from five days per week to once per week is acceptable because industry experience demonstrates there is a low probability of significant fuel failure that is not readily apparent by other indications, industry experience indicates that trending of results for gross activity determinations at a 7 day Frequency is effective in identifying incipient fuel failure prior to exceeding limits, and the operation of the gross failed fuel monitor which is required by plant licensee programs controlled outside of Technical Specifications (See Relocated Item R.21). This change has no significant adverse impact on safety because the combination of the low probability of fuel failure, the use of trending to identify incipient fuel failure prior to exceeding limits, and the presence of a gross failed fuel monitor provide a high degree of assurance that failed fuel will be detected in a timely manner.

LESS RESTRICTIVE

L.1 CTS Table 4.1-2, Item 1, establishes a surveillance Frequency for E Bar determination as semi-annually with a "maximum time between analysis" of 30 weeks. ITS SR 3.4.16.3 also requires verification of E Bar every 184 days but the maximum time between analyses is based on ITS SR 3.0.2

which allows a 25% grace period for a maximum interval of approximately 32.5 weeks. This change is not needed to satisfy technical requirements but is being adopted for consistency with the NUREG-1431 and to simplify application of ITS SR 3.0.2. Extensive experience has shown that E Bar does not change rapidly. Additionally, unexpected changes in E Bar would be evident from changes in other primary coolant activity levels which are monitored more frequently. Therefore, keeping the normal Frequency for E Bar determination as 184 days but extending the maximum time between analyses from 30 weeks to 32.5 weeks has no significant adverse impact on safety.

L.2 CTS Table 4.1-2, Item 1, establishes a surveillance Frequency for E Bar determination as semi-annually. This SR Frequency is modified by CTS Table 4.1-2, Note 3, which specifies that E Bar determination will be started when the gross activity analysis indicates $\geq$ 10 μCi/cc. This modification of the SR Frequency is intended to allow determination of E Bar to be deferred until plant conditions are such that meaningful results can be obtained.

ITS SR 3.4.16.3 also requires verification of E Bar every 184 days but provides a more precise method of ensuring that the sample is taken only when plant conditions are established so that the sample provides an accurate indication of plant conditions. SR 3.4.16.3 ensures that appropriate plant conditions are established by requiring that the E Bar verification can be made only in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for $\geq$ 48 hours. A Note to SR 3.4.16.3 allows deferring performance of the SR until these conditions can be established.

The combination of the sampling restriction in the SR and the allowance provided in the SR note ensure that the sample is accurate by both allowing and requiring the SR be performed when radioactive materials are at equilibrium so the analysis results are representative of actual plant conditions and can be trended. This change has no impact on safety because the combination of the allowance for deferral of the SR (the SR Note) and restrictions about the conditions for sampling ensure that the SR provides an accurate indication of actual plant conditions.

L.3 Not Used.

L.4 CTS Table 4.1-2, Note 3, specifies that E Bar will be redetermined if the primary coolant gross radioactivity changes by more than 10 μCi/cc. ITS SR 3.4.16.3 does not include this requirement.

This change is needed to ensure that E Bar measurements are not skewed by a crud burst or other similar event. This change is acceptable because extensive industry experiences indicates that E Bar changes slowly and the combination of the sampling restrictions in the SR and the allowance provided in the SR note ensure that the sample is accurate by both allowing and requiring the SR be performed when radioactive materials are at equilibrium so the analysis results are representative of actual plant conditions and can be trended. Therefore, this change has no significant adverse impact on safety.

REMOVED DETAIL

LA.1 CTS 3.1.D specifies that limits on specific activity apply only to "noble gases with half-lives greater than 10 minutes." ITS LCO 3.4.16 establishes limits for gross specific activity (See ITS 3.4.16, DOC M.2) with the clarification in the ITS Bases that gross specific activity is basically a quantitative measure of radionuclides with half lives longer than 10 minutes, excluding iodines, this measurement is the sum of the degassed gamma activities and the gaseous gamma activities in the sample taken.

These descriptions of what constitutes a gross specific activity determination are not retained in ITS LCO 3.4.16 and are moved to the Bases. This change is acceptable because ITS LCO 3.4.16 maintains the requirement that reactor coolant activity levels be maintained within the specified limits. Maintaining this information in the Bases is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, and ITS 5.5.13, Technical Specifications (TS) Bases Control Program, are designed to assure that changes to the ITS Bases do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the possibility of a new

This change is a less restrictive administrative change with no impact on safety because no requirements are being deleted from Technical Specifications and an appropriate change control process and an appropriate level of regulatory oversight are maintained for the information being relocated out of the Technical Specifications.

LA.2 CTS Table 4.1-2, Item 1, includes a surveillance for a weekly measurement of tritium activity in the reactor coolant. ITS 3.4.16 does not retain these requirements which are being relocated to the Final Safety Analysis Report (FSAR).

This change, which allows the weekly surveillance of tritium activity in the reactor coolant to be maintained in the FSAR, is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, are designed to assure that changes in the FSAR do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the possibility of a new or different kind of accident, and do not result in a significant reduction in a margin of safety, Additionally, IP3 programs that implement FSAR changes in accordance with 10 CFR 50.59 require periodic submittal of FSAR and Bases changes to the NRC for review.

This change is a less restrictive administrative change with no impact on safety because an appropriate change control process and an appropriate level of regulatory oversight are maintained for the information being relocated out of the Technical Specifications.

LA.3 CTS Table 4.1-2, Item 1, includes a surveillance for a twice weekly measurement of boron concentration. ITS 3.4.16 does not retain this requirement which is being relocated to the FSAR.

This change, which allows the twice weekly measurement of boron concentration to be maintained in the FSAR, is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, are designed to assure that changes in the FSAR do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the possibility of a new or different kind of accident, and do not result in a significant reduction in a margin of safety. This change is also acceptable because boron concentration is an intrinsic part of verification that shutdown margin and rod insertion limits are met. ITS 3.1, Reactivity Control Systems, and 3.9, Refueling Operations, maintain requirements for the verification of shutdown margin and rod insertion limits. Additionally, IP3 programs that implement FSAR changes in accordance with 10 CFR 50.59 require periodic submittal of FSAR and Bases changes to the NRC for review.

This change is a less restrictive administrative change with no impact on safety because an appropriate change control process and an appropriate level of regulatory oversight are maintained for the information being relocated out of the Technical Specifications.

LA.4 CTS Table 4.1-2, Footnote (4), requires increasing the sampling frequency of RCS Gross activity to twice per day whenever the Gross Failed Fuel Monitor is inoperable. ITS 3.4.16 does not retain these requirements which are being relocated to plant procedures.

Maintaining the requirements for increased RCS activity measurement when the Gross Failed Fuel Monitor is inoperable outside the Technical Specifications is acceptable because the requirements for Gross Failed Fuel Monitor operability are contained in ITS 3.3.3, PAM Instrumentation. In accordance with ITS 3.3.3, Required Action F.1, a report to the NRC would be required in the event the Gross Failed Fuel Monitor became inoperable. This report would detail, in part, the alternate means of monitoring provided, and the degree to which the alternate means are equivalent to the installed instrument. Therefore, this change is a less restrictive administrative change because no requirements are being deleted from the Technical Specifications.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.16:
"RCS Specific Activity"

PART 4:

No Significant Hazards Considerations
for
Changes between CTS and ITS
that are
Less Restrictive

No Significant Hazard Considerations for Changes that are Administrative, More Restrictive, and Removed Details are the same for all Packages. A Copy is included at the end of the Package.

NO SIGNIFICANT HAZARDS EVALUATION
ITS SECTION 3.4.16 - RCS Specific Activity

LESS RESTRICTIVE
("L.3" Labeled Comments/Discussions)

Not Used.

LESS RESTRICTIVE
("L.4" Labeled Comments/Discussions)

New York Power Authority has evaluated the proposed Technical Specification change identified as "Less Restrictive" in accordance with the criteria set forth in 10 CFR 50.92, and has determined that the proposed change does not involve a significant hazards consideration. The bases for the determination that the proposed changes do not involve a significant hazards consideration are discussed below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   This change eliminates the requirement that E Bar be redetermined if the primary coolant gross radioactivity changes by more than 10 μCi/cc. This change will not result in a significant increase in the probability of an accident previously evaluated because the Frequency for the determination of E Bar is not related to the precursor of any analyzed accident. This change will not result in a significant increase in the consequences of an accident previously evaluated because the change will ensure that E Bar measurements are not skewed by a crud burst or other similar event. This change is acceptable because extensive industry experiences indicates that E Bar changes slowly and the combination of the sampling restrictions in the SR and the allowance provided in the SR note ensure that the sample is accurate by both allowing and requiring the SR be performed when radioactive materials are at equilibrium so the analysis results are representative of actual plant conditions and can be trended.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed changes will not involve any physical changes to plant The proposed changes will not involve any physical changes to plant systems, structures, or components (SSC). The changes in normal Plant operation

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.4.16:
"RCS Specific Activity"

PART 5:

NUREG-1431
Annotated to show differences between
NUREG-1431 and ITS

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

<3.1.D.1>
<DOC M2>

LCO 3.4.16 The specific activity of the reactor coolant shall be within limits.

<3.1.D.1>
<DOC A.6>

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS average {loop} temperature (T_{avg}) ≥ 500°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<DOC A3> <3.1.D.1.a> A. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.	------------Note------------ LCO 3.0.4 is not applicable. ----------------------------	
<3.1.D.2> <Table 4.1-2, Note 5>	A.1 Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	AND	
<3.1.D.2>	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
<3.1.D.4> <DOC A.4> B. Gross specific activity of the reactor coolant not within limit {of SR 3.4.16.1}.	~~B.1 Perform SR 3.4.16.2.~~	~~4 hours~~ (T.1)
	~~AND~~	
	B.~~2~~ 1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

(continued)

<CTS>

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
<3.1.D.3> <DOC A.4> C. Required Action and associated Completion Time of Condition A not met. OR <3.1.D.3> <DOC A.4> DOSE EQUIVALENT I-131 in the unacceptable region of Figure 3.4.16-1.	C.1	Be in MODE 3 with T_{avg} < 500°F.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
<3.1.D.1.b> <T 4.1-2, #1> <DOC M.2> <DOC M3> SR 3.4.16.1	Verify reactor coolant gross specific activity ≤ 100/Ē μCi/gm. (E(bar) PA.1)	7 days |R.1
<3.1.D.1.a> <Table 4.1-2, Item 1> SR 3.4.16.2	-------------------NOTE------------------- Only required to be performed in MODE 1. -- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 μCi/gm.	14 days AND <Table 4.1-2 Item 1, Note 5> Between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RTP within a 1 hour period

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.16.3	-------------------NOTE------------------- Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours. --- Determine Ē from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.	184 days

<DOC L.2>

<Table 4.1-2, Item 1>
<DOC L.1>
<DOC L.2>
<DOC L.4>

(E (bar)) (PA.1)

R.1

BASES

APPLICABLE SAFETY ANALYSES (continued)

The analysis for the SGTR accident establishes the acceptance limits for RCS specific activity. Reference to this analysis is used to assess changes to the unit that could affect RCS specific activity, as they relate to the acceptance limits.

