C. The anticipatory reactor trip upon turbine trip shall be unblocked when the power range nuclear instrumentation indicates ≥ 35% of rated power.

3. The Control Rod Protection System shall open the reactor trip breakers during RCS cooldown prior to T_{cold} decreasing below 350°F.

Basis

The Reactor Trip Setpoint Limits specified herein are the nominal values at which the bistables may be set for each functional unit. The Trip Setpoints have been selected to ensure that the core and Reactor Coolant System are prevented from exceeding their Safety Limits during normal operation and design basis anticipated operational occurrences, and to assist the Engineered Safety Features Actuation system in mitigating the consequences of accidents. A Setpoint for a Reactor Trip System or interlock function is applicable to the process rack modules and is considered to be adjusted consistent with the nominal value when the "as left" value is within the band allowed for calibration accuracy. This band is defined by the calibration accuracy applied in both the conservative and non-conservative directions about the Trip Setpoint for process rack modules and the calibration point(s) for sensor/transmitters as defined by plant calibration procedures and the plant setpoint study.

To accommodate the instrument drift which is assumed to occur between operational tests and the accuracy to which setpoints can be measured and calibrated, administrative limits for the Reactor Trip Setpoint have been determined.

Operation with "as found" setpoints less conservative than the Trip Setpoint but within the administrative limit is acceptable since allowances have been made in the plant setpoint study to account for the applicable instrument uncertainties and the plant administrative process, including the administrative limit, verifying that the instrument performance complies with the plant setpoint study. Operation with the "as found" setpoints less conservative than the administrative limit requires that further instrument operability evaluations be performed. This would include verification that the channel is capable of demonstrating operating

performance within the design characteristics of the instruments through channel calibrations, drift evaluations, instrument response characteristics, and other manufacturer recommended tests.

Process rack modules or a sensor/transmitter found outside the "as left" band for calibration accuracy must be returned to within the band after the performance of each surveillance test.

The high flux reactor trips provide redundant protection in the power range for a power excursion beginning from low power. This trip was used in the safety analysis[1].

The power range nuclear flux reactor trip high setpoint protects the reactor core against reactivity excursions which are too rapid to be protected by temperature and pressure protective circuitry. The prescribed setpoint, with allowance for errors, is consistent with the trip point assumed in the accident analysis[2,3].

The source and intermediate range reactor trips do not appear in the specification as these settings are not used in the transient and accident analysis (UFSAR Section 14). Both trips provide protection during reactor startup. The former is set at about 10^{+5} counts/sec and the latter at a current proportional to approximately 25% of rated full power.

The high and low pressure reactor trips limit the pressure range in which reactor operation is permitted. The high pressurizer pressure reactor trip is backed up by the pressurizer code safety valves for overpressure protection, and is therefore set lower than the set pressure for these valves (2485 psig). The low pressurizer pressure reactor trip also trips the reactor in the unlikely event of a loss of coolant accident. Its setting limit is consistent with the value assumed in the loss of coolant analysis[4].

The overtemperature ΔT reactor trip provides core protection against DNB for all combinations of pressure, power, coolant temperature, and axial power distribution, provided only that (1) the transient is slow with respect to piping transit delays from the core to the temperature detector (about 4 seconds)[5], and (2) pressure is within the range between the high and low pressure reactor trips. With normal

Steamline Isolation

Steamline isolation signals are initiated by the Engineered Safety Features closing all steamline stop valves. In the event of a steamline break, this action prevents continuous, uncontrolled steam release from more than one steam generator by isolating the steamlines on high containment pressure (Hi-Hi Level) or high steamline flow. Protection is afforded for breaks inside or outside the containment even when it is assumed that there is a single failure in the steamline isolation system.

Feedwater Line Isolation

The feedwater lines are isolated upon actuation of the Safety Injection System in order to prevent excessive cooldown of the reactor coolant system. This mitigates the effect of an accident such as steam break which in itself causes excessive coolant temperature cooldown.

Feedwater line isolation also reduces the consequences of a steamline break inside the containment by stopping the entry of feedwater.

Setting Limits

The Engineered Safety Features Actuation System instrumentation trip setpoints Specified in Table 3.5-1 are the nominal values at which the bistables may be set for each functional unit. A setpoint for an Engineered Safety Features Actuation System or interlock function is applicable to the process rack modules and is considered to be adjusted consistent with the nominal value when the "as left" value is within the band allowed for calibration accuracy. Sensor/Transmitters are considered to be adjusted consistent with the nominal value when the "as left" value(s) at the calibration point(s) is (are) within the band allowed for calibration accuracy. This band is defined by the calibration accuracy applied in both the conservative and non-conservative directions about the trip setpoint for process rack modules and calibration point(s) for sensor/transmitters as defined by plant calibration procedures and the plant setpoint study.

