See Correction ltr of 5/4/89

April 14, 1989

Docket No. 50-483

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Mr. Donald F. Schnell
Vice President - Nuclear
Union Electric Company
Post Office Box 149
St. Louis, Missouri 63166

Dear Mr. Schnell:

SUBJECT: AMENDMENT NO. 43 TO FACILITY OPERATING LICENSE NO. NPF-30 (TAC NO. 69261)

The Commission has issued the enclosed Amendment No. 43 to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1. This amendment revises the Technical Specifications (TS) in response to your application dated August 30, 1988, as supplemented by letters dated November 18 (2 letters) and December 28, 1988, and February 7, 10 and 15, 1989.

The amendment revises the provisions in the TS relating to the steam generator low-low level trip circuitry by adding an Environmental Allowance Modifer (EAM) and a Trip TIme Delay (TTD).

A copy of the Safety Evaluation and of the notice of issuance are also enclosed. The notice of issuance has been forwared to the Office of the Federal Register for publication.

Sincerely,

/s/

Thomas W. Alexion, Project Manager
Project Directorate III-3
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 43 to License No. NPF-30
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosures:
See next page

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Surname:	PKreutzer	TAlexion/mr	Bachmann	JHannon
Date:	3/31/89	3/31/89	4/11/89	4/13/89

8904280097 890414
PDR ADOCK 05000483
P PNU

DF01
11

Mr. D. F. Schnell
Union Electric Company

Callaway Plant
Unit No. 1

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. STN 50-483

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 43
License No. NPF-30

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by Union Electric Company (UE, the licensee) dated August 30, 1988, as supplemented by letters dated November 18 (2 letters) and December 28, 1988, and February 7, 10 and 15, 1989 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-30 is hereby amended to read as follows:

8904280099 890414
PDR ADOCK 05000483
P PNU

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 43, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into the license. UE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas V. Wambach
for John N. Hannon, Director
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 14, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 43

OPERATING LICENSE NO. NPF-30

DOCKET NO. 50-483

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Corresponding overleaf pages are provided to maintain document completeness.

REMOVE	INSERT
2-5	2-5
-	2-5(a)
-	2-5(b)
-	2-5(c)
3/4 3-3	3/4 3-3
-	3/4 3-3(a)
3/4 3-6	3/4 3-6
3/4 3-6(a)	3/4 3-6(a)
3/4 3-8	3/4 3-8
3/4 3-10	3/4 3-10
-	3/4 3-10(a)
3/4 3-17	3/4 3-17
3/4 3-18	3/4 3-18
-	3/4 3-18(a)
-	3/4 3-21(a)
3/4 3-25	3/4 3-25
-	3/4 3-25(a)
-	3/4 3-25(b)
-	3/4 3-25(c)
-	3/4 3-25(d)
-	3/4 3-25(e)
-	3/4 3-25(f)
3/4 3-31	3/4 3-31
3/4 3-32(a)	3/4 3-32(a)
3/4 3-36	3/4 3-36
-	3/4 3-36(a)
B 2-7	B 2-7
-	B 2-7(a)

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
13. Steam Generator Water Level Low-Low					
a. Vessel ΔT Equivalent ≤ 10% RTP Vessel ΔT (Power 1)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 10% RTP	≤ Vessel ΔT Equivalent to 14.0% RTP
Coincident with Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 232 seconds	≤ 240 seconds

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
13. Steam Generator Water Level Low-Low (Continued)					
b. 10% RTP < Vessel ΔT Equivalent ≤ 20% RTP Vessel ΔT (Power 2)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 20% RTP	≤ Vessel ΔT Equivalent to 24.0% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure-Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 122 seconds	≤ 130 seconds

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
13. Steam Generator Water Level Low-Low (Continued)					
c. Vessel ΔT Equivalent > 20% RTP					
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
14. Undervoltage - Reactor Coolant Pumps	7.7	1.33	0	≥ 10584 Volts A.C.	≥ 10356 Volts A.C.
15. Underfrequency - Reactor Coolant Pumps	3.3	0	0	≥ 57.2 Hz	≥ 57.1 Hz

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
16. Turbine Trip					
a. Low Fluid Oil Pressure	N.A.	N.A.	N.A.	≥ 598.94 psig	≥ 539.42 psig
b. Turbine Stop Valve Closure	N.A.	N.A.	N.A.	≥ 1% open	≥ 1% open
17. Safety Injection Input from ESF	N.A.	N.A.	N.A.	N.A.	N.A.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
18. Reactor Trip System Interlocks					
a. Intermediate Range Neutron Flux, P-6	N.A.	N.A.	N.A.	$\geq 1 \times 10^{-10}$ amps	$\geq 6 \times 10^{-11}$ amps
b. Low Power Reactor Trips Block, P-7					
1) P-10 input	N.A.	N.A.	N.A.	10% of RTP*	≥6.7% to ≤12.4% of RTP*
2) P-13 input	N.A.	N.A.	N.A.	≤10% of RTP* Turbine Impulse Pressure Equivalent	≤12.4% of RTP* Turbine Impulse Pressure Equivalent
c. Power Range Neutron Flux, P-8	N.A.	N.A.	N.A.	≤48% of RTP*	≤51.3% of RTP*
d. Power Range Neutron Flux, P-9	N.A.	N.A.	N.A.	≤50% of RTP*	≤53.3% of RTP*
e. Power Range Neutron Flux, P-10	N.A.	N.A.	N.A.	10% of RTP*	≥6.7% to ≤12.4% of RTP*
f. Turbine Impulse Chamber Pressure, P-13	N.A.	N.A.	N.A.	≤10% of RTP* Turbine Impulse Pressure Equivalent	≤12.4% of RTP* Turbine Impulse Pressure Equivalent
19. Reactor Trip Breakers	N.A.	N.A.	N.A	N.A.	N.A.
20. Automatic Trip and Interlock Logic	N.A.	N.A.	N.A.	N.A.	N.A.