The analysis is for two cases of reactor coolant specific activity. One case assumes specific activity at 1.0 μCi/gm DOSE EQUIVALENT I-131 with a concurrent large iodine spike that increases the I-131 activity in the reactor coolant by a factor of about 50 immediately after the accident. The second case assumes the initial reactor coolant iodine activity at 60.0 μCi/gm DOSE EQUIVALENT I-131 due to a pre-accident iodine spike caused by an RCS transient. In both cases, the noble gas activity in the reactor coolant assumes 1% failed fuel, which closely equals the LCO limit of 100/Ē μCi/gm for gross specific activity. (PA.1) R.1

E(bar)

The analysis also assumes a loss of offsite power at the same time as the SGTR event. The SGTR causes a reduction in reactor coolant inventory. The reduction initiates a reactor trip from a low pressurizer pressure signal or an RCS overtemperature ΔT signal.

The coincident loss of offsite power causes the steam dump valves to close to protect the condenser. The rise in pressure in the ruptured SG discharges radioactively contaminated steam to the atmosphere through the ~~SG power operated relief valves~~ and the main steam safety valves. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends. (PA.1) (DB.1)

Atmospheric Dump Valves (ADVs)

The safety analysis shows the radiological consequences of an SGTR accident are within a small fraction of the Reference 1 dose guideline limits. Operation with iodine specific activity levels greater than the LCO limit is permissible, if the activity levels do not exceed the limits shown in Figure 3.4.16-1, in the applicable specification, for more than 48 hours. The safety analysis has concurrent and pre-accident iodine spiking levels up to 60.0 μCi/gm DOSE EQUIVALENT I-131.

The remainder of the above limit permissible iodine levels shown in Figure 3.4.16-1 are acceptable because of the low probability of a SGTR accident occurring during the established 48 hour time limit. The occurrence of an SGTR

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

accident at these permissible levels could increase the site boundary dose levels, but still be within 10 CFR 100 dose guideline limits.

The limits on RCS specific activity are also used for establishing standardization in radiation shielding and plant personnel radiation protection practices.

RCS specific activity satisfies Criterion 2 of the NRC Policy Statement. 10 CFR 50.36 PA.1

LCO

R.1 PA.1 E(bar)

The specific iodine activity is limited to 1.0 μCi/gm DOSE EQUIVALENT I-131, and the gross specific activity in the reactor coolant is limited to the number of μCi/gm equal to 100 divided by Ē (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the 2 hour thyroid dose to an individual at the site boundary during the Design Basis Accident (DBA) will be a small fraction of the allowed thyroid dose. The limit on gross specific activity ensures the 2 hour whole body dose to an individual at the site boundary during the DBA will be a small fraction of the allowed whole body dose.

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline limits.

APPLICABILITY

In MODES 1 and 2, and in MODE 3 with RCS average temperature ≥ 500°F, operation within the LCO limits for DOSE EQUIVALENT I-131 and gross specific activity are necessary to contain the potential consequences of an SGTR to within the acceptable site boundary dose values.

For operation in MODE 3 with RCS average temperature < 500°F, and in MODES 4 and 5, the release of radioactivity in the event of a SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety valves.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.16.3

A radiochemical analysis for Ē determination is required every 184 days (6 months) with the plant operating in MODE 1 equilibrium conditions. The Ē determination directly relates to the LCO and is required to verify plant operation within the specified gross activity LCO limit. The analysis for Ē is a measurement of the average energies per disintegration for isotopes with half lives longer than 15 minutes, excluding iodines. The Frequency of 184 days recognizes Ē does not change rapidly.

This SR has been modified by a Note that indicates sampling is required to be performed within 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for at least 48 hours. This ensures that the radioactive materials are at equilibrium so the analysis for Ē is representative and not skewed by a crud burst or other similar ~~abnormal~~ event.

E (bar)

and non-gamma emitters

10

The 10 minute limit on half-lives ensures that Xenon-138 is included in the determination of Ē.

PA.1 | R.1

CLB.1

PA.1 | R.1

DB.1

PA.1 | R.1

REFERENCES

1. 10 CFR 100.11, 1973.
2. FSAR, Section ~~15.6.3~~ 14.2.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.1:
"Accumulators"

PART 5:

NUREG-1431
Annotated to show differences between
NUREG-1431 and ITS

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.4

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31 day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 1% volume increase will identify whether inleakage has caused a reduction in boron concentration to below the required limit. It is not necessary to verify boron concentration if the added water inventory is from the refueling water storage tank (RWST), because the water contained in the RWST is within the accumulator boron concentration requirements. This is consistent with the recommendation of NUREG-1366 (Ref. 5).

SR 3.5.1.5

Verification every 31 days that power is removed from each accumulator isolation valve operator when the pressurizer pressure is ≥ 2000 psig ensures that an active failure could not result in the undetected closure of an accumulator motor operated isolation valve. If this were to occur, only two accumulators would be available for injection given a single failure coincident with a LOCA. Since power is removed under administrative control, the 31 day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when pressurizer pressure is < 2000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during plant startups or shutdowns. Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves.

Should closure of a valve occur in spite of the interlock, the SI signal provided to the valves would open a closed valve in the event of a LOCA.

(continued)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2:
"ECCS - Operating"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

ACTIONS (continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS – Operating

LCO 3.5.2 Three ECCS trains shall be OPERABLE.

---------------------------NOTES---------------------------

1. In MODE 3, both HHSI flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.

2. Operation in MODE 3 with HHSI pumps made incapable of injecting pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP)," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds 375°F, whichever comes first.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND Two HHSI pumps, one RHR pump and one Containment Recirculation pump are OPERABLE.	A.1 Restore train(s) to OPERABLE status.	72 hours

RAI-01

(continued)

BASES

BACKGROUND (continued)

The ECCS FUNCTION is provided by three separate ECCS systems: high head safety injection (HHSI), residual heat removal (RHR) injection, and containment recirculation. Each ECCS system is divided into subsystems as follows:

- HHSI System is divided into three 50% capacity subsystems (i.e., HHSI 31, 32 and 33) which share two pump discharge headers (i.e., 31 and 33). Each HHSI subsystem consists of one pump as well as associated piping and valves to transfer water from the suction source to the core. HHSI subsystem 32 is aligned to inject using the flow path associated with both HHSI subsystem 31 and 33. If either HHSI pump 31 or 33 fails to start or achieve required discharge pressure, HHSI pump 32 will inject via the header associated with the failed pump. If all three HHSI pumps start, flow from HHSI pump 32 will be divided between header 31 and 33. Note that the HHSI pumps have a shutoff head of approximately 1500 psig. Therefore, IP3 is classified as a low head safety injection plant. RAI-01

- RHR injection System is divided into two 100% capacity subsystems. Each ECCS RHR subsystem consists of one RHR pump and one RHR heat exchanger as well as associated piping and valves to transfer water from the suction source to the core. Although either RHR heat exchanger may be credited for either RHR subsystem, one RHR heat exchanger must be OPERABLE for each OPERABLE RHR injection subsystem.

- Containment Recirculation is divided into two 100% capacity subsystems. Each subsystem consists of one Containment Recirculation pump and one RHR heat exchanger as well as associated piping and valves to transfer water from the suction source to the core. Although either RHR heat exchanger may be credited for either Recirculation subsystem, one RHR heat exchanger must be OPERABLE for each OPERABLE Containment Recirculation subsystem.

(continued)

BASES

BACKGROUND (continued)

- The three ECCS systems (3 HHSI, 2 RHR and 2 Recirculation) are grouped into three trains (5A, 2A/3A and 6A) such that any 2 of the 3 trains are capable of meeting all ECCS capability assumed in the accident analysis. Each ECCS train consists of the following:

  a. ECCS Train 5A includes subsystems HHSI 31 and containment recirculation 31;

  b. ECCS Train 2A/3A includes subsystems HHSI 32 and RHR 31; and,

  c. ECCS Train 6A includes subsystems HHSI 33, RHR 32, and containment recirculation 32.

The ECCS trains use the same designation as the Safeguards Power Trains required by LCO 3.8.9, Distribution Systems - Operating, with Safeguards Power Train 5A supported by DG 33, Safeguards Power Train 2A/23 supported by DG 31, Safeguards Power Train 6A supported by DG 32.

The ECCS accumulators and the RWST are also part of the ECCS, but are not considered part of an ECCS flow path as described by this LCO.

The ECCS flow paths consist of piping, valves, heat exchangers, and pumps such that water from the RWST can be injected into the RCS following the accidents described in this LCO. The major components of each subsystem are the high head safety injection pumps, the RHR pumps, heat exchangers, and the containment recirculation pumps. This interconnecting and redundant subsystem design provides the operators with the ability to utilize components from different trains to achieve the required 100% flow to the core.

During the injection phase of LOCA recovery, a suction header supplies water from the RWST to the HHSI and RHR pumps. The discharge from the HHSI and RHR pumps feed injection lines to each of the RCS cold legs. Control valves are set to balance the

(continued)

BASES

BACKGROUND (continued)

HHSI flow to the RCS. This balance ensures sufficient flow to the core to meet the analysis assumptions following a LOCA in one of the RCS cold legs.

During the recirculation phase of LOCA recovery, the containment recirculation pumps take suction from the containment recirculation sump and direct flow through the RHR heat exchangers to the cold legs. The RHR pumps can be used to provide a backup method of recirculation in which case the RHR pump suction is transferred to the containment sump. The RHR pumps then supply recirculation flow directly or supply the suction of the HHSI pumps. Initially, recirculation is through the same paths as the injection phase. Subsequently, recirculation injection is split between the hot and cold legs.

The ECCS also functions to supply borated water to the reactor core following increased heat removal events, such as a main steam line break (MSLB). The limiting design conditions occur when the negative moderator temperature coefficient is highly negative, such as at the end of each cycle.

During low temperature conditions in the RCS, limitations are placed on the maximum number of HHSI pumps that may be OPERABLE. Refer to the Bases for LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for the basis of these requirements.

The ECCS subsystems, except for the containment recirculation subsystems, are actuated upon receipt of an SI signal. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately in the programmed sequence. If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the emergency diesel generators (EDGs). Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting, sequenced loading, and pump starting determines the time required before pumped flow is available to the core following a LOCA. RAI 02

(continued)

BASES

APPLICABILITY (continued)	Circulation – High Water Level," and LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation – Low Water Level."

ACTIONS

A.1

With one or more trains inoperable and any two HHSI pumps, any one RHR pump, and any one Containment Recirculation pump OPERABLE (i.e., 100% of the ECCS capability assumed in the accident analysis available), the inoperable components must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on an NRC reliability evaluation (Ref. 4) and is a reasonable time for repair of many ECCS components. If 100% of the ECCS capability assumed in the accident analysis is not OPERABLE, entry into LCO 3.0.3 is required.

An ECCS train is inoperable if it is not capable of delivering design flow to the RCS. Individual components are inoperable if they are not capable of performing their design function or supporting systems are not available.

