AMEREN/UE
DOCUMENT CONTROL SYSTEM
DOCUMENT TRANSMITTAL

TRANSMITTAL NUMBER: 493590
TO CONTROL NUMBER: 423U
TITLE: OTHER
DEPT: NUCLEAR REGULATORY COMM.
LOCATION: USNRC-WASH DC
TRANSMITTAL DATE: 20021007

RETURN ACKNOWLEDGED TRANSMITTAL AND
SUPERSEDED DOCUMENTS (IF APPLICABLE) TO:
ADMINISTRATION RECORDS
AMEREN/UE
CALLAWAY PLANT
P.O. BOX 620
FULTON, MO 65251

TRAN CODE	DOC TYPE	DOCUMENT NUMBER	REV	RET REV	MED	COPY	ALT MED	ALT COPY	AFFECTED DOCUMENT
A	CNOT	AMENDMENT 151			C	1			TECH SPEC
A	CNOT	02-009 TSB			C	1			TECH SPEC BASES
A	CNOT	02-022 FSAR			C	1			FSAR CH 16 TECH SPEC

ACKNOWLEDGED BY:

DATE:

A053

DIRECTIONS FOR INSERTING AMENDMENT 151 TO TECH. SPEC

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Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
1.	Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA
		3[b], 4[b], 5[b]	2	C	SR 3 3.1.14	NA
2.	Power Range Neutron Flux					
	a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 112.3% RTP
	b. Low	1[c],2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3 3.1.16	≤ 28.3% RTP
3.	Power Range Neutron Flux Rate - High Positive Rate	1,2	4	E	SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 6 3 % RTP with time constant ≥ 2 sec
4.	Intermediate Range Neutron Flux	1[c], 2[d]	2	F, G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 35.3% RTP

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(b) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(c) Below the P-10 (Power Range Neutron Flux) interlock.
(d) Above the P-6 (Intermediate Range Neutron Flux) interlock.

October 7, 2002

DIRECTIONS FOR INSERTING *CN 02-009* REVISION TO TS BASES

Remove and insert pages as listed below. Dashes (---) in the remove or insert column of the directions indicate no actions required.

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APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

Power Range Neutron Flux (continued)

power range detectors provide input to the Rod Control System and the Steam Generator (SG) Water Level Control System. Therefore, the actuation logic must be able to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Note that this Function also provides a signal to prevent rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

a. Power Range Neutron Flux - High

The Power Range Neutron Flux - High trip Function ensures that protection is provided, from all power levels, against a positive reactivity excursion leading to DNB during power operations and will prevent fuel melting, providing protection for the safety limit on linear heat rate. These excursions can be caused by rod withdrawal or reductions in RCS temperature.

The LCO requires all four of the Power Range Neutron Flux - High channels to be OPERABLE (two-out-of-four trip logic). The Trip Setpoint is ≤ 109% RTP.

In MODE 1 or 2, when a positive reactivity excursion could occur, the Power Range Neutron Flux - High trip must be OPERABLE. This Function will terminate the reactivity excursion and shut down the reactor prior to reaching a power level that could damage the fuel. In MODE 3, 4, 5, or 6, the NIS power range detectors cannot detect neutron levels. In these MODES, the Power Range Neutron Flux - High does not have to be OPERABLE because the reactor is shut down and reactivity excursions into the power range are extremely unlikely. Other RTS Functions and administrative controls provide protection against reactivity additions when in MODE 3, 4, 5, or 6.

b. Power Range Neutron Flux - Low

The LCO requirement for the Power Range Neutron Flux - Low trip Function ensures that protection is provided against a positive reactivity excursion from low power or subcritical conditions.

(continued)

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APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

b. Power Range Neutron Flux - Low (continued)

The LCO requires all four of the Power Range Neutron Flux - Low channels to be OPERABLE (two-out-of-four trip logic). The Trip Setpoint is ≤ 25% RTP.

In MODE 1, below the Power Range Neutron Flux (P-10 setpoint), and in MODE 2, the Power Range Neutron Flux-Low trip must be OPERABLE. This Function may be manually blocked by the operator when two out of four power range channels are greater than 10% RTP (P-10 setpoint). This Function is automatically unblocked when three out of four power range channels are below the P-10 setpoint. Above the P-10 setpoint, positive reactivity additions are mitigated by the Power Range Neutron Flux-High trip Function.

In MODE 3, 4, 5, or 6, the Power Range Neutron Flux - Low trip Function does not have to be OPERABLE because the reactor is shut down and the NIS power range detectors cannot detect neutron levels in this range. Other RTS trip Functions and administrative controls provide protection against positive reactivity additions or power excursions in MODE 3, 4, 5, or 6.

3. Power Range Neutron Flux Rate

The Power Range Neutron Flux Rate trip uses the same channels as discussed for Function 2 above.

Power Range Neutron Flux - High Positive Rate

The Power Range Neutron Flux - High Positive Rate trip Function ensures that protection is provided against rapid increases in neutron flux that are characteristic of an RCCA drive rod housing rupture and the accompanying ejection of the RCCA. This Function compliments the Power Range Neutron Flux - High and Low Setpoint trip Functions to ensure that the criteria are met for a rod ejection from the power range. This Function also provides protection for the rod withdrawal at power event.

