

**SURVEILLANCE REQUIREMENTS**

-----NOTE-----

Refer to Table 3.3.1-1 to determine which SRs apply for each RTS Function.

SURVEILLANCE		FREQUENCY
SR 3.3.1.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.1.2	<p>-----NOTES-----                      Not required to be performed until 12 hours after THERMAL POWER is <math>\geq</math> 15% RTP.                      -----</p> <p>Compare results of calorimetric heat balance calculation to power range channel output. Adjust power range channel output if calorimetric heat balance calculation results exceed power range channel output by more than +2% RTP.</p>	24 hours
SR 3.3.1.3	<p>-----NOTES-----                      Not required to be performed until 24 hours after THERMAL POWER is <math>\geq</math> 15% RTP.                      -----</p> <p>Compare results of the incore detector measurements to Nuclear Instrumentation System (NIS) AFD. Adjust NIS channel if absolute difference is <math>\geq</math> 3%.</p>	31 effective full power days (EFPD)

(continued)

BASES

---

SURVEILLANCE  
REQUIREMENTS

SR 3.3.1.1 (continued)

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 operational use of the displays associated with the LCO required channels.

SR 3.3.1.2

SR 3.3.1.2 compares the calorimetric heat balance calculation to the power range channel output every 24 hours. If the calorimetric heat balance results exceed the power range channel output by more than +2% RTP, the power range channel is not declared inoperable, but must be adjusted consistent with the calorimetric heat balance results. If the power range channel output cannot be properly adjusted, the channel is declared inoperable.

If the calorimetric is performed at part power (< 50% RTP), adjusting the power range channel indication in the increasing direction will assure a reactor trip below the safety analysis limit of 118% RTP. Making no adjustment to the power range channel in the decreasing power direction due to a part-power calorimetric assures a reactor trip consistent with the safety analyses.

This allowance does not preclude making indication power adjustments, if desired, when the calorimetric heat balance calculation is less than the power range channel output. To provide close agreement between indicated and calorimetric power and to preserve operating margin, the power range channels are normally adjusted when operating at or near full power during steady-state conditions. However, discretion must be exercised if the power range channel output is adjusted in the decreasing power direction due to a part-power calorimetric (< 50% RTP). This action may introduce a nonconservative bias at higher power levels which may result in an NIS reactor trip above the safety analysis limit of 118% RTP. The cause of the potential nonconservative bias is the decreased accuracy of the calorimetric at reduced power conditions. The primary error

(continued)

**BASES**

---

**SURVEILLANCE  
REQUIREMENTS**

SR 3.3.1.2 (continued)

contributor to the instrument uncertainty for a secondary side power calorimetric measurement is the feedwater flow measurement which is typically a  $\Delta P$  measurement across a feedwater venturi. While the measurement uncertainty remains constant in  $\Delta P$  as power decreases, when translated into flow, the uncertainty increases as a square term. Thus a 1% flow error at 100% RTP can approach a 10% error at 30% RTP even though the  $\Delta P$  error has not changed. An evaluation of extended operation at part-power conditions would conclude that it is prudent to administratively adjust the setpoint of the Power Range Neutron Flux – High bistables to  $\leq 90\%$  RTP for a calorimetric power determined below 50% RTP, and to  $\leq 75\%$  RTP for a calorimetric power determined below 20% RTP when: 1) the power range channel output is adjusted in the decreasing power direction due to a part-power calorimetric; or 2) for a post-refueling startup.

Before the Power Range Neutron Flux – High bistables are reset to the nominal value in Table 3.3.1-1 of Specification 3.3.1, the power range channel adjustment must be confirmed based on a calorimetric performed at a power level  $\geq 50\%$  RTP.

The Note clarifies that this Surveillance is required only if reactor power is  $\geq 15\%$  RTP and that 12 hours is allowed for performing the first Surveillance after reaching 15% RTP. At lower power levels, calorimetric data are inaccurate.

The Frequency of every 24 hours is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Together these factors demonstrate that a difference between the calorimetric heat balance calculation and the power range channel output of more than +2% RTP is not expected in any 24 hour period.