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy of trains and the diversity of subsystems, the inoperability of one pump in a train does not render the ECCS incapable of performing its function. Neither does the inoperability of two different pumps, each in a different train, necessarily result in a loss of function for the ECCS. The intent of this Condition is to maintain a combination of equipment such that 100% of the ECCS flow equivalent to two OPERABLE ECCS trains remains available. This allows increased flexibility in plant operations under circumstances when pumps in redundant trains are inoperable.

An event accompanied by a loss of offsite power and the failure of an EDG can disable one ECCS train until power is restored. A reliability analysis (Ref. 4) has shown that the impact of having one full ECCS train inoperable is sufficiently small to justify continued operation for 72 hours.

(continued)

BASES

ACTIONS

A.1 (continued)

Reference 5 describes situations in which one component, such as the valves governed by SR 3.5.2.1, can disable more than one ECCS train. With one or more component(s) inoperable such that 100% of the flow equivalent for HHSI, RHR and Containment Recirculation is not available, the facility is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be immediately entered. | RAI - 02

B.1 and B.2

If the inoperable trains cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 6 hours and MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1

Verification of proper valve position ensures that the flow path from the ECCS pumps to the RCS is maintained. Misalignment of these valves could render more than one ECCS train inoperable. Securing these valves in position by removal of power or by key locking the control in the correct position ensures that they cannot change position as a result of an active failure or be inadvertently misaligned. These valves are of the type, described in Reference 5, that can disable the function of more than one ECCS train and invalidate the accident analyses. A 12 hour Frequency is considered reasonable in view of other administrative controls that will ensure a mispositioned valve is unlikely.

(continued)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2:
"ECCS - OPERATING"

PART 2:

CURRENT TECHNICAL SPECIFICATION PAGES

Annotated to show differences between CTS and ITS

CTS PAGE	AMENDMENT FOR REV O SUBMITTAL	AMENDMENT FOR REV 1 SUBMITTAL	COMMENT
3.3-2	154	154	
3.3-3	179	179	
3.3-4	139	196	AOT for SI pump increased from 24 to 72 hours
3.3-5	53	53	
3.3-14	132	132	
3.3-15	139;97-175	139;9-22-98	
3.3-16	154	154	
3.3-17	179	179	
4.5-1	142	142	
4.5-7	178	178	
4.5-8	178	178	
4.5-9	148	148	
4.5-11	148	148	

SEE ITS 3.5.1

a. The accumulators may be isolated during the performance of the reactor coolant system hydrostatic tests.

For the purpose of accumulator check valve leakage testing, one accumulator may be isolated at a time, for up to 8 hours, provided the reactor is in the hot shutdown condition.

3.5.2 Reg Act A.1

b. One safety injection pump may be out of service, provided the pump is restored to an operable status within 24 hours. 72 ~~L.2~~ R.1

c. One residual heat removal pump may be out of service, provided the pump is restored to an operable status within 24 hours. 72 L.2 A.4 L.1

d. One residual heat exchanger may be out of service provided that it is restored to an operable status within 48 hours. 72 L.2

e. Any valve required for the functioning of the system during and following accident conditions may be inoperable provided that it is restored to an operable status within 24 hours and all valves in the system that provide the duplicate function are operable. 72 L.2

f. DELETED Recirculation subsys inoperable - 72 hours L.2

SEE ITS 3.3.3

g. One refueling water storage tank low level alarm may be inoperable for up to 7 days provided the other low level alarm is operable.

Superceded by Amend 196
See next page.
Eliminated need for
DOC L.2

a. The accumulators may be isolated during the performance of the reactor coolant system hydrostatic tests.

For the purpose of accumulator check valve leakage testing, one accumulator may be isolated at a time, for up to 8 hours, provided the reactor is in the hot shutdown condition.

b. One safety injection pump may be out of service, provided the pump is restored to an operable status within 72 hours.

c. One residual heat removal pump may be out of service, provided the pump is restored to an operable status within 24 hours.

d. One residual heat exchanger may be out of service provided that it is restored to an operable status within 48 hours.

e. Any valve required for the functioning of the system during and following accident conditions may be inoperable provided that it is restored to an operable status within 24 hours and all valves in the system that provide the duplicate function are operable.

f. DELETED

g. One refueling water storage tank low level alarm may be inoperable for up to 7 days provided the other low level alarm is operable.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2: "ECCS - Operating"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

systems has no significant adverse consequence and is deleted.

L.2 Superceded by Amendment 196.

L.3 ITS LCO 3.5.2, Note 1, provides a new allowance that both ECCS injection flow paths may be isolated when in Mode 3 by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1. CTS includes no such allowance.

This change is needed because ITS SR 3.4.14.1 includes a new requirement that pressure isolation valve testing per SR 3.4.14.1 must be performed within 24 hours following valve actuation due to automatic or manual action or if there is flow through the valve. This allows performance of required testing in Mode 3 and facilitates timely completion for return to power Operation.

This change is acceptable because of the stable conditions associated with operation in Mode 3, the low probability of occurrence of a Design Basis Accident (DBA) during the period the flow paths are isolated, the limited core cooling requirements in Mode 3, and because the required flow paths are either readily restorable from the control room or the valves are closed under administrative controls that ensure prompt restoration if required. Therefore, this change has no significant adverse impact on safety.

L.4 ITS LCO 3.5.2, Note 2, provides a new allowance that operation in Mode 3 with ECCS pumps declared inoperable pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds 375°F, whichever comes first. CTS includes no such allowance.

This change is needed because the IP3 LTOP enable temperature (currently 319°F) is close enough to the Mode 3 boundary temperature of 350°F that only a small window exists for the restoration from LTOP requirements during heatup. This allowance allows temperature to be established safely above the LTOP enable temperature before restoration is performed and verified without impacting plant heatup.

This change is acceptable because ITS 3.5.2 maintains the existing requirement for the Operability of three trains of ECCS; therefore, there is no change to the existing requirements and no change to the level of safety of facility operation.

This change, which allows the description of the design of the ECCS systems to be maintained in the FSAR and the detailed description of the requirements for Operability of these systems to be maintained in the ITS Bases, is consistent with the approach used in NUREG-1431 for all Limiting Conditions for Operation (LCOs). This approach is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, and ITS 5.5.13, Technical Specifications (TS) Bases Control Program, are designed to assure that changes to the FSAR and ITS Bases do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the possibility of a new or different kind of accident, and do not result in a significant reduction in a margin of safety. Additionally, IP3 programs that implement FSAR changes in accordance with 10 CFR 50.59 and ITS Bases changes in accordance with ITS 5.5.13 require periodic submittal of FSAR and Bases changes to the NRC for review.

This change is a less restrictive administrative change with no impact on safety because no requirements are being deleted from Technical Specifications and an appropriate change control process and an appropriate level of regulatory oversight are maintained for the information being relocated out of the Technical Specifications.

LA.2 CTS 4.5.B.1 requires starting the pump and operating for at least 15 minutes at the required pressure every quarter for the safety injection pumps, residual heat removal pumps, containment spray pumps and the auxiliary component cooling water pumps and every 24 months for the recirculation pumps.

ITS SR 3.5.2.3 maintain the requirements to verify each ECCS pump's developed head is greater than or equal to the required head; however, the Frequency is specified as in accordance with the Inservice Testing (IST) Program. Additionally, the required run time for each pump is also relocated to the IST. The Inservice Test (IST) Program is required inoperable pump in an ECCS system that provides a different safety function. Finally, the very short (one hour) allowable out of service time (AOT) when an ECCS accumulator or the RWST is inoperable due to a critical feature not within limits (See ITS 3.5.4, DOC L.2 and ITS 3.5.1, DOC L.2) is not affected by a concurrent inoperability of another ECCS system in either the CTS or the ITS. Therefore, elimination of the restriction in CTS 3.3.A.4 that prohibits concurrent inoperable ECCS systems has no significant adverse consequence and is deleted.

L.2 Superceded by Amendment 196.

L.3 ITS LCO 3.5.2, Note 1, provides a new allowance that both ECCS injection flow paths may be isolated when in Mode 3 by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1. CTS includes no such allowance.

This change is needed because ITS SR 3.4.14.1 includes a new requirement that pressure isolation valve testing per SR 3.4.14.1 must be performed within 24 hours following valve actuation due to automatic or manual action or if there is flow through the valve. This allows performance of required testing in Mode 3 and facilitates timely completion for return to power Operation.

This change is acceptable because of the stable conditions associated with operation in Mode 3, the low probability of occurrence of a Design Basis Accident (DBA) during the period the flow paths are isolated, the limited core cooling requirements in Mode 3, and because the required flow paths are either readily restorable from the control room or the valves are closed under administrative controls that ensure prompt restoration if required. Therefore, this change has no significant adverse impact on safety.

L.4 ITS LCO 3.5.2, Note 2, provides a new allowance that operation in Mode 3 with ECCS pumps declared inoperable pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds 375°F,

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2:
"ECCS - Operating"

PART 4:

No Significant Hazards Considerations
for
Changes between CTS and ITS
that are
Less Restrictive

No Significant Hazard Considerations for Changes that are Administrative, More Restrictive, and Removed Details are the same for all Packages. A Copy is included at the end of the Package.

The proposed changes will not involve any physical changes to plant systems, structures, or components (SSC). The changes in normal Plant operation are consistent with the current safety analysis assumptions because there is no change in the way ECCS systems are operated. Therefore, these changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

   This change does not involve a significant reduction in a margin of safety because all 4 accumulators, 2 of the 3 HHSI pumps, 1 of the 2 RHR pumps, and 1 of the 2 recirculation pumps is the minimum complement of ECCS systems assumed available in the safety analysis and this minimum complement is sufficient to mitigate a design basis. Additionally, each of these ECCS systems provides a different safety function; therefore, more than the minimum required number of pumps and/or accumulators for any of these systems does not provide significant compensation for an inoperable pump and/or accumulator in an ECCS system that provides a different safety function. Finally, the very short (one hour) allowable out of service time (AOT) when an ECCS accumulator or the RWST is inoperable due to a critical feature not within limits is not affected by a concurrent inoperability of another ECCS system in either the CTS or the ITS.

LESS RESTRICTIVE
("L.2" Labeled Comments/Discussions)

Superceded by Amendment 196.

LESS RESTRICTIVE
("L.3" Labeled Comments/Discussions)

New York Power Authority has evaluated the proposed Technical Specification change identified as "Less Restrictive" in accordance with the criteria set forth in 10 CFR 50.92, and has determined that the proposed change does not

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2:
"ECCS - Operating"

PART 5:

NUREG-1431
Annotated to show differences between NUREG-1431 and ITS

<Doc LA> <3.3.A.3.e> <3.3.A.3.f> <3.3.A.3.g> <3.3.A.3> <Doc L.3> <Doc L.4>

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS—Operating

DB.2

LCO 3.5.2 ~~Two~~ Three ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

T.1

NOTES

1. In MODE 3, both ~~safety injection (SI) pump~~ HHSI flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.
2. Operation in MODE 3 with ~~ECCS~~ HHSI pumps ~~declared inoperable~~ made incapable of injecting pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) ~~System~~," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds [375]°F, whichever comes first.