To accommodate the instrument drift assumed to occur between operational tests and the accuracy to which setpoints can be measured and calibrated, administrative limits for the setpoints have been determined. Operation with "as found" setpoints less conservative than the Trip Setpoint but within the administrative limit is acceptable since allowances have been made in the plant setpoint study to account for the applicable instrument uncertainties and the plant administrative process, including the administrative limit, verifying that the instrument performance complies with the plant setpoint study. Operation with "as found" setpoints less conservative than the administrative limit requires that further instrument operability evaluations be performed. This would include verification that the channel is capable of demonstrating operating performance within the design characteristics of the instruments through channel calibration, drift evaluations, instrument response characteristics, and other manufacturer recommended tests. Process rack modules or a sensor/transmitter found outside the "as left" band for calibration accuracy must be returned to within the band after the performance of each surveillance test.

1. The Hi Level containment pressure limit is set at 2.0 psig containment pressure. Initiation of Safety Injection protects against loss-of-coolant[2,4] or steamline-break[3,4] accidents as discussed in the safety analysis.

2. The Hi-Hi Level containment pressure limit is set at about 50% of design containment pressure. Initiation of Containment Spray and Steamline Isolation protects against large loss of coolant[2] or steamline-break accidents[3] as discussed in the safety analysis.

3. The pressurizer low-pressure limit is set substantially below system operating pressure limits. However, it is sufficiently high to protect against a loss-of-coolant accident as shown in the safety analysis[2].

4. The steamline high differential pressure limit is set well below the differential pressure expected in the event of a large steamline-break accident as shown in the safety analysis[3].

NRC Question

(2) Justify the terms of the calibration accuracy band (leave along zone) and evaluate the worst case situation (i.e., finding an "as found" value close to the limit of the band).

Response

The leave alone zone is defined as the calibration tolerance. If the equipment is found outside of the calibration tolerance the equipment will be returned to within the calibration tolerance.

NRC Question

(3) How does the administrative limit term relate to the allowable value term used in Standard Technical Specifications? Discuss how the use of this term meets the requirements and guidance of 10 CFR 50.36 (c)(1), "Safety limits, limiting safety system settings, and limiting control setting," ISA 67.04-1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants," and Regulatory Guide 1.105-1986, "Instrument Setpoints for Safety-Related Systems."

Response

The Administrative Limit term serves the same function as the Allowable Value term used in Standard Technical Specifications (STS). A different designation is used for the following reasons; 1) the Indian Point Unit 2 Technical Specifications are custom Technical Specifications and therefore do not carry the same terminology. 2) The Allowable Value in the STS is used to define channel operability whereas Indian Point Unit 2 uses the Administrative Limit as the first step in the plant administrative process to determine channel operability. The Administrative Limit does not by itself determine channel operability. 3) The Indian Point Unit 2 Plant provides administrative control to confirm channel operability by checking instrument characteristics such as drift, ability to accurately calibrate, and response characteristics as a more accurate means of defining channel operability.

The trip setpoints are the nominal values at which the bistables are set and will be equal to, or more conservatively set, than the current Technical Specification values. This approach was discussed in a letter to the NRC dated October 23, 1992. The nominal trip setpoints as defined in the Technical Specifications have been compared with the safety analysis limits as defined in the FSAR and plant setpoint study. The nominal trip setpoints correspond to the limiting safety system setting as defined in 10 CFR 50.36(c)(1). All channel uncertainty calculations were performed to confirm the preservation of the safety analysis limits by the use of the Technical Specification nominal trip setpoint and conform with the requirements of Regulatory Guide 1.105 Rev. 2.

In further evaluation of R.G. 1.105 Rev. 2, as well as ISA-S67.04, 1982, we interpret the terms "upper setpoint limit" and "lower setpoint limit" (presumed to be in the conservative direction) to correspond to calibration tolerance which is discussed in the responses to questions 1, 2 and 4. Adjustment to within the calibration band is always required for the "as-left" condition.

(1) Con Edison letter, S. Bram to Document Control Desk, dated October 23, 1992; Extension of Technical Specification Surveillance Intervals for 24-month Refueling Cycles.

NRC Question

(4) Show that when leaving an "as found" setpoint in the worst case portion of the calibration accuracy band that sufficient margin exists to account for instrument drift for all cases.

Response

Equipment will not be left outside of the calibration accuracy band which will preserve the safety analysis limits(s) throughout the operating cycle. The calibration tolerance is defined in the calibration procedures as used in the plant setpoint study. Instrument drift will be monitored for consistency with the plant setpoint study.