In addition, control room operators periodically monitor redundant indications and alarms to detect deviations in channel outputs.

SR 3.3.1.3

SR 3.3.1.3 compares the incore system to the NIS channel output every 31 EFPD. If the absolute difference is  $\geq 3\%$ , the NIS channel is still OPERABLE, but must be readjusted. If the NIS channel cannot be properly readjusted, the channel is declared

(continued)

**BASES**

---

**SURVEILLANCE  
REQUIREMENTS**

**SR 3.3.1.3 (continued)**

inoperable. This surveillance is primarily performed to verify the (AFD) input to the overtemperature  $\Delta T$  function.

SR 3.3.1.3 compares the incore system to the NIS channel output every 31 EFPD. If the absolute difference is  $\geq 3\%$ , the NIS channel is still OPERABLE, but must be readjusted. If the NIS channel cannot be properly readjusted, the channel is declared inoperable. This surveillance is primarily performed to verify the f(AFD) input to the overtemperature  $\Delta T$  function.

The Note clarifies that the Surveillance is required only if reactor power is  $\geq 15\%$  RTP and that 24 hours is allowed for performing the first Surveillance after reaching 15% RTP.

Axial offset is the difference between the power in the top half of the core and the bottom half of the core expressed as a fraction (percent) of the total power being produced by the core. Mathematically, it is expressed as:

$$AO = 100 \times \frac{(Flux_T - Flux_B)}{(Power)(Flux_T + Flux_B)}$$

where  $Flux_T$  = neutron flux at the top of the core, and

$Flux_B$  = neutron flux at the bottom of the core

The relationship between AFD and axial offset is:

$$AFD = AO \times (Power (\%)/100)$$

AFD as displayed on the main control board and as determined by the plant computer use inputs from the power range NIS detectors which are located outside the reactor vessel. Axial offset is measured using incore detectors.

The surveillance assures that the AFD as displayed on the main control board and as determined by the plant computer is within 3% of the AFD as calculated from the axial offset equation. Agreement is required so that the reactor is operated within the bounds of the safety analysis regarding axial power distribution.

(continued)

**BASES**

---

**SURVEILLANCE  
REQUIREMENTS**

**SR 3.3.1.3** (continued)

The Frequency of every 31 EFPD is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Also, the slow changes in neutron flux during the fuel cycle can be detected during this interval.

**SR 3.3.1.4**

SR 3.3.1.4 is the performance of a TADOT every 31 days on a STAGGERED TEST BASIS. This test shall verify OPERABILITY by actuation of the end devices.

The RTB test shall include separate verification of the undervoltage and shunt trip mechanisms. Independent verification of RTB undervoltage and shunt trip function is not required for the bypass breakers. No capability is provided for performing such a test at power. The independence test for bypass breakers is included in SR 3.3.1.13. The bypass breaker test shall include a local shunt trip. A Note has been added to indicate that this test must be performed on the bypass breaker prior to placing it in service.

The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

**SR 3.3.1.5**

SR 3.3.1.5 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 31 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

(continued)

BASES

---

SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.3.1.6

SR 3.3.1.6 is a calibration of the excore channels to the incore channels. If the measurements do not agree, the excore channels are not declared inoperable but must be calibrated to agree with the incore detector measurements. If the excore channels cannot be adjusted, the channels are declared inoperable. This surveillance is primarily performed to verify the f(AFD) input to the overtemperature  $\Delta T$  function.

Two Notes modify SR 3.3.1.6. Note 1 states that this Surveillance is required only if reactor power is > 75% RTP and that 7 days is allowed for performing the first surveillance after reaching 75% RTP. Note 2 states that neutron detectors are excluded from the calibration.

The Frequency of 92 EFPD is adequate. It is based on industry operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 92 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be within the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of Reference 7.