T.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<3.3.A.4> <Doc L.1> <3.3.A.4.b> <3.3.A.4.c> <3.3.A.4.d> <3.3.A.4.e> <Doc L.2> A. One or more trains inoperable. AND ~~At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.~~ Two HHSI pumps, one RHR pump and one Containment Recirc Pump are Operable	A.1 Restore train(s) to OPERABLE status.	72 hours
<3.3.A.5> <Doc M.3> <Doc M.4> <Doc L.6> B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

R.1 DB.2

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
<DOC M.1> <3.3.A.3.h> <3.3.A.3.i> <3.3.A.3.j> <3.3.A.3.l> <3.3.A.3.m>	SR 3.5.2.1 Verify the following valves are in the listed position with power to the valve operator removed. Number / Position / Function [ ] [ ] [ ] [ ] [ ] [ ] . . . [ ] [ ] [ ] Insert: 3.5-5-01	12 hours
<DOC M.1>	SR 3.5.2.2 Verify each ECCS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
	~~SR 3.5.2.3 Verify ECCS piping is full of water.~~	~~31 days~~
<4.5.B.1> <LA.2>	SR 3.5.2.~~4~~ 3 Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program
<4.5.A.1.a> <4.5.A.1.b> <DOC LA3>	SR 3.5.2.~~5~~ 4 Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	~~[18]~~ 24 months

R.1

R.1

(continued)

INSERT: B 3.5-10-01:

The ECCS Function is provided by three separate ECCS systems: high head safety injection (HHSI), residual heat removal (RHR) injection, and containment recirculation. Each ECCS system is divided into subsystems as follows:

HHSI System is divided into three 50% capacity subsystems (i.e., HHSI 31, 32 and 33) which share two pump discharge headers (i.e., 31 and 33). Each HHSI subsystem consists of one pump as well as associated piping and valves to transfer water from the suction source to the core. HHSI subsystem 32 is aligned to inject using the flow path associated with both HHSI subsystem 31 and 33. If either HHSI pump 31 or 33 fails to start or achieve required discharge pressure, HHSI pump 32 will inject via the header associated with the failed pump. If all three HHSI pumps stat, flow from HHSI pump 32 will be divided between header 31 and 33. Note that the HHSI pumps have a shutoff head of approximately 1500 psig. Therefore, IP3 is classified as a low head safety injection plant.

RHR injection System is divided into two 100% capacity subsystems. Each ECCS RHR subsystem consists of one RHR pump and one RHR heat exchanger as well as associated piping and valves to transfer water from the suction source to the core. Although either RHR heat exchanger may be credited for either RHR subsystem, one RHR heat exchanger must be OPERABLE for each OPERABLE RHR injection subsystem.

Containment Recirculation is divided into two 100% capacity subsystems. Each subsystem consists of one Containment Recirculation pump and one RHR heat exchanger as well as associated piping and valves to transfer water from the suction source to the core. Although either RHR heat exchanger may be credited for either Recirculation subsystem, one RHR heat exchanger must be OPERABLE for each OPERABLE Containment Recirculation subsystem.

BASES (continued)

R.1

ACTIONS

A.1

Insert B3.5-16-01

With one or more trains inoperable and at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, the inoperable components must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on an NRC reliability evaluation (Ref. 5) and is a reasonable time for repair of many ECCS components. (4)

An ECCS train is inoperable if it is not capable of delivering design flow to the RCS. Individual components are inoperable if they are not capable of performing their design function or supporting systems are not available.

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy of trains and the diversity of subsystems, the inoperability of one component [pump] in a train does not render the ECCS incapable of performing its function. Neither does the inoperability of two different components [pumps], each in a different train, necessarily result in a loss of function for the ECCS. The intent of this Condition is to maintain a combination of equipment such that 100% of the ECCS flow equivalent to a single [two] OPERABLE ECCS train remains available. This allows increased flexibility in plant operations under circumstances when components [pumps] in opposite [redundant] trains are inoperable.

An event accompanied by a loss of offsite power and the failure of an EDG can disable one ECCS train until power is restored. A reliability analysis (Ref. 5) has shown that the impact of having one full ECCS train inoperable is sufficiently small to justify continued operation for 72 hours. (4)

Reference 6 (5) describes situations in which one [more than one] component, such as an RHR crossover valve [the valves governed by SR 3.5.2.1], can disable both ECCS trains. With one or more component(s) inoperable such that 100% of the flow equivalent to a single OPERABLE ECCS train [for HHSI, RHR and Containment Recirculation] is not available, the facility is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be immediately entered.

(continued)

<u>INSERT: B 3.5-16-01</u>:

With one or more trains inoperable and any two HHSI pumps, any one RHR pump, and any one Containment Recirculation pump are OPERABLE (i.e., 100% of the ECCS capability assumed in the accident analysis available),

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.2 (continued)

under administrative control, and an improper valve position would only affect a single train. This Frequency has been shown to be acceptable through operating experience.

R.1

SR 3.5.2.3

With the exception of the operating centrifugal charging pump, the ECCS pumps are normally in a standby, nonoperating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. Maintaining the piping from the ECCS pumps to the RCS full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SI signal or during shutdown cooling. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the procedural controls governing system operation.

SR 3.5.2.4 (3)

Periodic surveillance testing of ECCS pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by Section XI of the ASME Code. This type of testing may be accomplished by measuring the pump developed head at only one point of the pump characteristic curve. This verifies both that the measured performance is within an acceptable tolerance of the original pump baseline performance and that the performance at the test flow is greater than or equal to the performance assumed in the plant safety analysis. SRs are specified in the Inservice Testing Program, which encompasses Section XI of the ASME Code. Section XI of the ASME Code provides the activities and Frequencies necessary to satisfy the requirements.

SR 3.5.2.5 (4) and SR 3.5.2.6 (5)

These Surveillances demonstrate that each automatic ECCS valve actuates to the required position on an actual or

(continued)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.2:
"ECCS - Operating"

PART 6:

Justification of Differences between

NUREG-1431 and IP3 ITS

JUSTIFICATION OF DIFFERENCES FROM NUREG-1431
ITS SECTION 3.5.2 - ECCS - Operating

RETENTION OF EXISTING REQUIREMENT (CURRENT LICENSING BASIS)

CLB.1 Not Used.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT

PA.1 Corrected typographical errors or made a minor editorial improvements to improve clarity and ensure requirements are fully understood and consistently applied. There are no technical changes to requirements as specified in NUREG 1431, Rev. 1; therefore, these changes are not significant or generic deviations from NUREG 1431, Rev 1.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN OR DESIGN BASIS

DB.1 Design or implementation details are incorporated or revised as necessary to more precisely describe IP3 current design or practice. These changes are intended to describe the design, improve clarity, or ensure requirements are fully understood and consistently applied. Unless identified and described blow, these changes are self-explanatory. There are no technical changes to requirements as specified in NUREG 1431, Rev 1; therefore, this change is not a significant or generic deviation from NUREG 1431, Rev 1.

DB.2 IP3 ITS 3.5.2 LCO, Conditions and Required Actions, and Bases differ from NUREG 1431, Rev 1, because IP3 uses 3 train of ECCS versus a 2 ECCS train design modeled in the NUREG. A detailed description of the design, accident analysis assumptions, and Operability requirements are incorporated into the IP3 ITS 3.5.2 Bases. This change maintains the IP3 current licensing basis except as identified and justified in the CTS/ITS discussion of changes.

DIFFERENCE BASED ON A GENERIC CHANGE TRAVELER FOR NUREG-1431

T.1 This change incorporates Generic Change TSTF-153, Rev.0 (WOG-63) which clarifies exception notes to be consistent with the requirement. This

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.3:
"ECCS - Shutdown"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS – Shutdown

LCO 3.5.3 One ECCS residual heat removal (RHR) subsystem and one ECCS recirculation subsystem shall be OPERABLE.

---------------------------- NOTE ----------------------------
An RHR train may be considered OPERABLE during alignment and operation for decay heat removal, and during pressure isolation valve testing per SR 3.4.14.1, if capable of being manually realigned to the ECCS mode of operation.

NYPA

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS residual heat removal (RHR) subsystem inoperable.	A.1 Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately
B. Required ECCS Recirculation subsystem inoperable.	B.1 Restore required ECCS recirculation subsystem to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 5.	24 hours

BASES

LCO (continued)

In MODE 4, ECCS requirements may be met using containment Recirculation subsystem 31 or 32 and RHR subsystem 31 or 32.

An ECCS RHR subsystem consists of one RHR pump and one RHR heat exchanger as well as associated piping and valves and instrumentation and controls needed to transfer water from the RWST or containment sump to the core. Either RHR heat exchanger may be used with either RHR pump to meet requirements for an RHR subsystem.

A containment Recirculation subsystem consists of one Containment Recirculation pump and one RHR heat exchanger as well as associated piping, valves, instrumentation and controls needed to transfer water from the recirculation sump to the core. Note that Recirculation pump OPERABILITY requires the functional availability of the associated auxiliary component cooling water pump. Either RHR heat exchanger may be used with either recirculation pump to meet requirements for a recirculation subsystem. The same RHR heat exchanger may be used to meet requirements for both the RHR subsystem and the Recirculation subsystem.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the RHR pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, the recirculation flow path using the Recirculation sump or containment sump may be used to deliver its flow to the RCS cold legs.

This LCO is modified by a Note that allows an RHR subsystem to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4. Similarly, this Note allows an RHR subsystem to be considered OPERABLE during alignment and operation for PIV testing per SR 3.4.14.1, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows testing of certain PIVs in MODE 4.

NYPA

(continued)

BASES

ACTIONS (continued)

B.1

With no containment Recirculation subsystem OPERABLE, due to the inoperability of the pump or flow path from the recirculation sump, the plant is not prepared to provide long term cooling response to Design Basis Events requiring SI. The 1 hour Completion Time to restore at least one ECCS Recirculation subsystem to OPERABLE status ensures that prompt action is taken to provide the required cooling capacity or to initiate actions to place the plant in MODE 5, where a recirculation subsystem is not required.

C.1

When the Required Actions of Condition B cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems or operators.

Note: Condition C should not be entered if Condition A is applicable. Required Action C.1 does not mandate a cooldown to MODE 5 when a required ECCS RHR subsystem is not OPERABLE (i.e., Condition A) because plant cooldown may not be possible with inoperable RHR subsystems. RAI-01

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1

The applicable Surveillance descriptions from Bases 3.5.2 apply.

REFERENCES

The applicable references from Bases 3.5.2 apply.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.3:
"ECCS - Shutdown"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

DISCUSSION OF CHANGES
ITS SECTION 3.5.3 - ECCS - Shutdown

ADMINISTRATIVE

A.1 In the conversion of the Indian Point Unit 3 Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes (either actual or interpretational). Additionally, editorial changes, reformatting, and revised numbering are adopted to make ITS consistent with the conventions in NUREG-1431, Standard Technical Specifications, Westinghouse Plants, Rev. 1, i.e., the improved Standard Technical Specifications.