*RTP = RATED THERMAL POWER

TABLE 3.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
11. Pressurizer Water Level-High	3	2	2	1	6#
12. Reactor Coolant Flow-Low					
a. Single Loop (Above P-8)	3/loop	2/loop in any operating loop	2/loop in each operating loop	1	6#
b. Two Loops (Above P-7 and below P-8)	3/loop	2/loop in two operating loops	2/loop each operating loop	1	6#
13. Steam Generator Water Level Low-Low					
a. Steam Generator Water Level Low-Low (Adverse Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. each operating stm. gen.	1, 2	6# (1), 7
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. each operating stm. gen.	1, 2	7, 13 # (1)
c. Vessel ΔT (Power-1, Power-2)	4	2	3	1, 2	11 # (1)
d. Containment Pressure - Environmental Allowance Modifier	4	2	3	1, 2	11 # (1)

TABLE 3.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
14. Undervoltage-Reactor Coolant Pumps	4-2/bus	2-1/bus	3	1	6#(1)
15. Underfrequency-Reactor Coolant Pumps	4-2/bus	2-1/bus	3	1	6#
16. Turbine Trip					
a. Low Fluid Oil Pressure	3	2	2	1	6#
b. Turbine Stop Valve Closure	4	4	1	1	11#
17. Safety Injection Input from ESF	2	1	2	1, 2	9

TABLE 3.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
18. Reactor Trip System Interlocks					
a. Intermediate Range Neutron Flux, P-6	2	1	2	2##	8
b. Low Power Reactor Trips Block, P-7					
P-10 Input	4	2	3	1	8
or					
P-13 Input	2	1	2	1	8
c. Power Range Neutron Flux, P-8	4	2	3	1	8
d. Power Range Neutron Flux, P-9	4	2	3	1	8
e. Power Range Neutron Flux, P-10	4	2	3	1, 2	8
f. Turbine Impulse Chamber Pressure, P-13	2	1	2	1	8
19. Reactor Trip Breakers	2	1	2	1, 2	9,12
	2	1	2	3*, 4*, 5*	10
20. Automatic Trip and Interlock Logic	2	1	2	1, 2	9
	2	1	2	3*, 4*, 5*	10

TABLE 3.3-1 (Continued)

TABLE NOTATIONS

*Only if the Reactor Trip System breakers happen to be in the closed position and the Control Rod Drive System is capable of rod withdrawal.

**The boron dilution flux doubling signals may be blocked during reactor startup in accordance with approved procedures.

#The provisions of Specification 3.0.4 are not applicable.

##Below the P-6 (Intermediate Range Neutron Flux Interlock) Setpoint.

###Below the P-10 (Low Setpoint Power Range Neutron Flux Interlock) Setpoint.

(1) The applicable MODES and ACTION statement for these channels noted in Table 3.3-3 are more restrictive and, therefore, applicable.

ACTION STATEMENTS

ACTION 1 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in HOT STANDBY within the next 6 hours.

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours,

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1, and

c. Either, THERMAL POWER is restricted to less than or equal to 75% of RATED THERMAL POWER and the Power Range Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours per Specification 4.2.4.2.

ACTION 3 - With the number of channels OPERABLE one less than the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

a. Below the P-6 (Intermediate Range Neutron Flux interlock) Setpoint, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint; or

b. Above the P-6 (Intermediate Range Neutron Flux interlock) Setpoint but below 10% of RATED THERMAL POWER, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above 10% of RATED THERMAL POWER.

TABLE 3.3-1 (Continued)

ACTION STATEMENTS (Continued)

ACTION 4 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement suspend all operations involving positive reactivity changes.

ACTION 5 - a. With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the Reactor trip breakers, suspend all operations involving positive reactivity changes and verify Valves BG-V178 and BG-V601 are closed and secured in position within the next hour.

b. With no channels OPERABLE, open the Reactor Trip Breakers, suspend all operations involving positive reactivity changes and verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and every 12 hours thereafter, and verify valves BG-V178 and BG-V601 are closed and secured in position within 4 hours and verified to be closed and secured in position every 14 days.

ACTION 6 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours, and

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels per Specification 4.3.1.1.

ACTION 7 - With an inoperable delay timer in the Trip Time Delay circuitry, STARTUP and/or POWER OPERATION may proceed provided that the Vessel Delta-T (Power-1, Power-2) channels in the affected protection sets are placed in the tripped condition within 6 hours.

ACTION 8 - With less than the Minimum Number of Channels OPERABLE, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

ACTION 9 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, be in at least HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1, provided the other channel is OPERABLE.

TABLE 3.3-1 (Continued)

ACTION STATEMENTS (Continued)

ACTION 10 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the Reactor trip breakers within the next hour.

ACTION 11 - With the number of OPERABLE channels less than the Total Number of Channels, operation may continue provided the inoperable channels are placed in the tripped condition within 6 hours.

ACTION 12 - With one of the diverse trip features (Undervoltage or Shunt Trip Attachment) inoperable, restore it to OPERABLE status within 48 hours or declare the affected breaker inoperable and apply ACTION 9. The breaker shall not be bypassed while one of the diverse trip features is inoperable except for the time required for performing maintenance to restore the breaker to OPERABLE status.

ACTION 13 - With the number of OPERABLE channels less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided that the Containment Pressure-Environmental Allowance Modifier channels in the affected protection sets are placed in the tripped condition within 6 hours.

TABLE 3.3-2

REACTOR TRIP SYSTEM INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
1. Manual Reactor Trip	N.A.
2. Power Range, Neutron Flux	≤ 0.5 second*
3. Power Range, Neutron Flux, High Positive Rate	N.A.
4. Power Range, Neutron Flux, High Negative Rate	≤ 0.5 second*
5. Intermediate Range, Neutron Flux	N.A.
6. Source Range, Neutron Flux	N.A.
7. Overtemperature ΔT	≤ 6.0 seconds*
8. Overpower ΔT	≤ 6.0 seconds*
9. Pressurizer Pressure-Low	≤ 2.0 seconds
10. Pressurizer Pressure-High	≤ 2.0 seconds
11. Pressurizer Water Level-High	N.A.

*Neutron detectors are exempt from response time testing. Response time of the neutron flux signal portion of the channel shall be measured from detector output or input to first electronic component in channel.

TABLE 3.3-2 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
12. Reactor Coolant Flow-Low	
a. Single Loop (Above P-8)	≤ 1.0 second
b. Two Loops (Above P-7 and below P-8)	≤ 1.0 second
13. Steam Generator Water Level Low-Low	
a. Steam Generator Water Level Low-Low (Adverse Containment Environment)	≤ 2.0 seconds (1)
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	≤ 2.0 seconds (1)
c. Vessel ΔT (Power-1, Power-2)	≤ 6.0 seconds (1)
d. Containment Pressure - Environmental Allowance Modifier	≤ 2.0 seconds (1)
14. Undervoltage-Reactor Coolant Pumps	≤ 1.5 seconds
15. Underfrequency-Reactor Coolant Pumps	≤ 0.6 seconds
16. Turbine Trip	
a. Low Fluid Oil Pressure	N.A.
b. Turbine Stop Valve Closure	N.A.
17. Safety Injection Input from ESF	N.A.
18. Reactor Trip System Interlocks	N.A.
19. Reactor Trip Breakers	N.A.
20. Automatic Trip and Interlock Logic	N.A.