This Surveillance Requirement is modified by two Notes that apply only to the Source Range instrument channels. Note 1 requires that the COT include verification that interlocks P-6 and P-10 are in the required state for the existing unit

(continued)

**BASES**

---

**SURVEILLANCE  
REQUIREMENTS**

**SR 3.3.1.7** (continued)

conditions. Note 2 provides a 4 hour delay in the requirement to perform this surveillance for source range instrumentation when entering Mode 3 from Mode 2. This Note allows a normal shutdown to proceed without delay for the performance of this SR to meet the applicability requirements in Mode 3. This delay allows time to open the RTBs in Mode 3 after which this SR is no longer required to be performed. If the unit is to be in Mode 3 with the RTBs closed for greater than 4 hours, this surveillance must be completed prior to the expiration of the 4 hours.

The Frequency of 92 days is justified in Reference 7.

**SR 3.3.1.8**

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except the frequency is prior to reactor startup. This SR is not required to be met when reactor power is decreased below P-10 (10% RTP) or when MODE 2 is entered from MODE 1 during controlled shutdowns. The Surveillance is modified by a Note that specifies this surveillance can be satisfied by the performance of a COT within 31 days prior to reactor startup. This test ensures that the NIS source range, intermediate range, and power range low setpoint channels are OPERABLE prior to taking the reactor critical.

**SR 3.3.1.9**

SR 3.3.1.9 is the performance of a TADOT and is performed every 92 days, as justified in Reference 7.

The SR is modified by a Note that excludes verification of setpoints from the TADOT. Since this SR applies to RCP undervoltage and underfrequency relays, setpoint verification requires elaborate bench calibration and is accomplished during the CHANNEL CALIBRATION.

(continued)

BASES

---

**SURVEILLANCE  
REQUIREMENTS**  
(continued)

SR 3.3.1.10

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology for some instrument functions, and the need to perform this Surveillance for some instrument functions under the conditions that apply during a plant outage and the potential for an unplanned plant transient if the Surveillance were performed at power. Operating experience has shown these components usually pass the Surveillance when performed on the 18 month Frequency.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 18 months. This SR is modified by a Note that states that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors includes a normalization of the detectors based on a power calorimetric and flux map performed above 75% RTP. The CHANNEL CALIBRATION for the source range neutron detectors includes obtaining the detector preamp discriminator curves and evaluating those curves.

(continued)



BASES

---

SURVEILLANCE  
REQUIREMENTS

SR 3.3.1.11 (continued)

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed on the 18 month Frequency.

SR 3.3.1.12

SR 3.3.1.12 is the performance of a COT of RTS interlocks every 18 months.

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.1.13

SR 3.3.1.13 is the performance of a TADOT of the Manual Reactor Trip and the SI Input from ESFAS. This TADOT is as described in SR 3.3.1.4, except that the test is performed every 18 months.

The manual reactor trip TADOT shall independently verify the OPERABILITY of the undervoltage and shunt trip circuits for the manual reactor trip function. This test shall also verify the OPERABILITY of the Bypass breaker trip circuit(s), including the automatic undervoltage trip.

The Frequency is based on the known reliability of the Functions and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

(continued)

BASES

---

SURVEILLANCE  
REQUIREMENTS

SR 3.3.1.13 (continued)

The SR is modified by a Note that excludes verification of setpoints from the TADOT. The Functions affected have no setpoints associated with them.

SR 3.3.1.14

SR 3.3.1.14 is the performance of a TADOT of the turbine stop valve closure Turbine Trip Functions. This TADOT is as described in SR 3.3.1.4, except that this test is performed after each entry into MODE 3 for a unit shutdown and prior to exceeding the P-9 interlock trip setpoint. Note 1 states that this Surveillance is not required if it has been performed within the previous 31 days. Note 2 states that verification of the Trip Setpoint does not have to be performed for this Surveillance. Performance of this test ensures that the reactor trip on turbine trip Function is OPERABLE prior to entering the Mode of Applicability (above the P-9 power range neutron flux interlock) for this instrument function. The frequency is based on the known reliability of the instrumentation that generates a reactor trip after the turbine trips, and has been shown to be acceptable through operating experience.