The CTS Bases are deleted and replaced with comprehensive ITS Bases designed to support interpretation and implementation of the associated Technical Specifications. The Bases explain, clarify, and document the reasons (i.e., bases) for the associated Technical Specifications, and reflect the IP3 plant specific design, analyses, and licensing basis. In accordance with 10 CFR 50.36(a), the ITS Bases are included with the proposed ITS conversion application; however, deletion of the CTS Bases and the adoption of the ITS Bases is an administrative change with no impact on safety because neither are required by 10 CFR 50.36, and neither define nor impose any specific requirements.

A.2 CTS Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) include statements of the objective and the applicability. The CTS statements of objective and applicability are deleted because these statements do not establish any requirements and do not provide any guidance for the application of CTS requirements. Therefore, deletion of these statements has no significant adverse impact on safety.

A.3 CTS 3.3.A.1.c requires at least one residual heat removal (RHR) subsystem operable for ECCS injection when in Mode 4. ITS LCO 3.5.3 maintains the requirement to have at least one RHR subsystem operable for ECCS injection when in Mode 4; however, ITS LCO 3.5.3 is modified by a note that allows an RHR subsystem to be considered Operable for the ECCS initiation function during alignment and operation for decay heat removal, and during pressure isolation valve testing per ITS SR 3.4.14.1, if the RHR subsystem is capable of being manually realigned (remote or local) to the ECCS mode of operation and is not otherwise inoperable. Although this allowance is not specifically stated in CTS 3.3, the requirement for an RHR pump to satisfy the ECCS function in CTS 3.3.A.1.c with a concurrent requirement in CTS 3.3.A.6.a for two RHR pumps in decay heat removal function implies that an RHR pump can satisfy both requirements concurrently. Additionally, CTS does not require the Operability of ECCS automatic initiation functions in Mode 4. Therefore, consistent with industry practice, IP3 does allow an RHR pump to satisfy concurrent requirements for ECCS injection function and decay heat removal function.

This allowance is acceptable because of the stable conditions associated with operation in Mode 4, the reduced probability of occurrence of a Design Basis Accident (DBA)in Mode 4 and the limited core cooling requirements in Mode 4. Therefore, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA in Mode 4.

Adding a statement that an RHR subsystem is Operable for the ECCS initiation function during alignment and operation for decay heat removal, and during pressure isolation valve testing per ITS SR 3.4.14.1, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable is an administrative change with no impact on safety (See ITS 3.5.3, DOC L.3).

MORE RESTRICTIVE

M.1 CTS 3.3 and CTS 4.5.A do not establish any requirements for the periodic verification that containment sump and recirculation sump suction inlets are unrestricted and otherwise in proper operating condition.

ITS SR 3.5.3.1 is added (in conjunction with ITS SR 3.5.2.7) to require verification every 24 months that containment sump suction inlets are unrestricted and otherwise in proper operating condition. This Frequency is consistent with the need to perform this verification while the plant is shutdown and, based on industry experience, is sufficient of occurrence of a Design Basis Accident (DBA) and the limited core cooling requirements. In Mode 4, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA. Therefore, this change has no significant adverse impact on safety.

REMOVED DETAIL

LA.1 CTS 3.3.A.1.e and d require Operability of one residual heat removal pump and heat exchanger and one recirculation pump with the associated piping and valves whenever the reactor is ≥ 200°F but 350°F (i.e., Mode 4).

ITS 3.5.3 requires Operability of one RHR and one Recirculation train as defined in the ITS 3.5.3 Bases and system descriptions in the FSAR.

Establishing requirements in terms of trains with the subsystems and trains defined in the ITS 3.5.3 Bases is needed because this presentation ensures that requirements are clearly understood and consistently applied in conjunction with ITS 3.8.1, AC Sources - Operating, and ITS 3.8.9, Distribution Systems - Operating.

This change is acceptable because ITS 3.5.3 maintains the existing requirement for the Operability of three trains of ECCS; therefore, there is no change to the existing requirements and no change to the level of safety of facility operation.

This change, which allows the description of the design of the ECCS systems to be maintained in the FSAR and the detailed description of the requirements for Operability of these systems to be maintained in the ITS Bases, is consistent with the approach used in NUREG-1431 for all Limiting Conditions for Operation (LCOs). This approach is acceptable because the requirements of 10 CFR 50.59, Changes, Tests and Experiments, and ITS 5.5.13, Technical Specifications (TS) Bases Control Program, are designed to assure that changes to the FSAR and ITS Bases do not result in changes to the Technical Specification requirements and do not result in significant increases in the probability or consequences of accidents previously evaluated, do not create the

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.3:
"ECCS - Shutdown"

PART 5:

NUREG-1431
Annotated to show differences between
NUREG-1431 and ITS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	-----NOTE----- An RHR train may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation. -----	and during pressure isolation valve testing per 3.4.14.1
	The following SRs are applicable for all equipment required to be OPERABLE: SR 3.5.2.1 SR 3.5.2.7 SR 3.5.2.3 SR 3.5.2.8 (7) SR 3.5.2.4 (3)	In accordance with applicable SRs

<4.5.B.1>
<4.5.A.1.d>
<DOC L.3>
<DOC M.1>

DB.1

R.1

Move Note Page 3.5-7

T.1

NUREG-1431 Markup Inserts
ITS SECTION 3.5.3 - ECCS - Shutdown

INSERT B 3.5-22-01:

(T.1)

This LCO is modified by a Note that allows an RHR subsystem to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4. Similarly, this note allows an RHR subsystem to be considered OPERABLE during alignment and operation for PIV testing per SR 3.4.14.1, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows testing of certain PIVs in MODE 4. R.1 (DB.1)

INSERT B 3.5-22-02:

one OPERABLE ECCS residual heat removal (RHR) subsystem and one OPERABLE ECCS recirculation subsystem

BASES

ACTIONS

A.1 (continued)

continue until the inoperable RHR loop components can be restored to operation so that decay heat removal is continuous.

With both RHR pumps and heat exchangers inoperable, it would be unwise to require the plant to go to MODE 5, where the only available heat removal system is the RHR. Therefore, the appropriate action is to initiate measures to restore one ECCS RHR subsystem and to continue the actions until the subsystem is restored to OPERABLE status.

B.1

With no ECCS high head subsystem OPERABLE, due to the inoperability of the centrifugal charging pump or flow path from the RWST, the plant is not prepared to provide high pressure response to Design Basis Events requiring SI. The 1 hour Completion Time to restore at least one ECCS high head subsystem to OPERABLE status ensures that prompt action is taken to provide the required cooling capacity or to initiate actions to place the plant in MODE 5, where an ECCS train is not required.

C.1

When the Required Actions of Condition B cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems or operators.

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1

The applicable Surveillance descriptions from Bases 3.5.2 apply. This SR is modified by a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of

(continued)

INSERT B 3.5-23-01:

Note: Condition C should not be entered if Condition A is applicable. Required Action C.1 does not mandate a cooldown to MODE 5 when a required ECCS RHR subsystem is not OPERABLE (i.e., Condition A) because plant cooldown may not be possible with inoperable RHR subsystems.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.4:
"Refueling Water Storage Tank (RWST)"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

LCO 3.5.4 The RWST and two channels of RWST low level alarm shall be OPERABLE.

NYPA

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RWST boron concentration not within limits of SR 3.5.4.3. OR RWST borated water temperature not within limits of SR 3.5.4.1.	A.1	Restore RWST to OPERABLE status.	8 hours
B. One channel of RWST low level alarm inoperable.	B.1	Restore RWST low level alarm to OPERABLE status.	7 days
C. RWST inoperable for reasons other than Condition A or B.	C.1	Restore RWST to OPERABLE status.	1 hour
D. Required Action and associated Completion Time not met.	D.1 AND D.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

NYPA

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.4.1	----------------NOTE------------------ Only required to be performed when ambient air temperature is < 35°F or > 110°F. -------------------------------------- Verify RWST borated water temperature is ≥ 35°F and ≤ 110°F.	24 hours
SR 3.5.4.2	Verify RWST borated water level is ≥ 35.4 feet.	7 days
SR 3.5.4.3	Verify RWST boron concentration is ≥ 2400 ppm and ≤ 2600 ppm.	31 days
SR 3.5.4.4	Perform CHANNEL CHECK of RWST level.	7 days
SR 3.5.4.5	Perform CHANNEL CALIBRATION of RWST level indicating switch and ensure the low level alarm setpoint is ≥10.5 ft and ≤12.5 ft.	184 days
SR 3.5.4.6	Perform CHANNEL CALIBRATION of RWST level transmitter and ensure the low level alarm setpoint is ≥10.5 ft and ≤12.5 ft.	18 months

RAI-1

NYPA

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.4 Refueling Water Storage Tank (RWST)

BASES

BACKGROUND

The RWST supplies borated water to the Chemical and Volume Control System (CVCS) during abnormal operating conditions, to the refueling cavity during refueling, to the ECCS to fill accumulators, and to the ECCS and the Containment Spray System during accident conditions.

The RWST supplies the ECCS and the Containment Spray System through separate supply headers during the injection phase of a loss of coolant accident (LOCA). Motor operated isolation valves are provided to isolate the RWST from the ECCS subsystems once the system has been transferred to the recirculation mode. The switchover to the cold leg recirculation phase is manually initiated when the RWST level has reached the low-alarm setpoint and sufficient coolant inventory to support pump operation in recirculation mode is verified to be in the containment. Use of a single RWST to supply all of the injection trains of the ECCS and Containment Spray System is acceptable since the RWST is a passive component, and passive failures are not required to be assumed to occur coincidentally with Design Basis Events.

NYPA

During normal operation in MODES 1, 2, and 3, the high head safety injection (HHSI) and residual heat removal (RHR) pumps are aligned to take suction from the RWST.

The ECCS and Containment Spray System pumps are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at or near shutoff head conditions.

This LCO ensures that:

a. The RWST contains sufficient borated water to support the ECCS during the injection phase;

(continued)

BACKGROUND (continued)

b. Sufficient water volume exists in the recirculation sump or the containment sump to support continued operation of the ECCS and Containment Spray System pumps at the time of transfer to the recirculation mode of cooling; and

c. The reactor remains subcritical following a LOCA or MSLB.

Insufficient water in the RWST could result in insufficient cooling capacity when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following the LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the containment due to improper pH in the sumps.

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWST provides a source of borated water to the ECCS and Containment Spray System pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS – Operating"; B 3.5.3, "ECCS – Shutdown"; and B 3.6.6, "Containment Spray System and Containment Fan Cooler System." These analyses are used to assess changes to the RWST in order to evaluate their effects in relation to the acceptance limits in the accident analyses.

The RWST must also meet volume, boron concentration, and temperature requirements for non-LOCA events. The volume is not an explicit assumption in non-LOCA events since the required volume is a small fraction of the available volume. The deliverable volume limit is set by the LOCA and containment analyses. For the RWST, the deliverable volume is different from the total volume contained since, due to the design of the tank, more water can be contained than can be delivered.

For a large break LOCA analysis, the minimum water volume limit of 195,800 gallons and the lower boron concentration limit of 2400 ppm are used to compute the post LOCA sump boron NYPA

(continued)

APPLICABLE SAFETY ANALYSES (continued)

concentration necessary to assure subcriticality. The large break LOCA is the limiting case since the safety analysis assumes that all control rods are out of the core.