(1) Does not include Trip Time Delays. Response times noted above include the transmitters, 7300 process protection cabinets, solid state protection cabinets, and actuation devices only. This reflects the response times necessary for THERMAL POWER in excess of 20% RATED THERMAL POWER.

TABLE 4.3-1

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
1. Manual Reactor Trip	N.A.	N.A.	N.A.	R(16)	N.A.	1, 2, 3*, 4*, 5
2. Power Range, Neutron Flux						
a. High Setpoint	S	D(2, 4), M(3, 4), Q(4, 6), R(4, 5)	Q(14)	N.A.	N.A.	1, 2
b. Low Setpoint	S	R(4)	S/U(1)	N.A.	N.A.	1###, 2
3. Power Range, Neutron Flux, High Positive Rate	N.A.	R(4)	Q(14)	N.A.	N.A.	1, 2
4. Power Range, Neutron Flux, High Negative Rate	N.A.	R(4)	Q(14)	N.A.	N.A.	1, 2
5. Intermediate Range, Neutron Flux	S	R(4, 5)	S/U(1)	N.A.	N.A.	1###, 2
6. Source Range, Neutron Flux	S	R(4, 5, 12)	S/U(1),Q(9,14)	N.A.	N.A.	2##, 3, 4, 5
7. Overtemperature ΔT	S	R(13)	Q(14)	N.A.	N.A.	1, 2
8. Overpower ΔT	S	R	Q(14)	N.A.	N.A.	1, 2
9. Pressurizer Pressure-Low	S	R	Q(14)	N.A.	N.A.	1
10. Pressurizer Pressure-High	S	R	Q(14)	N.A.	N.A.	1, 2
11. Pressurizer Water Level-High	S	R	Q(14)	N.A.	N.A.	1
12. Reactor Coolant Flow-Low	S	R	Q(14)	N.A.	N.A.	1

TABLE 4.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
13. Steam Generator Water Level Low-Low						
a. Steam Generator Water Level Low-Low (Adverse Containment Environment)	S	R	Q (14,15)	N.A.	N.A.	1, 2
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	S	R	Q (14,15)	N.A.	N.A.	1, 2
c. Vessel ΔT (Power-1, Power-2)	S	R	Q (14,15)	N.A.	N.A.	1, 2
d. Containment Pressure-Environmental Allowance Modifier	S	R	Q (14,15)	N.A.	N.A.	1, 2
14. Undervoltage - Reactor Coolant Pumps	N.A.	R	N.A.	Q (14,15)	N.A.	1
15. Underfrequency - Reactor Coolant Pumps	N.A.	R	N.A.	Q (14)	N.A.	1
16. Turbine Trip						
a. Low Fluid Oil Pressure	N.A.	R	N.A.	S/U (1,10)	N.A.	1
b. Turbine Stop Valve Closure	N.A.	R	N.A.	S/U (1,10)	N.A.	1

TABLE 4.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
17. Safety Injection Input from ESF	N.A.	N.A.	N.A.	R#	N.A.	1, 2
18. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	N.A.	R (4)	R	N.A.	N.A.	2##
b. Power Range Neutron Flux, P-8	N.A.	R (4)	R	N.A.	N.A.	1
c. Power Range Neutron Flux, P-9	N.A.	R (4)	R	N.A.	N.A.	1

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
5. Feedwater Isolation & Turbine Trip					
a. Automatic Actuation Logic and Actuation Relay (SSPS)	2	1	2	1, 2	27
b. Steam Generator Water Level High-High	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. in each operating stm. gen.	1, 2	19*
c. Safety Injection	See Item 1. above for all Safety Injection initiating functions and requirements.				
6. Auxiliary Feedwater					
a. Manual Initiation	3(1/pump)	1/pump	1/pump	1, 2, 3	24
b. Automatic Actuation Logic and Actuation Relays (SSPS)	2	1	2	1, 2, 3	21
c. Automatic Actuation Logic and Actuation Relays (BOP ESFAS)	2	1	2	1, 2, 3	21
d. Steam Generator Water Level Low-Low					
1) Start Motor-Driven Pumps					
a) Steam Generator Water Level Low-Low (Adverse Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. in each operating stm. gen.	1, 2, 3	19*,27(a)

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
1) Start Motor-Driven Pumps (Continued)					
b) Steam Generator Water Level Low-Low (Normal Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. in each operating stm. gen.	1, 2, 3	27(a), 27(b)*
c) Vessel ΔT (Power-1, Power-2)	4	2	3	1, 2, 3	27 (c)*
d) Containment Pressure-Environmental Allowance Modifier	4	2	3	1, 2, 3	27 (c)*
2) Start Turbine-Driven Pump					
a) Steam Generator Water Level Low-Low (Adverse Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. in each operating stm. gen.	1, 2, 3	19*, 27(a)
b) Steam Generator Water Level Low-Low (Normal Containment Environment)	4/stm. gen.	2/stm. gen. in any operating stm. gen.	3/stm. gen. in each operating stm. gen.	1, 2, 3	27(a), 27(b)*
c) Vessel ΔT (Power-1, Power-2)	4	2	3	1, 2, 3	27(c)*

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
2) Start Turbine-Driven Pump (Continued)					
d) Containment Pressure-Environmental Allowance Modifier	4	2	3	1, 2, 3	27(c)*
e. Safety Injection Start Motor-Driven Pumps	See Item 1 above for all Safety Injection initiating functions and requirements.				
f. Loss-of-Offsite Power-Start Turbine-Driven Pump	2	1	2	1, 2, 3	22
g. Trip of all Main Feedwater Pumps -Start Motor-Driven Pumps	4-(2/pump)**	2-(1/pump in same separation)	3	1, 2###	19
h. Auxiliary Feedwater Pump Suction Pressure-Low (Transfer to ESW)	3	2	2	1, 2, 3	15*
7. Automatic Switchover to Containment Sump					
a. Automatic Actuation Logic and Actuation Relays (SSPS)	2	1	2	1, 2, 3, 4	14
b. RWST Level - Low-Low Coincident With Safety Injection	4	2	3	1, 2, 3, 4	16
	See Item 1 above for Safety Injection initiating functions and requirements.				