SR 3.3.1.15

SR 3.3.1.15 verifies that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in FSAR, Chapter 16 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer function set to one or with the time constants set to their nominal value. The results must be compared to properly defined acceptance criteria. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

(continued)

**BASES**

---

**SURVEILLANCE  
REQUIREMENTS**

**SR 3.3.1.15 (continued)**

Response time may be verified by actual response time tests in any series of sequential, overlapping, or total channel measurements; or by the summation of allocation sensor, signal processing, and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) using vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 10), provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," (Ref. 11), provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response

(continued)

BASES

---

**SURVEILLANCE  
REQUIREMENTS**

SR 3.3.1.15 (continued)

times. Experience has shown that these components usually pass this surveillance when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.15 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. 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 a virtually instantaneous response.

SR 3.3.1.16

SR 3.3.1.16 is the performance of a COT for the low fluid oil pressure portion of the Turbine Trip Functions as described in SR 3.3.1.7 except that the Frequency is after each entry into MODE 3 for a unit shutdown and prior to exceeding the P-9 interlock trip setpoint. The surveillance is modified by two Notes. Note 1 states that the surveillance may be satisfied if performed within the previous 31 days. Note 2 states that verification of the setpoint is not required. Performance of this test ensures that the reactor trip on turbine trip function is OPERABLE prior to entering the Mode of Applicability (above the P-9 power range neutron flux interlock) for this instrument function. The frequency is based on the known reliability of the instrumentation that generates a reactor trip after the turbine trips, and has been shown to be acceptable through operating experience.

---

**REFERENCES**

1. FSAR, Chapter 7.

(continued)

BASES

---

REFERENCES  
(continued)

2. FSAR, Chapter 6.
3. FSAR, Chapter 15.
4. IEEE-279-1971.
5. 10 CFR 50.49.
6. WCAP-11269, Westinghouse Setpoint Methodology for Protection Systems; as supplemented by:
  - Amendments 34 (Unit 1) and 14 (Unit 2), RTS Steam Generator Water Level – Low Low, ESFAS Turbine Trip and Feedwater Isolation SG Water Level – High High, and ESFAS AFW SG Water Level – Low Low.
  - Amendments 48 and 49 (Unit 1) and Amendments 27 and 28 (Unit 2), deletion of RTS Power Range Neutron Flux High Negative Rate Trip.
  - Amendments 60 (Unit 1) and 39 (Unit 2), RTS Overtemperature  $\Delta T$  setpoint revision.
  - Amendments 57 (Unit 1) and 36 (Unit 2), RTS Overtemperature and Overpower  $\Delta T$  time constants and Overtemperature  $\Delta T$  setpoint.
  - Amendments 43 and 44 (Unit 1) and 23 and 24 (Unit 2), revised Overtemperature and Overpower  $\Delta T$  trip setpoints and allowable values.
  - Amendments 104 (Unit 1) and 82 (Unit 2), revised RTS Intermediate Range Neutron Flux, Source Range Neutron Flux, and P-6 trip setpoints and allowable values.
  - Amendments 127 (Unit 1) and 105 (Unit 2), revised Overtemperature  $\Delta T$  trip setpoint to limit value of the compensated temperature difference and revised the modifier for axial flux difference.
  - Amendments 128 (Unit 1) and 106 (Unit 2), revised Overtemperature  $\Delta T$  and Overpower  $\Delta T$  trip setpoints to increase the fundamental setpoints  $K_1$  and  $K_4$ , and to modify coefficients and dynamic compensation terms.
7. WCAP-10271-P-A, Supplement 1, May 1986.
8. FSAR, Chapter 16.

(continued)

**BASES**

---

**REFERENCES**  
(continued)

9. Westinghouse Letter GP-16696, November 5, 1997.
  10. WCAP-13632-P-A Revision 2, "Elimination of Periodic Sensor Response Time Testing Requirements," January 1996.
  11. WCAP-14036-P-A Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.
  12. WCAP-14333-P-A, Rev. 1, October 1998.
  13. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.
-