The RWST level required by Technical specifications includes allowances for instrument accuracy, the unusable volume in the RWST, and the maximum volume expected to remain in the RWST when the plant is switched from the injection to recirculation modes of operation.

NYPA

The upper limit on boron concentration of 2600 ppm is used to determine the maximum allowable time to switch to hot leg recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident.

In the ECCS analysis, the containment spray temperature is assumed to be equal to the RWST lower temperature limit of 35°F. If the lower temperature limit is violated, the containment spray further reduces containment pressure, which decreases the rate at which steam can be vented out the break and increases peak clad temperature. The upper temperature limit of 110°F is used in the LOCA containment integrity analysis. Exceeding this temperature will result in higher containment pressures due to reduced containment spray cooling capacity. The minimum boron concentration is an explicit assumption in the main steam line break (MSLB) analysis to ensure the required shutdown capability. For the containment response following an MSLB, the lower limit on boron concentration and the upper limit on RWST water temperature are used to maximize the total energy release to containment.

RAI-01

Following a LOCA, switchover from the injection phase to the recircuation phase must occur before the RWST empties to prevent damage to the pumps and a loss of cooling capability. For similar reasons, switchover must not occur before there is sufficient water in the containment to support recirculation pump suction. Furthermore, early switchover must not occur to ensure that sufficient borated water is injected from the RWST.

NYPA

(continued)

APPLICABLE SAFETY ANALYSES (continued)

The IP3 ESFAS design does not include automatic switchover from thesafety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who must be alerted by redundant RWST low level alarms. The switchover to the cold leg recirculation phase is manually initiated when the RWST level has reached the low alarm setpoint and sufficient coolant inventory to support pump operation in recirculation mode is verified to be in the containment.

The RWST low level alarm setpoint has both upper and lower limits. The upper limit is set to ensure that switchover does not occur until there is adequate water inventory in the containment to provide ECCS pump suction. (This is confirmed by recirculation and/or containment sump level indication.) The lower limit is set to ensure switchover occurs before the RWST empties, to prevent ECCS pump damage.

Requiring 2 channels of RWST low level alarm ensures that the alarm function will be available assuming a single failure of one channel. NYPA

The RWST satisfies Criterion 3 of 10 CFR 50.36.

LCO

The RWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA), to cool and cover the core in the event of a LOCA, to maintain the reactor subcritical following a DBA, and to ensure adequate level in the recirculation sump and the containment sump to support ECCS pump operation in the recirculation mode.

To be considered OPERABLE, the RWST must meet the water level, boron concentration, and temperature limits established in the SRs. NYPA

APPLICABILITY

In MODES 1, 2, 3, and 4, RWST OPERABILITY requirements are dictated by ECCS and Containment Spray System OPERABILITY requirements. Since both the ECCS and the Containment Spray System must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation. Core cooling requirements in MODE 5 are

(continued)

APPLICABILITY (continued)

addressed by LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.4, "Residual Heat Removal (RHR) and Coolant Circulation-High Water Level," and LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation-Low Water Level."

ACTIONS

A.1

With RWST boron concentration or borated water temperature not within limits of SR 3.5.4.3 and SR 3.5.4.1, respectively, they must be returned to within limits within 8 hours. Under these conditions neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE condition. The 8 hour limit to restore the RWST temperature or boron concentration to within limits was developed considering the time required to change either the boron concentration or temperature and the fact that the contents of the tank are still available for injection.

B.1

Condition B applies when one channel of RWST low level alarm is inoperable. Required Action B.1 requires restoring the inoperable channel to OPERABLE status within 7 days. The 7 day Completion Time for restoration of redundancy to the alarm function is needed because the IP3 ESFAS design does not include automatic switchover from the safety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who is alerted by the RWST low level alarm as the primary indicator for determining the time for the switchover. The 7 day Completion Time for restoration of redundancy for this alarm function is acceptable because of the remaining alarm channel and the availability of containment and recirculation sump level indication in the containment.

NYPA

(continued)

BASES

ACTIONS (continued)

C.1

With the RWST inoperable for reasons other than Condition A (e.g., water volume), it must be restored to OPERABLE status within 1 hour.

In this Condition, neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE status or to place the plant in a MODE in which the RWST is not required. The short time limit of 1 hour to restore the RWST to OPERABLE status is based on this condition simultaneously affecting redundant trains.

D.1 and D.2

If the RWST cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.5.4.1

The RWST borated water temperature should be verified every 24 hours to be within the limits assumed in the accident analyses band. This Frequency is sufficient to identify a temperature change that would approach either limit and has been shown to be acceptable through operating experience.

The SR is modified by a Note that eliminates the requirement to perform this Surveillance when ambient air temperatures are within the operating limits of the RWST. With ambient air temperatures within the band, the RWST temperature should not exceed the limits. NYPA

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.4.2

The RWST water volume should be verified every 7 days to be above the required minimum level in order to ensure that a sufficient initial supply is available for injection and to support continued ECCS System pump operation on recirculation.

Since the RWST volume is normally stable and is protected by an alarm, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.4.3

The boron concentration of the RWST should be verified every 31 days to be within the required limits. This SR ensures that the reactor will remain subcritical following a LOCA. Further, it assures that the resulting sump pH will be maintained in an acceptable range so that boron precipitation in the core will not occur and the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized. Since the RWST level is normally stable, a 31 day sampling Frequency to verify boron concentration is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.4.4

Performance of the CHANNEL CHECK every 7 days ensures that a gross failure of the RWST level instruments has not occurred. A CHANNEL CHECK is normally the comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same channel should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure: thus, it is key to verifying that the RWST level instruments continue to operate properly between each CHANNEL CALIBRATION.

NYPA

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.5.4.4 (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the RWST level instrument channel has drifted outside the limit. If the channels are within criteria, it is an indication that the RWST level instrument channels are OPERABLE.

The frequency of 7 days is based on operating experience that demonstrates that channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of displays associated with the LCO required RWST level instruments.

SR 3.5.4.5

A CHANNEL CALIBRATION of the RWST level indicating switch is performed at least every 184 days. CHANNEL CALIBRATION is a complete check of the level indicating switch loop including the required alarm. The test verifies the RWST level indicating switch responds to RWST level within the required range and accuracy. The test also verifies that the RWST level indicating switch will cause the low level alarm to annunciate at $\geq$10.5 feet and $\leq$12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.

SR 3.5.4.6

A CHANNEL CALIBRATION of the RWST level transmitter is performed at least every 18 months. CHANNEL CALIBRATION is a complete check of the RWST level transmitter loop including the required alarm. The test verifies the RWST level transmitter responds to RWST level within the required range and accuracy.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.4.6 (continued)

The test also verifies that the RWST level transmitter will cause the low level alarm to annunciate at ≥10.5 feet and ≤12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.

NYPA

REFERENCES

1. FSAR, Chapter 6 and Chapter 14.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.4:
"REFUELING WATER STORAGE TANK"

PART 2:

CURRENT TECHNICAL SPECIFICATION PAGES

Annotated to show differences between CTS and ITS

CTS PAGE	AMENDMENT FOR REV O SUBMITTAL	AMENDMENT FOR REV 1 SUBMITTAL	COMMENT
3.3-1	154	154	
3.3-2	154	154	
3.3-5	53	53	
3.3-14	132	132	
3.3-15	139;97-175	139;9-22-98	
3.3-16	154	154	
3.3-17	179	179	
T4.1-2(1)	139	200	Deleted Boric Acid Tank from the Table

(No impact on ITS 3.5.4)

3.3 ENGINEERED SAFETY FEATURES

(A.2)

Applicability

Applies to the operating status of the Engineered Safety Features.

Objective

To define those limiting conditions for operating that are necessary: 1) to remove decay heat from the core in emergency or normal shutdown situations; 2) to remove heat from containment in normal operating and emergency situations; 3) to remove airborne iodine from the containment atmosphere following a Design Basis Accident; 4) to minimize containment leakage to the environment subsequent to a Design Basis Accident; 5) to minimize the potential for and consequences of Reactor Coolant System pressure transients.

Specification

The following specifications apply except during low temperature physics tests.

A. Safety Injection and Residual Heat Removal Systems {Mode 1, 2, 3 and 4} (A 3)

LCO 3.5.4 Applicability 1. The reactor coolant system T_{avg} shall not exceed 200°F unless the following requirements are met:

LCO 3.5.4, SR 3.5.4.2, SR 3.5.4.3 a. The refueling water storage tank water level shall be a minimum of 35.4 feet, with the water at a boron concentration ≥2400 ppm and ≤2600 ppm.

LCO 3.5.4, SR 3.5.4.4, SR 3.5.4.5, SR 3.5.4.6 b. One refueling water storage tank low level alarm operable and set to alarm between 10.5 feet and 12.5 feet of water in the tank. R.1

add SR 3.5.4.1 — M.1

add SR 3.5.4.2 — M.4

Amendment No. 87, 129, 154

a. The accumulators may be isolated during the performance of the reactor coolant system hydrostatic tests.

For the purpose of accumulator check valve leakage testing, one accumulator may be isolated at a time, for up to 8 hours, provided the reactor is in the hot shutdown condition.

b. One safety injection pump may be out of service, provided the pump is restored to an operable status within 72 hours.

c. One residual heat removal pump may be out of service, provided the pump is restored to an operable status within 24 hours.

d. One residual heat exchanger may be out of service provided that it is restored to an operable status within 48 hours.

e. Any valve required for the functioning of the system during and following accident conditions may be inoperable provided that it is restored to an operable status within 24 hours and all valves in the system that provide the duplicate function are operable.

f. DELETED

Reg. Act B.1 g. One refueling water storage tank low level alarm may be inoperable for up to 7 days provided the other low level alarm is operable. R.1

Add Condition A and associated Req Act

M.1

L.2

RWST

5. If the Safety Injection and Residual Heat Removal Systems are not restored to meet the requirements of 3.3.A.3 within the time periods specified in 3.3.A.4; then: M.2

a. If the reactor is critical, it shall be in the hot shutdown condition within four hours and the cold shutdown condition within the following 24 hours. 6 36 L1 | R.1

b. If the reactor is subcritical, the reactor coolant system temperature and pressure shall not be increased more than 25°F and 100 psi, respectively, over existing values. If the requirements of 3.3.A.3 are not satisfied within an additional 48 hours, the reactor shall be brought to the cold shutdown condition using normal operating procedures. The shutdown shall start no later than the end of the 48 hour period. M.2

6. When the reactor coolant system T_{avg} is greater than 200°F and less than 350°F, the following decay heat removal requirements shall be met:

a. Two residual heat removal pumps together with their associated heat exchangers, piping, and valves shall be operable,

OR

b. A minimum of one residual heat removal pump and heat exchanger and a minimum of one reactor coolant pump and steam generator together with their associated piping and valves, shall be operable,

OR

SEE ITS 3.4.6 3.4.7 3.4.8

c. A minimum of two reactor coolant pumps and two steam generators, together with their associated piping and valves, shall be operable,

OR

d. With less than the above operable, initiate corrective action to return the required equipment to an operable status as soon as possible and suspend any operations which would reduce the boron concentration of the reactor coolant system. Otherwise, if sufficient equipment is available, be in cold shutdown within 20 hours.