The LCO requires all four of the Power Range Neutron Flux - High Positive Rate channels to be OPERABLE (two-out-of-four trip logic). The Trip Setpoint is ≤ 4.25% RTP with a time constant ≥ 2 seconds.

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APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

Power Range Neutron Flux - High Positive Rate (continued)

In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a rod ejection accident (REA), the Power Range Neutron Flux - High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux- High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. Also, since only the shutdown banks may be withdrawn in MODE 3, 4, or 5, the remaining complement of control bank worth ensures a sufficient degree of SDM in the event of an REA. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.

4. Intermediate Range Neutron Flux

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup (automatic rod withdrawal is no longer available). This trip Function provides redundant protection to the Power Range Neutron Flux - Low Setpoint trip Function. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS intermediate range detectors do not provide any input to control systems. Note that this Function also provides a signal to prevent rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

The LCO requires two channels of Intermediate Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function (one-out-of-two trip logic). The Trip Setpoint is ≤ 25% RTP.

Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function is required to be OPERABLE. Therefore, a third channel is unnecessary.

In MODE 1 below the P-10 setpoint, and in MODE 2 above the P-6 setpoint, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the

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BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

4. Intermediate Range Neutron Flux (continued)

Intermediate Range Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the Power Range Neutron Flux - High Setpoint trip and the Power Range Neutron Flux - High Positive Rate trip provide core protection for a rod withdrawal accident. In MODE 2 below the P-6 setpoint, the Source Range Neutron Flux trip Function provides core protection for reactivity accidents. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because the control rods must be fully inserted and only the shutdown rods may be withdrawn. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM. Also, the NIS intermediate range detectors cannot detect neutron levels present in this MODE.

5. Source Range Neutron Flux

The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup (automatic rod withdrawal is no longer available). This trip Function provides redundant protection to the Power Range Neutron Flux- Low and Intermediate Range Neutron Flux trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled manual withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RTS automatic protection function required in MODES 3, 4, and 5 with the Rod Control System capable of rod withdrawal or one or more rods not fully inserted. Therefore, the functional capability at the Trip Setpoint is assumed to be available.

The LCO requires two channels of Source Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function. This Function uses one-out-of-two trip logic. The Trip Setpoint is $\leq$ 1.0 E5 cps. The outputs of the Function to RTS logic are not required OPERABLE in MODE 6 or when all rods are fully inserted and the Rod Control System is incapable of rod withdrawal.

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SURVEILLANCE REQUIREMENTS

SR 3.3.1.16 (continued)

(c) Any intentional time delay set into the trip circuitry (e.g., undervoltage relay time delay, NLL cards (lag, lead/lag, rate/lag) and NPL cards (PROM logic cards for trip time delay) associated with the OTΔT, OPΔT, and SG low-low level Vessel ΔT (Power-1, Power-2) trip functions, and NLL cards (lead/lag) associated with the low pressurizer pressure reactor trip function) to add margin or prevent spurious trip signals;

(d) For the undervoltage RCP trip function, back EMF delay from the time of the loss of the bus voltage until the back EMF voltage generated by the bus loads has decayed;

(e) The time delay for the reactor trip breakers to open; and

(f) The time delay for the control rod drive stationary gripper coil voltage to decay and the RCCA grippers to mechanically release making the rods free to fall (i.e., gripper release time measured during the performance of SR 3.1.4.3).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time verification is performed with the time constants set at their nominal values. Time constants are verified during the performance of SR 3.3.1.10 and SR 3.3.1.11. The response time may be verified by a series of overlapping tests, or other verification (e.g., Ref. 9 and Ref. 15), such that the entire response time is verified.

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 allocated 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) inplace, onsite, or offsite (e.g. vendor) test measurements; or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," 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.

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SURVEILLANCE REQUIREMENTS

SR 3.3.1.16 (continued)

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," 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 References 9 and 15 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 time must be verified every 18 months on a STAGGERED TEST BASIS. Each verification shall include at least one train such that both trains are verified at least once per 36 months. Testing of the final actuation devices (i.e., reactor trip breakers) is included in the verification. Testing of the final actuation devices measures the time delay for the reactor trip breakers to open. The time delay for the control rod drive stationary gripper coil voltage to decay and the RCCA grippers to mechanically release making the rods free to fall (i.e., gripper release time) is measured during the performance of SR 3.1.4.3 which verifies rod drop time from the beginning of decay of stationary gripper coil voltage. For surveillance testing performance, gripper release time is not included in the reactor trip system instrumentation response time testing due to the difficulty in determining the precise point at which the rods are free to fall. SR 3.1.4.3 specifies a readily quantifiable time to use as a separation point for field measurements, i.e., "from the beginning of decay of stationary gripper coil voltage." The rod drop time measurement in SR 3.1.4.3 begins at the time the rod control power cabinet regulator board circuit for a specific rod group is grounded, causing the board to reduce the stationary gripper coil current to zero releasing the rod group. This is essentially the same time at which the reactor trip breaker's opening would interrupt current to the stationary gripper coil. The response time definition, "until loss of stationary gripper coil voltage," is less quantifiable. However, the definition's provision for overlapping testing allows this testing approach since the total response time is determined. The safety analyses are satisfied as long as both surveillances, response time and rod drop time, are met. Some portions of the response time testing cannot be performed during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this Surveillance when performed at the

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SURVEILLANCE REQUIREMENTS

SR 3.3.1.16 (continued)

18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.16 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. Response time of the neutron flux signal portion of the channel shall be verified from detector output or input to the first electronic component in the channel.