TABLE 3.3-3 (Continued)

ACTION STATEMENTS (Continued)

b. The Minimum Channels OPERABLE requirement is met; however, the inoperable channel may be bypassed for up to 2 hours for surveillance testing of other channels per Specification 4.3.2.1.

ACTION 20 - With less than the Minimum Channels OPERABLE, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3.

ACTION 21 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1 provided the other channel is OPERABLE.

ACTION 22 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in at least HOT SHUTDOWN within the following 6 hours.

ACTION 23 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or declare the associated valve inoperable and take the ACTION required by Specification 3.7.1.5.

ACTION 24 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, declare the affected auxiliary feedwater pump inoperable and take the ACTION required by Specification 3.7.1.2.

ACTION 25 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, declare the affected diesel generator and off-site power source inoperable and take the ACTION required by Specification 3.8.1.1.

ACTION 26 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or initiate and maintain operation of the Control Room Emergency Ventilation System.

ACTION 27 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, be in at least HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1 provided the other channel is OPERABLE.

TABLE 3.3-3 (Continued)

ACTION STATEMENTS (Continued)

ACTION 27(a) - With an inoperable delay timer in the Trip Time Delay circuitry, STARTUP and/or POWER OPERATION may proceed provided that the Vessel ΔT (Power-1, Power-2) channels in the affected protection set are placed in the tripped condition within 6 hours.

ACTION 27(b) - With the number of OPERABLE channels less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided that the Containment Pressure-Environmental Allowance Modifier channels in the affected protection sets are placed in the tripped condition within 6 hours.

ACTION 27(c) - With the number of OPERABLE channels less than the Total Number of Channels, operation may continue provided the inoperable channels are placed in the tripped condition within 6 hours.

TABLE 3.3-4

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
1. Safety Injection (Reactor Trip, Phase "A" Isolation, Feedwater Isolation, Turbine Trip, Component Cooling Water, Auxiliary Feedwater - Motor-Driven Pump, Emergency Diesel Generator Operation, Containment Cooling, and Essential Service Water Operation)					
a. Manual Initiation	N.A.	N.A.	N.A.	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	N.A.
c. Containment Pressure - High-1	3.6	0.71	2.0	≤ 3.5 psig	≤ 4.5 psig
d. Pressurizer Pressure - Low	18.6	14.41	2.0	> 1849 psig	≥ 1834 psig
e. Steam Line Pressure - Low	19.6	14.81	2.0	≥ 615 psig	≥ 571 psig*
2. Containment Spray					
a. Manual Initiation	N.A.	N.A.	N.A.	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	N.A.

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
5. Feedwater Isolation (Continued)					
b. Steam Generator Water Level-High-High	5.0	2.18	2.0	≤ 78% of narrow range instrument span	≤ 79.8% of narrow range instrument span
c. Safety Injection	See Item 1. above for all Safety Injection Trip Setpoints and Allowable Values.				
6. Auxiliary Feedwater					
a. Manual Initiation	N.A.	N.A.	N.A.	N.A.	N.A.
b. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	N.A.
c. Automatic Actuation Logic and Actuation Relays (BOP ESFAS)	N.A.	N.A.	N.A.	N.A.	N.A.
d. Steam Generator Water Level-Low-Low					

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
1) Start Motor-Driven Pumps					
a. Vessel ΔT Equivalent < 10% RTP Vessel ΔT (Power-1)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 10% RTP	≤ Vessel ΔT Equivalent to 14.0% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 232 seconds	≤ 240 seconds

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
1) Start Motor-Driven Pumps (Continued)					
b. 10% RTP < Vessel ΔT Equivalent ≤ 20% RTP Vessel ΔT (Power-2)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 20% RTP	≤ Vessel ΔT Equivalent to 24.0% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure-Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 122 seconds	≤ 130 seconds

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
1) Start Motor-Driven Pumps (Continued)					
c. Vessel ΔT Equivalent > 20% RTP					
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
2) Start Turbine-Driven Pump					
a. Vessel ΔT Equivalent ≤ 10% RTP Vessel ΔT (Power-1)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 10% RTP	≤ Vessel ΔT Equivalent to 14.0% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 232 seconds	≤ 240 seconds

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
2) Start Turbine-Driven Pump (Continued)					
b. 10% RTP < Vessel ΔT Equivalent ≤ 20% RTP Vessel ΔT (Power-2)	6.0	2.38	2.0	≤ Vessel ΔT Equivalent to 20% RTP	≤ Vessel ΔT Equivalent to 24.0% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
And					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				≤ 122 seconds	≤ 130 seconds

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
d. Steam Generator Water Level Low-Low (Continued)					
2) Start Turbine-Driven Pump (Continued)					
c. Vessel ΔT Equivalent > 20% RTP					
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	≥ 20.2% of Narrow Range Instrument Span	≥ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	≤ 1.5 psig	≤ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	≥ 14.8% of Narrow Range Instrument Span	≥ 13.0% of Narrow Range Instrument Span

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
6. Auxiliary Feedwater (Continued)					
e. Safety Injection-Start Motor-Driven Pumps	See Item 1. above for all Safety Injection Trip Setpoints and Allowable Values.				
f. Loss-of-Offsite Power-Start Turbine-Driven Pump	N.A.	N.A.	N.A.	N.A.	N.A.
g. Trip of All Main Feedwater Pumps-Start Motor-Driven Pumps	N.A.	N.A.	N.A.	N.A.	N.A.
h. Auxiliary Feedwater Pump Suction Pressure-Low (Transfer to ESW)	N.A.	N.A.	N.A.	≥21.71 psia	≥20.64 psia
7. Automatic Switchover to Containment Sump					
a. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	N.A.
b. RWST Level-Low-Low Coincident with Safety Injection	3.4	1.21	2.0	≥36%	≥35.2%
	See Item 1. above for Safety Injection Trip Setpoints and Allowable Values.				
8. Loss of Power					
a. 4 kV Undervoltage -Loss of Voltage	N.A.	N.A.	N.A.	≥83V (120V Bus) w/1s delay	≥74.7 (120V Bus) w/1+0.2,-0.5s delay

TABLE 3.3-5 (Continued)