7. When the reactor coolant T_{avg} is less than 200°F, but not in the refueling operation condition, two residual heat removal pumps, together with their associated heat exchangers, piping and valves, shall be operable.

a. With less than the above operable, initiate corrective action to return the required equipment to an operable status as soon as possible and suspend any operations which would reduce the boron concentration of the reactor coolant system.

b. The above requirements may be suspended during maintenance, modifications, testing, inspection or repair provided that:

1) an alternate means of decay heat removal is available and return of the system within sufficient time to prevent exceeding cold shutdown requirements is assured;

TABLE 4.1-1 (Sheet 2 of 6)

Channel Description	Check	Calibrate	Test	Remarks
8. 6.9 KV Voltage	N.A.	18M	Q	Reactor protection circuits only
6.9 KV Frequency	N.A.	24M	Q	Reactor protection circuits only
9. Analog Rod Position	S	24M	M	
10. Steam Generator Level	S	24M	Q	
11. Residual Heat Removal Pump Flow	N.A.	24M	N.A.	
12. Deleted				
13. Refueling Water Storage Tank Level				
a. Transmitter	W	18M	N.A.	Low level alarm SR 3.5.4.4, SR 3.5.4.6
b. Indicating Switch	W	6M	N.A.	Low level alarm SR 3.5.4.4, SR 3.5.4.5
14a. Containment Pressure - narrow range	S	24M	Q	High and High-High
14b. Containment Pressure - wide range	M	18M	N.A.	
15. Process and Area Radiation Monitoring:				
a. Fuel Storage Building Area Radiation Monitor (R-5)	D	24M	Q	
b. Vapor Containment Process Radiation Monitors (R-11 and R-12)	D	24M	Q	
c. Vapor Containment High Radiation Monitors (R-25 and R-26)	D	24M	Q	
d. Wide Range Plant Vent Gas Process Radiation Monitor (R-27)	D	24M	Q	

R.1

ITS 3.5.4

Amendment No. 8, 38, 65, 68, 74, 93, 107, 125, 137, 140, 144, 148, 150, 154, 169, 200

SR 3.5.4.3

(LA.1)

ITS 5.5.11

TABLE 4.1-2 (Sheet 1 of 2)

FREQUENCIES FOR SAMPLING TESTS

Sample	Analysis	Frequency	Maximum Time Between Analysis
1. Reactor Coolant	Gross Activity(1) Tritium Activity Boron concentration Radiochemical (gamma)(2) Spectral Check Oxygen and Chlorides Concentration Fluorides Concentration Ē Determination (2) Isotopic Analysis for I-131, I-133, I-135	5 days/week(1)(4) Weekly(1) 2 days/week Monthly 3 times per 7 days Weekly Semi-Annually Once per 14 days(3)	3 days(4) 10 days 5 days 45 days 3 days 10 days 30 weeks 20 days
2. Boric Acid Tank	Boron Concentration, Chlorides	Weekly	10 days
3. Spray Additive Tank	NaOH Concentration	Monthly	45 days
4. Accumulators	Boron Concentration	Monthly	45 days
5. Refueling Water Storage Tank	Boron Concentration pH, Chlorides Gross Activity	Monthly 31 days Quarterly	45 days (M.3) 16 weeks see Relocated
6. Secondary Coolant	I-131 Equivalent (Isotopic Analysis) Gross Activity	Monthly 3 times per 7 days	45 days 3 days
7. Component Cooling Water	Gross Activity, Corrosion Inhibitor and pH	Monthly	45 days
8. Spent Fuel Pool (when fuel stored)	Gross Activity Boron Concentration, Chlorides	Monthly	45 days

R.1

Amendment No. 139

TABLE 4.1-2 (Sheet 1 of 2)

FREQUENCIES FOR SAMPLING TESTS			
Sample	Analysis	Frequency	Maximum Time Between Analysis
1. Reactor Coolant	Gross Activity(1)	5 days/week(1)(4)	3 day(4)
	Tritium Activity	Weekly(1)	10 days
	Boron Concentration	2 days/week	5 days
	Radiochemical (gamma)(2) Spectral Check	Monthly	45 days
	Oxygen and Chlorides Concentration	3 times per 7 days	3 days
	Fluorides Concentration	Weekly	10 days
	Ē Determination (3)	Semi-Annually	30 Weeks
	Isotopic Analysis for I-131, I-133, I-135	Once per 14 days(5)	20 days
2. Deleted			
3. Spray Additive Tank	NaOH Concentration	Monthly	45 days
4. Accumulators	Boron Concentration	Monthly	45 days
5. Refueling Water Storage Tank	Boron Concentration pH, Chlorides	Monthly	45 days
	Gross Activity	Quarterly	16 weeks
6. Secondary Coolant	I-131 Equivalent (Isotopic Analysis)	Monthly	45 days
	Gross Activity	3 times per 7 days	3 days
7. Component Cooling Water	Gross Activity, Corrosion Inhibitor and pH	Monthly	45 days
8. Spent Fuel Pool (when fuel stored)	Gross Activity Boron Concentration, Chlorides	Monthly	45 days

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.4:
"Refueling Water Storage Tank (RWST)"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

Under the same conditions, ITS 3.5.4, Required Action B.1, still requires that an RWST to be restored within one hour if it is inoperable because level is not within required limits; however, ITS 3.5.4, Required Action A.1, allows 8 hours to restore an RWST that is inoperable because boron concentration is not within limits. This change is needed because it provides a reasonable time to restore boron concentration to within required limits and avoids a plant shutdown for a parameter that can be corrected without reactor shutdown. This change is acceptable because the required volume of the RWST is still available for injection and boron concentration would be expected to be outside of required limits by only a small amount because boron concentration changes very slowly relative to the required Frequency of the SR that verifies boron concentration. Therefore, this change has no significant adverse impact on safety.

REMOVED DETAIL

LA.1 CTS Table 4.1-2, Item 5, requires a monthly analysis of pH for the RWST. This information is not required to support the requirements of ITS LCO 3.5.4; therefore, this information is relocated to plant procedures.

This change, which allows the requirement for analyzing the RWST water for pH to be maintained in plant procedures is acceptable because measured pH will not change the water level in the RWST and will not change the concentration of boron in the RWST. The pH of the RWST is largely a function of the boron concentration, which buffers the liquid contents such that significant changes in pH are unlikely. In addition, administrative controls ensure that procedures changes receive the appropriate level of review prior to implementation.

This change is a less restrictive administrative change with no impact on safety because the measured pH of the RWST does not change the water level or boron concentration. In addition, administrative controls ensure an appropriate level of oversight is maintained for information being relocated out of Technical Specifications.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.5.4:
"Refueling Water Storage Tank (RWST)"

PART 5:

NUREG-1431
Annotated to show differences between NUREG-1431 and ITS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

<3.3.A.1.b> <3.3.A.1.a> <3.3.A.3.a>

LCO 3.5.4 The RWST [Insert: 3.5-9-01] shall be OPERABLE. (DB.1) R.1

<3.3.A.1> <3.3.A.3> <DOC A.3>

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<3.3.A.2> A. RWST boron concentration not within limits [of SR 3.5.4.3]. OR <3.3.A.5> <DOC L.2> <DOC M.1> RWST borated water temperature not within limits [of SR 3.5.4.1]. <3.3.A.4.g>	A.1 Restore RWST to OPERABLE status.	8 hours (PA.1)
<3.3.A.2> <3.3.A.5> B. RWST inoperable for reasons other than Condition A.	B.1 Restore RWST to OPERABLE status.	1 hour R.1
<DOC L.1> <DOC M.2> C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours R.1 36 hours R.1

(DB.1) [Insert: 3.5-9-02] R.1

NUREG-1431 Markup Inserts
ITS SECTION 3.5.4 - Refueling Water Storage Tank (RWST)

R.1

INSERT: 3.5-9-01

<3.3.A.1.b> and two channels of RWST low level alarm

INSERT: 3.5-9-02

<3.3.A.4.g> B.	One channel of RWST low level alarm inoperable.	B.1 Restore RWST low level alarm to OPERABLE status.	7 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.4.1	-----NOTE----- Only required to be performed when ambient air temperature is < [35]°F or > [100]°F. ----- [110] Verify RWST borated water temperature is ≥ [35]°F and ≤ [100]°F. [110]	24 hours
SR 3.5.4.2	Verify RWST borated water volume [level] is ≥ [466,200 gallons (_)%]. [35.4 feet]	7 days
SR 3.5.4.3	Verify RWST boron concentration is ≥ [2000] [2400] ppm and ≤ [2200] [2600] ppm.	7 [31] days

<DOC M.1> <DOC M.4> <3.3.A.1.a> <3.3.A.3.a> <T4.1-2, #5> <3.3.A.1.a> <3.3.A.3.a> <T4.1-1 #13>

Insert: 3.5-10-01

DB.1

R.1

R.1

INSERT: 3.5-10-01

<T4.1-1,#13>	SR 3.5.4.4	Perform CHANNEL CHECK of RWST level.	7 days
<T4.1-1,#13> <3.3.A.4.g>	SR 3.5.4.5	Perform CHANNEL CALIBRATION of RWST level indicating switch and ensure the low level alarm setpoint is ≥10.5 ft and ≤ 12.5 ft.	184 days
<T4.1-1#13> <3.3.A.4.g>	SR 3.5.4.6	Perform CHANNEL CALIBRATION of RWST level transmitter and ensure the low level alarm setpoint is ≥10.5 ft and≤ 12.5 ft.	18 months

DB.1

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.4 Refueling Water Storage Tank (RWST)

BASES

BACKGROUND

The RWST supplies borated water to the Chemical and Volume Control System (CVCS) during abnormal operating conditions, to the refueling pool [Cavity] during refueling, and to the ECCS and the Containment Spray System during [to the ECCS to fill accumulators] accident conditions.

The RWST supplies both trains of [all of the injection] the ECCS and the Containment Spray System through separate, redundant supply headers during the injection phase of a loss of coolant accident (LOCA) recovery. A motor operated isolation valves [subsystems] is [are] provided in each header to isolate the RWST from the ECCS once the system has been transferred to the recirculation mode. The recirculation mode is entered when pump suction is transferred to the containment sump following receipt of the RWST—Low Low (Level 1) signal. [Insert: B 3.5-25-01] Use of a single RWST to supply both trains of the ECCS and Containment Spray System is acceptable since the RWST is a passive component, and passive failures are not required to be assumed to occur coincidentally with Design Basis Events.

The switchover from normal operation to the injection phase of ECCS operation requires changing centrifugal charging pump suction from the CVCS volume control tank (VCT) to the RWST through the use of isolation valves. Each set of isolation valves is interlocked so that the VCT isolation valves will begin to close once the RWST isolation valves are fully open. Since the VCT is under pressure, the preferred pump suction will be from the VCT until the tank is isolated. This will result in a delay in obtaining the RWST borated water. The effects of this delay are discussed in the Applicable Safety Analyses section of these Bases.