REFERENCES

1. FSAR, Chapter 7.
2. FSAR, Chapter 15.
3. IEEE-279-1971.
4. 10 CFR 50.49.
5. Callaway OL Amendment No. 17 dated September 8, 1986.
6. Callaway Setpoint Methodology Report, SNP (UE)-565 dated May 1, 1984.
7. Callaway OL Amendment No. 43 dated April 14, 1989.
8. FSAR Section 16.3, Table 16.3-1.
9. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.
10. FSAR Table 15.0-4.
11. WCAP-9226, "Reactor Core Response to Excessive Secondary Steam Releases," Revision 1, January 1978.
12. NRC Generic Letter 85-09 dated May 23, 1985.
13. FSAR Section 15.1.1.
14. RFR - 18637A.

BASES

REFERENCES (continued)

15. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

16. FSAR Section 15.4.6.

Table B 3.3.1-1
(Page 1 of 3)

	FUNCTION	NOMINAL TRIP SETPOINT [a]
1.	Manual Reactor Trip	N.A.
2.	Power Range Neutron Flux	
	a. High	≤ 109% RTP
	b. Low	≤ 25% RTP
3.	Power Range Neutron Flux Rate - High Positive Rate	≤ 4.25% RTP with time constant ≥ 2 sec.
4.	Intermediate Range Neutron Flux	≤ 25% RTP
5.	Source Range Neutron Flux	≤ 1.0E5 CPS
6.	Overtemperature ΔT	See Table 3.3.1-1 Note 1.
7.	Overpower ΔT	See Table 3.3.1-1 Note 2.
8.	Pressurizer Pressure	
	a. Low	≥ 1885 psig
	b. High	≤ 2385 psig
9.	Pressurizer Water Level - High	≤ 92% of instrument span
10.	Reactor Coolant Flow - Low	≥ 90% of loop minimum measured flow (MMF=95,660 gpm)

(continued)

(a) The inequality sign only indicates conservative direction. The as-left value will be within a two-sided calibration tolerance band on either side of the nominal value. This also applies to the Overtemperature ΔT and Overpower ΔT K values per Reference 14.

Table B 3.3.1-1
(Page 2 of 3)

FUNCTION	NOMINAL TRIP SETPOINT [a]
11. Not used.	
12. Undervoltage RCPs	≥ 10,584 Vac
13. Underfrequency RCPs	≥ 57.2 Hz
14. Steam Generator (SG) Water Level Low-Low	
a. Steam Generator Water Level Low-Low (Adverse Containment Environment)	≥ 27.0% of narrow range instrument span
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	≥ 21.6% of narrow range instrument span
c. Vessel ΔT Equivalent including delay timers - Trip Time Delay	
(1) Vessel ΔT (Power-1)	≤ Vessel ΔT Equivalent to 12.41% RTP (with a time delay ≤ 232 sec.)
(2) Vessel ΔT (Power- 2)	≤ Vessel ΔT Equivalent to 22.41% RTP (with a time delay ≤ 122 sec.)
d. Containment Pressure - Environmental Allowance Modifier	≤ 1.5 psig
15. Not used.	

(continued)

(a) The inequality sign only indicates conservative direction. The as-left value will be within a two-sided calibration tolerance band on either side of the nominal value. This also applies to the Overtemperature ΔT and Overpower ΔT K values per Reference 14.

Table B 3.3.1-1
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	FUNCTION	NOMINAL TRIP SETPOINT [a]
16.	Turbine Trip	
	a. Low Fluid Oil Pressure	≥ 598.94 psig
	b. Turbine Stop Valve Closure	≥ 1% open
17.	Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	N.A.
18.	Reactor Trip System Interlocks	
	a. Intermediate Range Neutron Flux, P-6	≥ 1.0E-10 amps
	b. Low Power Reactor Trips Block, P-7	N.A.
	c. Power Range Neutron Flux, P-8	≤ 48% RTP
	d. Power Range Neutron Flux, P-9	≤ 50% RTP
	e. Power Range Neutron Flux, P-10	10% RTP
	f. Turbine Impulse Pressure, P-13	≤ 10% Turbine Power
19.	Reactor Trip Breakers	N.A.
20.	Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	N.A.
21.	Automatic Trip Logic	N.A.

(a) The inequality sign only indicates conservative direction. The as-left value will be within a two-sided calibration tolerance band on either side of the nominal value. This also applies to the Overtemperature ΔT and Overpower ΔT K values per Reference 14.