

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.2</p> <p>-----NOTE----- Not required to be performed until 24 hours after THERMAL POWER is \geq 15% RTP. -----</p> <p>Compare results of calorimetric heat balance calculation to the power range channel output and adjust power range channel output if calorimetric exceeds power range channel output by \geq 2% RTP.</p>	<p>24 hours</p>
<p>SR 3.3.1.3</p> <p>-----NOTE----- Not required to be performed until 24 hours after THERMAL POWER is \geq 15% RTP. -----</p> <p>Compare out of core measured AXIAL POWER IMBALANCE (API_o) to incore measured AXIAL POWER IMBALANCE (API_i) as follows:</p> <p>$(RTP/TP)(API_o - (CS \times API_i)) = \text{imbalance error}$</p> <p>where CS is CORRELATION SLOPE</p> <p>Adjust power range channel output if the absolute value of imbalance error is \geq 2% RTP.</p>	<p>31 days</p>
<p>SR 3.3.1.4</p> <p>Perform CHANNEL FUNCTIONAL TEST.</p>	<p>45 days on a STAGGERED TEST BASIS</p>

(continued)

BASES

**SURVEILLANCE
REQUIREMENTS**

SR 3.3.1.2 (continued)

assumed in the safety analyses of UFSAR, Chapter 15 (Ref. 2). These checks and, if necessary, the adjustment of the power range channels ensure that channel accuracy is maintained within the analyzed error margins. The 24 hour Frequency is adequate, based on unit operating experience, which demonstrates the change in the difference between the power range indication and the calorimetric results rarely exceeds a small fraction of 2% in any 24 hour period. Furthermore, the control room operators monitor redundant indications and alarms to detect deviations in channel outputs.

SR 3.3.1.3

A comparison of power range nuclear instrumentation channels against incore detectors shall be performed at a 31 day Frequency when reactor power is $\geq 15\%$ RTP. A Note clarifies that 24 hours is allowed for performing the first Surveillance after reaching 15% RTP. If the absolute value of imbalance error is $\geq 2\%$ RTP, the power range channel is not inoperable, but an adjustment of the measured imbalance to agree with the incore measurements is necessary. The Imbalance error calculation is adjusted for conservatism by applying a correlation slope (CS) value to the error calculation formula. This ensures that the value of the API_o is $> API_i$. The CS value is listed in the COLR and is cycle dependent. If the power range channel cannot be properly recalibrated, the channel is declared inoperable. The calculation of the Allowable Value envelope assumes a difference in out of core to incore measurements of 2.0%. Additional inaccuracies beyond those that are measured are also included in the setpoint envelope calculation. The 31 day Frequency is adequate, considering that long term drift of the excore linear amplifiers is small and burnup of the detectors is slow. Also, the excore readings are a strong function of the power produced in the peripheral fuel bundles, and do not represent an integrated reading across the core. The slow changes in neutron flux during the fuel cycle can also be detected at this interval.

SR 3.3.1.4

A CHANNEL FUNCTIONAL TEST is performed on each required RPS channel to ensure that the entire channel will perform the intended function. Setpoints must be found within the Allowable Values specified in Table 3.3.1-1. Any setpoint adjustment shall be consistent with the assumptions of the current setpoint analysis.

BASES

**SURVEILLANCE
REQUIREMENTS**

SR 3.3.1.4 (continued)

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in BAW-10167

The Frequency of 45 days on a STAGGERED TEST BASIS is consistent with the calculations of Reference 7 that indicate the RPS retains a high level of reliability for this test interval.

SR 3.3.1.5

A Note to the Surveillance indicates that neutron detectors are excluded from CHANNEL CALIBRATION. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure virtually instantaneous response.

A CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the setpoint analysis. Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the resistance temperature detectors (RTD) sensors is accomplished by an in-place cross calibration that compares the other sensing elements with the recently installed sensing element.

The Frequency is justified by the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

REFERENCES

1. UFSAR, Chapter 7.
2. UFSAR, Chapter 15.
3. 10 CFR 50.49.
4. EDM-102, "Instrument Setpoint/Uncertainty Calculations."

BASES

REFERENCES
(continued)

5. NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1979.
 6. BAW-1893, "Basis for Raising Arming Threshold for Anticipating Reactor Trip on Turbine Trip," October 1985.
 7. BAW-10167, May 1986.
 8. 10 CFR 50.36.
-