During normal operation in MODES 1, 2, and 3, the [high head] safety injection (SI) [HHSI] and residual heat removal (RHR) pumps are aligned to take suction from the RWST.

The ECCS and Containment Spray System pumps are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at or near shutoff head conditions.

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.5.4 - Refueling Water Storage Tank (RWST)

INSERT: B 3.5-25-01:

DB.1

The switchover to the cold leg recirculation phase is manually initiated when the RWST level has reached the low alarm setpoint and sufficient coolant inventory to support pump operation in recirculation mode is verified to be in the containment. R.1

BASES

Recirculation sump or the

BACKGROUND (continued)

When the suction for the ECCS and Containment Spray System pumps is transferred to the containment sump, the RWST flow paths must be isolated to prevent a release of the containment sump contents to the RWST, which could result in a release of contaminants to the atmosphere and the eventual loss of suction head for the ECCS pumps.

This LCO ensures that:

a. The RWST contains sufficient borated water to support the ECCS during the injection phase;

b. Sufficient water volume exists in the containment sump to support continued operation of the ECCS and Containment Spray System pumps at the time of transfer to the recirculation mode of cooling; and

c. The reactor remains subcritical following a LOCA. or HSLB

Insufficient water in the RWST could result in insufficient cooling capacity when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following the LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the containment. due to improper pH in the sumps

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWST provides a source of borated water to the ECCS and Containment Spray System pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS—Operating"; B 3.5.3, "ECCS—Shutdown"; and B 3.6.6, "Containment Spray and Cooling Systems." These analyses are used to assess changes to the RWST in order to evaluate their effects in relation to the acceptance limits in the analyses.

Containment Fan Cooler

The RWST must also meet volume, boron concentration, and temperature requirements for non-LOCA events. The volume is not an explicit assumption in non-LOCA events since the

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

required volume is a small fraction of the available volume. The deliverable volume limit is set by the LOCA and containment analyses. For the RWST, the deliverable volume is different from the total volume contained since, due to the design of the tank, more water can be contained than can be delivered. The minimum boron concentration is an explicit assumption in the main steam line break (MSLB) analysis to ensure the required shutdown capability. The importance of its value is small for units with a boron injection tank (BIT) with a high boron concentration. For units with no BIT or reduced BIT boron requirements, the minimum boron concentration limit is an important assumption in ensuring the required shutdown capability. The maximum boron concentration is an explicit assumption in the inadvertent ECCS actuation analysis, although it is typically a nonlimiting event and the results are very insensitive to boron concentrations. The maximum temperature ensures that the amount of cooling provided from the RWST during the heatup phase of a feedline break is consistent with safety analysis assumptions; the minimum is an assumption in both the MSLB and inadvertent ECCS actuation analyses, although the inadvertent ECCS actuation event is typically nonlimiting.

Move to Page B 3.5-28

The MSLB analysis has considered a delay associated with the interlock between the VCT and RWST isolation valves, and the results show that the departure from nucleate boiling design basis is met. The delay has been established as [27] seconds, with offsite power available, or [37] seconds without offsite power. This response time includes [2] seconds for electronics delay, a [15] second stroke time for the RWST valves, and a [10] second stroke time for the VCT valves. Plants with a BIT need not be concerned with the delay since the BIT will supply highly borated water prior to RWST switchover, provided the BIT is between the pumps and the core.

For a large break LOCA analysis, the minimum water volume limit of [466,200] 195,800 gallons and the lower boron concentration limit of [2000] 2400 ppm are used to compute the post LOCA sump boron concentration necessary to assure subcriticality. The large break LOCA is the limiting case since the safety analysis assumes that all control rods are out of the core. R.1

Insert: B 3.5-27-01

The upper limit on boron concentration of [2200] 2600 ppm is used to determine the maximum allowable time to switch to hot leg

(continued)

INSERT: B 3.5-27-01:

DB.1

The RWST level required by Technical specifications includes allowances for instrument accuracy, the unusable volume in the RWST, and the maximum volume expected to remain in the RWST when the plant is switched from the injection to recirculation modes of operation. R.1

BASES

APPLICABLE SAFETY ANALYSES (continued)

recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident.

In the ECCS analysis, the containment spray temperature is assumed to be equal to the RWST lower temperature limit of [35]°F. If the lower temperature limit is violated, the containment spray further reduces containment pressure, which decreases the rate at which steam can be vented out the break and increases peak clad temperature. The upper temperature limit of [100]°F is used ~~in the small break LOCA analysis~~ and containment ~~OPERABILITY~~ analysis. Exceeding this temperature will result in a higher peak clad temperature, because there is less heat transfer from the core to the injected water for the small break LOCA and higher containment pressures due to reduced containment spray cooling capacity. For the containment response following an MSLB, the lower limit on boron concentration and the upper limit on RWST water temperature are used to maximize the total energy release to containment.

35 | 110 | in the LOCA containment integrity | Insert from Page B3.5-27 | R.1

The RWST satisfies Criterion 3 of the NRC Policy Statement. (10 CFR 50.36)

LCO

Insert B3.5-28-01 | R.1

The RWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA), to cool and cover the core in the event of a LOCA, to maintain the reactor subcritical following a DBA, and to ensure adequate level in the containment sump to support ECCS and Containment Spray System pump operation in the recirculation mode.

Recirculation sump and

To be considered OPERABLE, the RWST must meet the water volume, boron concentration, and temperature limits established in the SRs. DB.1 | R.1

APPLICABILITY

In MODES 1, 2, 3, and 4, RWST OPERABILITY requirements are dictated by ECCS and Containment Spray System OPERABILITY requirements. Since both the ECCS and the Containment Spray System must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS

(continued)

R.1

INSERT: B 3.5-28-01

DB,1

Following a LOCA, switchover from the injection phase to the recirculation phase must occur before the RWST empties to prevent damage to the pumps and a loss of cooling capability. For similar reasons, switchover must not occur before there is sufficient water in the containment to support recirculation pump suction. Furthermore, early switchover must not occur to ensure that sufficient borated water is injected from the RWST.

The IP3 ESFAS design does not include automatic switchover from the safety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who must be alerted by redundant RWST low level alarms. The switchover to cold leg recirculation phase is manually initiated when the RWST level has reached the low alarm setpoint and sufficient cooling inventory to support pump operation in recirculation mode is verified to be in the containment.

The RWST low level alarm setpoint has both upper and lower limits. The upper limit is set to ensure that switchover does not occur until there is adequate water inventory in the containment to provide ECCS pump suction. (This is confirmed by recirculation and/or containment sump level indication.) The lower limit is set to ensure switchover occurs before the RWST empties, to prevent ECCS pump damage.

Requiring 2 channels of RWST low level alarm ensures that the alarm function will be available assuming a single failure of one channel.

BASES

APPLICABILITY (continued)

Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With RWST boron concentration or borated water temperature not within limits, they must be returned to within limits within 8 hours. Under these conditions neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE condition. The 8 hour limit to restore the RWST temperature or boron concentration to within limits was developed considering the time required to change either the boron concentration or temperature and the fact that the contents of the tank are still available for injection.

B.1

With the RWST inoperable for reasons other than Condition A (e.g., water volume), it must be restored to OPERABLE status within 1 hour.

In this Condition, neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE status or to place the plant in a MODE in which the RWST is not required. The short time limit of 1 hour to restore the RWST to OPERABLE status is based on this condition simultaneously affecting redundant trains.

C.1 and C.2

If the RWST cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.5.4 - Refueling Water Storage Tank (RWST)

R.1

INSERT: B 3.5-29-01

B.1

DB.1

Condition B applies when one channel of RWST low level alarm is inoperable. Required Action B.1 requires restoring the inoperable channel to OPERABLE status within 7 days. The 7 day Completion Time for restoration of redundancy to the alarm function is needed because the IP3 ESFAS design does not include automatic switchover from the safety injection mode to the recirculation mode of operation based on low level in the RWST coincident with a safety injection signal. This function is performed manually by the operator who is alerted by the RWST low level alarm as the primary indicator for determining the time for switchover. The 7 day Completion Time for restoration of redundancy for ths alarm function is acceptable because of the remaining alarm channel and the availability of containment and recirculation sump level indication in the containment.

BASES

ACTIONS

D.1 and D.2 (continued)

power conditions in an orderly manner and without challenging plant systems.

R.1

SURVEILLANCE REQUIREMENTS

SR 3.5.4.1

The RWST borated water temperature should be verified every 24 hours to be within the limits assumed in the accident analyses band. This Frequency is sufficient to identify a temperature change that would approach either limit and has been shown to be acceptable through operating experience.

The SR is modified by a Note that eliminates the requirement to perform this Surveillance when ambient air temperatures are within the operating limits of the RWST. With ambient air temperatures within the band, the RWST temperature should not exceed the limits. R.1

SR 3.5.4.2

The RWST water volume should be verified every 7 days to be above the required minimum level in order to ensure that a sufficient initial supply is available for injection and to support continued ECCS and Containment Spray System pump operation on recirculation. Since the RWST volume is normally stable and is protected by an alarm, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.4.3

31 The boron concentration of the RWST should be verified every 7 days to be within the required limits. This SR ensures that the reactor will remain subcritical following a LOCA. Further, it assures that the resulting sump pH will be maintained in an acceptable range so that boron precipitation in the core will not occur and the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized. Since the RWST volume is normally stable, a 7 day sampling Frequency to verify boron

31 level

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.4.3 (continued)

concentration is appropriate and has been shown to be acceptable through operating experience.

Insert B3.5-31-01

REFERENCES

1. FSAR, Chapter [6] and Chapter [15]. 14

DB.1

R.1

R.1

INSERT: B 3.5-31-01

SR 3.5.4.4

DB.1

Performance of the CHANNEL CHECK every 7 days ensures that a gross failure of the RWST level instruments has not occurred. A CHANNEL CHECK is normally the comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same channel should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure: thus, it is key to verifying that the RWST level instruments continue to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the RWST level instrument channel has drifted outside the limit. If the channels are within criteria, it is an indication that the RWST level instrument channels are OPERABLE.

The frequency of 7 days is based on operating experience that demonstrates that channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of displays associated with the LCO required RWST level instruments.

SR 3.5.4.5

A CHANNEL CALIBRATION of the RWST level indicating switch is performed at least every 184 days. CHANNEL CALIBRATION is a complete check of the level indicating switch loop including the required alarm. The test verifies the RWST level indicating switch responds to RWST level within the required range and accuracy. The test also verifies that the RWST level indicating switch will cause the low level alarm to annunciate at ≥10.5 feet and ≤12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.

R.1

INSERT: B 3.5-31-01 (continued)

SR 3.5.4.6

DB.1

A CHANNEL CALIBRATION of the RWST level transmitter is performed at least every 18 months. CHANNEL CALIBRATION is a compelete check of the RWST level transmitter loop including the required alarm. The test verifies the RWST level transmitter responds to RWST level within the required range and accuracy. The test also verifies that the RWST level transmitter will cause the low level alarm to annunciate at ≥10.5 feet and ≤12.5 feet to ensure the operator is alerted to start the switchover to the recirculation mode during accident conditions. The frequency is based on operating experience and previous license commitments.