ENGINEERED SAFETY FEATURES RESPONSE TIMES

INITIATING SIGNAL AND FUNCTION	RESPONSE TIME IN SECONDS
5. Containment Pressure-High-3	
a. Containment Spray	$\leq 32^{(1)}/20^{(2)}$
b. Phase "B" Isolation	≤ 31.5
6. Containment Pressure-High-2	
Steam Line Isolation	$\leq 2^{(5)}$
7. Steam Line Pressure-Negative Rate-High	
Steam Line Isolation	$\leq 2^{(5)}$
8. Steam Generator Water Level-High-High	
a. Feedwater Isolation	$\leq 2^{(5)}$
b. Turbine Trip	≤ 2.5
9. Steam Generator Water Level-Low-Low	
a. Start Motor-Driven Auxiliary Feedwater Pumps	$\leq 60^{(8)}$
b. Start Turbine-Driven Auxiliary Feedwater Pump	$\leq 60^{(8)}$
10. Loss-of-Offsite Power	
Start Turbine-Driven Auxiliary Feedwater Pump	N.A.
11. Trip of All Main Feedwater Pumps	
Start Motor-Driven Auxiliary Feedwater Pumps	N.A.

TABLE NOTATIONS (Continued)

(7) Diesel generator starting and sequence loading delays included. Sequential transfer of charging pump suction from the VCT to the RWST (RWST valves open, then VCT valves close) is not included. Response time assumes only opening of RWST valves.

(8) Does not include Trip Time Delays. Response times noted above include the transmitters, 7300 process protection cabinets, solid state protection cabinets, and actuation devices only. This reflects the response times necessary for THERMAL POWER in excess of 20% RATED THERMAL POWER.

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MASTER RELAY TEST	SLAVE RELAY TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
4. Steam Line Isolation								
a. Manual Initiation	N.A.	N.A.	N.A.	R	N.A.	N.A.	N.A.	1, 2, 3
b. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	M(1)	M(1)	Q	1, 2, 3
c. Containment Pressure-High-2	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
d. Steam Line Pressure-Low	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
e. Steam Line Pressure-Negative Rate-High	S	R	M	N.A.	N.A.	N.A.	N.A.	3
5. Feedwater Isolation & Turbine Trip								
a. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	M(1)	M(1)	Q(3)	1, 2
b. Steam Generator Water Level-High-High	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2
c. Safety Injection	See Item 1. above for all Safety Injection Surveillance Requirements.							
6. Auxiliary Feedwater								
a. Manual Initiation	N.A.	N.A.	N.A.	R	N.A.	N.A.	N.A.	1, 2, 3
b. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	M(1)	M(1)	Q	1, 2, 3

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MASTER RELAY TEST	SLAVE RELAY TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
6. Auxiliary Feedwater (Continued)								
c. Automatic Actuation Logic and Actuation Relays (BOP ESFAS)	N.A.	N.A.	N.A.	N.A.	M(1)(2)	N.A.	N.A.	1, 2, 3
d. Steam Generator Water Level Low-Low								
1) Steam Generator Water Level Low-Low (Adverse Containment Environment)	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
2) Steam Generator Water Level Low-Low (Normal Containment Environment)	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
3) Vessel ΔT (Power-1, Power-2)	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
4) Containment Pressure - Environmental Allowance Modifier	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
e. Safety Injection	See Item 1 above for all Safety Injection Surveillance Requirements.							

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANGE OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST	MASTER RELAY TEST	SLAVE RELAY TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
6. Auxiliary Feedwater (Continued)								
f. Loss-of-Offsite Power	N.A.	R	N.A.	M	N.A.	N.A.	N.A.	1, 2, 3
g. Trip of All Main Feedwater Pumps	N.A.	N.A.	N.A.	R	N.A.	N.A.	N.A.	1, 2
h. Auxiliary Feedwater Pump Suction Pressure-Low	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3
7. Automatic Switchover to Containment Sump								
a. Automatic Actuation Logic and Actuation Relays (SSPS)	N.A.	N.A.	N.A.	N.A.	M(1)	M(1)	Q(3)	1, 2, 3, 4
b. RWST Level - Low-Low Coincident With Safety Injection	S	R	M	N.A.	N.A.	N.A.	N.A.	1, 2, 3, 4
8. Loss of Power								
a. 4 kV Undervoltage-Loss of Voltage	N.A.	R	N.A.	M	N.A.	N.A.	N.A.	1, 2, 3, 4
b. 4 kV Undervoltage-Grid Degraded Voltage	N.A.	R	N.A.	M	N.A.	N.A.	N.A.	1, 2, 3, 4

Steam Generator Water Level

The Steam Generator Water Level Low-Low trip protects the reactor from loss of heat sink in the event of a sustained steam/feedwater flow mismatch resulting from loss of normal feedwater or a feedwater system pipe break, inside or outside of containment. This function also provides input to the steam generator level control system, therefore, the actuation logic must be able to withstand both an input failure to the control system (which may then require the protective function actuation) and a single failure in the remaining channels providing the protection function actuation. This results in a 2/4 actuation logic. With the transmitters (d/p cells) located inside containment and thus possibly experiencing adverse environmental conditions (due to a feedline break), the Environmental Allowance Modifier (EAM) was devised. The EAM function (Containment Pressure with a setpoint of $\leq$ 1.5 psig) senses the presence of adverse containment conditions (elevated pressure) and enables the Steam Generator Water Level - Low-Low trip setpoint (Adverse) which reflects the increased transmitter uncertainties due to this environment. The EAM allows the use of a lower Steam Generator Water Level - Low-Low trip setpoint (Normal) when these conditions are not present, thus allowing more margin to trip for normal operating conditions. The Trip Time Delay (TTD) creates additional operational margin when the plant needs it most, during early escalation to power, by allowing the operator time to recover level when the primary side load is sufficiently small to allow such action. The TTD is based on the continuous monitoring of primary side power through the use of Vessel ΔT. Two time delays are possible, based on the primary side power level, the magnitude of the trip delay decreasing with increasing power. In the event that the EAM or TTD functions do not meet the minimum channels operable requirements, it is acceptable to place the inoperable channels in the Tripped Condition and continue operation. Placing the inoperable channels in this mode will result in the enabling of the Steam Generator Water Level - Low-Low (Adverse) function, for the EAM, or in the removal of the trip delay, for the TTD. In the event that the Steam Generator Water Level - Low-Low (Normal) function does not meet the minimum channels operable requirement, it is acceptable to place the associated EAM channels in the Tripped Condition and continue operation. Performing this action will result in the enabling of the Steam Generator Water Level - Low-Low (Adverse) function which has a more conservative (higher level) trip setpoint. At this time it would also be acceptable to place the inoperable Steam Generator Water Level - Low-Low channels in the Bypassed Condition to prevent an inadvertent Reactor Trip or ESFAS actuation.

Undervoltage and Underfrequency - Reactor Coolant Pump Busses

The Undervoltage and Underfrequency Reactor Coolant Pump Bus trips provide core protection against DNB as a result of complete loss of forced coolant flow. The specified Setpoints assure a Reactor trip signal is generated before the Low Flow Trip Setpoint is reached. Time delays are incorporated in the Underfrequency and Undervoltage trips to prevent spurious Reactor trips from momentary electrical power transients. For undervoltage, the delay is set so that the time required

Undervoltage and Underfrequency - Reactor Coolant Pump Busses (Continued)

for a signal to reach the Reactor trip breakers following the simultaneous trip of two or more reactor coolant pump bus circuit breakers shall not exceed 1.2 seconds. For underfrequency, the delay is set so that the time required for a signal to reach the Reactor trip breakers after the Underfrequency Trip Setpoint is reached shall not exceed 0.3 second. On decreasing power the Undervoltage and Underfrequency Reactor Coolant Pump Bus trips are automatically blocked by P-7 (a power level of approximately 10% of RATED THERMAL POWER with a turbine impulse chamber pressure at approximately 10% of full power equivalent); and on increasing power, reinstated automatically by P-7.

Turbine Trip

A Turbine trip initiates a Reactor trip. On decreasing power the Reactor trip from the Turbine trip is automatically blocked by P-9 (a power level of approximately 50% of RATED THERMAL POWER); and on increasing power, reinstated automatically by P-9.

Safety Injection Input from ESF

If a Reactor trip has not already been generated by the Reactor Trip System instrumentation, the ESF automatic actuation logic channels will initiate a Reactor trip upon any signal which initiates a Safety Injection. The ESF instrumentation channels which initiate a Safety Injection signal are shown in Table 3.3-3.

Reactor Trip System Interlocks

The Reactor Trip System interlocks perform the following functions:

P-6 On increasing power, P-6 allows the manual block of the Source Range trip (i.e., prevents premature block of Source Range trip), provides a backup block for Source Range Neutron Flux doubling, and allows deenergization of the high voltage to the detectors. On decreasing power, Source Range Level trips are automatically reactivated and high voltage restored.

P-7 On increasing power, P-7 automatically enables Reactor trips on low flow in more than one reactor coolant loop, reactor coolant pump bus undervoltage and underfrequency, pressurizer low pressure and pressurizer high level. On decreasing power, the above listed trips are automatically blocked.

P-8 On increasing power, P-8 automatically enables Reactor trips on low flow in one or more reactor coolant loops. On decreasing power, the P-8 automatically blocks the single loop Low Flow trip.

P-9 On increasing power, P-9 automatically enables Reactor trip on Turbine trip. On decreasing power, P-9 automatically blocks Reactor trip on Turbine trip.

P-10 On increasing power, P-10 allows the manual block of the Intermediate Range trip and the Low Setpoint Power Range trip; and automatically blocks the Source Range trip and de-energizes the Source Range high voltage power. On decreasing power, the Intermediate Range trip and the Low Setpoint Power Range trip are automatically reactivated. Provides input to P-7.

P-13 Provides input to P-7.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 43 TO FACILITY OPERATING LICENSE NO. NPF-30

UNION ELECTRIC COMPANY
CALLAWAY PLANT, UNIT 1
DOCKET NO. STN 50-483

1.0 INTRODUCTION

A recent Westinghouse Owners Group (WOG) survey of Westinghouse operating plants found that a high percentage of inadvertent plant trips were initiated by either low-low steam generator level or low feedwater flow trip signals. A Trip Reduction and Assessment Program (TRAP) was established by the WOG to investigate methods and design modifications to reduce the frequency of unnecessary reactor trips occurring in Westinghouse plants. As a result of this assessment, the WOG issued two generic topical reports and proposed system modifications. One of the reports, Reference 1, proposed a trip signal design change to add a Trip Time Delay (TTD) circuit. The other report, Reference 2 proposed a trip signal design change to implement an Environmental Allowance Modifier (EAM). These topical reports were reviewed and approved by the staff in Reference 3. These generic topical reports were reissued as References 4 and 5, respectively, indicating staff approval, by the inclusion of Reference 3.

By Reference 6, the licensee requested an amendment to Facility Operating License No. NPF-30 for Callaway Unit 1. The licensee also submitted clarifying information by References 8, 9, 10, 11, and 12. The purpose of the proposed modification is to reduce the frequency of unnecessary feedwater-related reactor trips. This amendment proposed to modify the plant by implementing an EAM and TTD circuit for the steam generator low-low level trip instrumentation. The licensee also proposed to revise the Technical Specifications and FSAR in conjunction with the plant modification. The development of the plant modification and safety analysis for Callaway Unit 1 are in accordance with the above topical reports.

2.0 DISCUSSION

The Westinghouse reactor is designed to trip if a low-low level condition is detected in any one of the four steam generators. The reactor trip derived from the steam generator low-low level protects the reactor from loss of heat sink in the event of sustained steam/feedwater flow mismatch resulting from loss of normal feedwater or feedwater system pipe break inside or outside containment. In the event of loss of feedwater, the reactor would be tripped on low-low steam generator level. Therefore, a low-low steam generator level trip circuit is provided for each steam generator to ensure that sufficient initial heat removal capability (inventory) is available in the steam generator at the start of a transient.

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The licensee proposed to modify the plant steam generator low-low level reactor trip circuitry by adding an EAM and TTD. The EAM would select a setpoint for the steam generator low-low level trip, including an environmental (containment atmosphere) uncertainty associated with the actual plant environmental conditions. The TTD would delay a steam generator low-low level trip actuation based upon the power level.

In the event that the onset of an adverse containment environment is sensed by the EAM via containment pressure, a higher steam generator low-low level trip setpoint would be automatically selected to account for larger environmental uncertainty due to a feedwater line rupture inside containment. A lower setpoint would be used by the EAM during normal operation when there would be a larger steam generator level operating band in order to permit feedwater inventory control. The trip actuation may then be delayed by the TTD depending on power level at the time that the low-low level signal is sensed. The licensee stated that this steam generator level reactor trip modification would provide more operational flexibility and at the same time, ensure adequate protection during normal and accident conditions.

The licensee provided a plant-specific Westinghouse Topical Report, Reference 7, which established plant-specific safety analysis limits for the steam generator low-low level trip time delay, normal and adverse containment trip setpoints, and the EAM containment pressure setpoint, for Callaway Unit 1.

3.0 EVALUATION

3.1 INSTRUMENTATION AND CONTROL SYSTEMS EVALUATION

DESIGN CRITERIA

The licensee provided logic diagrams and schematic drawings describing the proposed circuit modifications.

The applicable regulatory Instrumentation and Control (I&C) system design criteria for the proposed modification was listed in Section 3.7 of Reference 7. The listing included appropriate General Design Criteria (from 10 CFR Part 50, Appendix A), Regulatory Guides and IEEE Standards. The plant-specific topical report was submitted as an attachment to Reference 6. Reference 7 was, therefore, considered to be an integral part of the licensee's request. Section 3.7 of Reference 7 included subsections describing how each of the important elements of the design criteria would be accomplished.

The proposed modification was designed as an extension of the existing Class 1E plant protective system. The design criteria requires that the same Class 1E design requirements be maintained for the proposed modification as are applicable to the plant protective system. In this review, the proposed modification was compared with the established requirements for Class 1E systems. Important requirements such as the single failure criteria, channel independence and separation were found to be accommodated in the

proposed modification. Other requirements such as operating bypasses are not relevant in this review because the proposed modification does not include a requirement for any new operating bypasses and does not impact any existing bypasses.

The design features of the proposed modification were also compared to the I&C design requirements identified in the staff-approved References 4 and 5. While there are variations in the two designs, the design proposed by the licensee is consistent in detail with that recommended in the generic topical reports. The plant-specific design also reflects a response to comments by the staff regarding power level setpoints.

FSAR REVISIONS

Reference 6 included marked up pages from Chapter 7 of the Callaway FSAR indicating the changes that would be necessary to implement the proposed modification. These changes were reviewed and found to be consistent with the proposed modification and adequately meet the I&C requirements of the staff.

SETPOINTS AND ALLOWABLE VALUES

Information on setpoints and allowable values relating to the proposed modification was provided in the licensee's request and in the proposed revision to the plant Technical Specifications.

The power levels for which the time delays would be imposed are below 10% of Rated Thermal Power (RTP) for a 232-second delay and between 10 and 20% of RTP for a delay of 122 seconds. These power levels are lower than was indicated in Section 7 of Reference 4. These more conservative power level setpoints accommodate a staff concern stated in Reference 3.

An adverse environmental condition has been defined in Reference 5 to exist when the surface temperature of the steam generator level transmitter (a differential pressure device) exceeds 180°F. Pipeline breaks are the only identified cause for this condition. The licensee has interpreted the adverse environmental condition to exist when the surface temperature of the level transmitter exceeds 180°F. By analysis this condition would only occur after the containment atmosphere temperature exceeds 230° F. This condition is identified by measurement of containment pressure. The licensee proposed to use a setpoint of 1.5 psig in the containment building to imply an adverse environmental condition.

During normal environmental conditions the steam generator low-low level setpoint would be set to trip when the level drops below 14.8% of the narrow range instrument span. This corresponds to a level of 112.9 inches above the top of the highest tube bundle. If an adverse environmental condition is detected, the trip level would be increased to 20.2% of the narrow range instrument span which corresponds to a level of 119.9 inches above the top of the highest tube bundle.

TESTING

Reference 6 included a description of a program for surveillance testing of the proposed circuit modification. Additional information was contained in the revisions to the plant Technical Specifications and in the revisions to the FSAR.

The current capability to test the reactor trip system, including the steam generator low-low level trips, would not be changed by the proposed plant modification. The current capability for periodic testing of the analog channel portion of the reactor trip system during power operation would also continue to be maintained. The process analog output signals to the logic circuitry would be interrupted during individual channel tests by test switches which when thrown place any EAM or TTD function into a conservative state.

On-line testing of the steam generator low-low level, EAM and TTD circuits would be conducted in overlapping stages. In the first stage a test circuit would provide test signals to the steam generator low-low level circuits to determine if the circuits are functioning correctly. The level channels would be tested one at a time to verify one-out-of-four operation and with various combinations of two at a time to verify two-out-of-four operation.

The second stage would be a test circuit that provides test signals to the EAM circuits to determine if the circuits are functioning correctly. The EAM system design includes a test interlock that would latch-in the adverse containment environment signal.

The third stage would be a test circuit that provides test signals to the TTD circuits to determine if the circuits are functioning correctly. The TTD system design includes a test interlock that would set the TTD circuit in a conservative state.

The containment pressure monitors and Delta-T power monitors would be tested by removing the transmitters from service and injecting test signals into the circuitry. During the test period a (conservative) tripped condition would prevail. All testing would be conducted according to written procedures.

Reference 2, Appendix C, pages C-10 and C-19 recommended monthly testing of the steam generator low-low level and the containment pressure EAM monitors. The proposed revision of Technical Specification Table 4.3-1 indicated that quarterly testing and Table 4.3-2 indicated monthly testing would be performed for this instrumentation. The reason for this discrepancy is that after Reference 2 was written, Callaway Unit 1 was approved for testing of

Reactor Trip System (RTS) instrumentation on a quarterly basis. Callaway's Technical Specification requirements for Engineered Safety Features Actuation System (ESFAS) is for monthly testing. Since the ESFAS surveillance requirements are more restrictive than those for RTS, the steam generator level, Delta-T power, containment pressure, EAM, and TTD instrumentation would be tested on a monthly basis.

Testing of the TTD timers would be required on a monthly basis but is not identified in the Technical Specifications. However, the licensee has committed in Reference 6 to test the TTD timers on a monthly basis. Based on this review, the staff finds the surveillance testing program identified for the proposed modification consistent with Regulatory Guide 1.118 and acceptable.

INSTRUMENT UNCERTAINTY

The licensee's request included a section on instrument loop uncertainty in Section 4.0, of Reference 7. A listing of calculated and measured statistical variances were provided to identify the sources and magnitude of the uncertainty for each of the monitoring instruments included in the proposed modification. These included the effects of instrument drift, calibration error and environment. Instrument response times were also identified. The total component uncertainty factors were statistically combined to provide an overall channel allowance which was incorporated into the proposed Technical Specification revision. This approach and the results are consistent with those used in previous evaluations and are acceptable to the staff.

ALARMS, ANNUNCIATORS, INDICATORS AND STATUS LIGHTS

The proposed modification included the additions of alarms, annunciators, indicators and status lights to provide the operator with adequate information regarding the status of the EAM and TTD instrumentation. Presently, there is an alarm and annunciator for each steam generator to indicate when at least one level channel has dropped below its trip setpoint. A "first out" alarm and reactor trip occurs if more than one level channel drops below the low-low setpoint for any steam generator. However, with the proposed modification, the signal to the current alarm and annunciator would not be actuated until after all applicable time delays were expired. Each level channel (16 channels) would be provided with a status light to indicate when the bistable trip point had been reached.

Additional alarms and annunciators would be provided with the proposed modification. A new low-low level alarm would be provided for each steam generator to indicate when the level in at least one channel had dropped below the low-low level setpoint in that steam generator. The operator may then observe individual steam generator indicators to determine appropriate action. A new single alarm and annunciator would be provided to indicate the presence of an adverse environment. The staff finds these arrangements acceptable.

IMPLEMENTATION OF THE TTD

The logic units for the TTD would act on a combination of two power levels (10% and 20% of RTP), two time delay values (122 seconds and 232 seconds) and the number of steam generator low-low level trips signals (one or more than one). The logic would function according to the descriptions in References 6 and 7. At power levels below 10% of RTP a low-low level trip signal from any steam generator or from more than one steam generator would be inhibited for a period of 232 seconds. At power levels more than 10% but less than 20% of RTP, the trip signals would be inhibited for a period of 122 seconds. Above 20% of RTP there would be no time delay. Power level signals for the TTD circuits would be derived from existing Delta-T signals from the overtemperature and overpower protection channels. Redundant sensors, processors and logic units would be utilized to meet the Class 1E requirements.

The licensee has provided diagrams of the logic system to implement the previously-described features. These diagrams have been reviewed in concept and application and found to apply the appropriate principles of redundancy, independence and testability required in Class 1E circuitry. The staff finds the basic design and conceptual application of the proposed modification acceptable.

IMPLEMENTATION OF THE EAM

The EAM would distinguish between a normal or adverse containment environment as detected by atmosphere pressure in the containment building in excess of 1.5 psig. A signal indicating an adverse environment would enable a higher steam generator low-low level trip setpoint (20.2% of narrow range span vs 14.8%). The adverse environmental level setpoint would be higher due to the inclusion of instrument uncertainties related to the adverse environment. The EAM circuit design is essentially the same as was described in Reference 5.

The EAM circuitry has been designed with a latch-in feature that remains enabled until manually reset. This feature prevents the circuit from reverting back to a normal mode without manual intervention once an adverse environment has been detected. The EAM would be employed redundantly to meet the requirements of Class 1E circuitry.

The EAM manual reset would be located in the 7300 Series Process Protection System cabinets, located behind the control board. The EAM annunciator will stay lit until the EAM is reset. Based on the licensee's description, the staff finds the circuit acceptable.

SUMMARY

The staff's review effort concentrated on plant specific design aspects of the steam generator low-low level reactor trip modification. Based on the

above evaluation, the staff finds the proposed modification design and methodology to be consistent with the previously-approved generic design. The Callaway Unit 1 steam generator low-low level reactor trip modification is in conformance with the instrumentation and control systems design criteria (IEEE-279) and is therefore acceptable.

3.2 REACTOR TRIP SYSTEM EVALUATION

The steam generator low-low level signal will trip the reactor and actuate the auxiliary feedwater system. These actions are necessary to protect the reactor core and to maintain an adequate heat sink for decay heat removal.

The licensee, in WCAP-11883 (Reference 7) submitted by its letter dated August 30, 1988, provided safety analyses to support its proposed modification of the steam generator low-low level trip circuitry for the Callaway Plant. These reports provide:

1. Basic functional description of the Callaway Plant EAM and TTD design.

2. Results of calculations performed, consistent with the WCAP-11325-P-A (Reference 4) approved methodology, to develop the Safety Analysis Limits (SAL's) for the steam generator low-low level, power level dependent trip time delays.

3. Results of calculations performed to develop the SAL's for the steam generator low-low level normal and harsh containment environment trip setpoints.

4. Evaluation of the impacts of the SAL's specified above on the FSAR non-LOCA safety analysis design bases.

5. Evaluation of the impact of the SAL's specified above on the FSAR LOCA-related safety analysis design bases.

The Callaway TTD design is based on the introduction of two unique nominal power bistable setpoints of 10% and 20% Rated Thermal Power. Callaway Plant specific loss of normal feedwater analyses have been performed assuming a reactor trip on steam generator low-low level setpoint at 0% span to provide the SAL's for 1/4 and 2/4 logic time delays at specified power levels. These analyses were performed consistent with the WCAP-11325-P-A safety analysis methodology. The results of these analyses indicated the following.

1. For 10% Rated Thermal Power with 1/4 or 2/4 steam generator logic, the SAL TTD is 240 seconds.

2. For 20% Rated Thermal power with 1/4 or 2/4 steam generator logic, the SAL TTD is 130 seconds.

A plant-specific feedline break analysis (with offsite power available) at 20% rated thermal power was also performed assuming a reactor trip on steam generator low-low level setpoint at 0% span. The results of the analysis indicate that with a SAL TTD of 130 seconds, the acceptance criteria of

this Condition IV event is met. This provides confirmation that introduction of the steam generator low-low level time delay at part-power does not invalidate the conclusions presented in the FSAR for the feedline break transient. This analysis is, therefore, a confirmation of the generic conclusions presented in WCAP-11325-P-A.

The licensee also performed an evaluation to demonstrate that the proposed TTD values are acceptable relative to other design basis transients which are affected by the steam generator low-low level trip.

SUMMARY

The staff has evaluated the above-stated licensee's analyses and concluded that the assumptions of these analyses are conservative and the methodology is consistent with the approved safety analysis methodology of WCAP-11325-P-A.

3.3 CONTAINMENT SYSTEM EVALUATION

The licensee provided Westinghouse Topical Report WCAP-11883 (Reference 7) which established plant-specific safety analysis limits for the steam generator low-low level trip time delay, normal and adverse containment trip setpoints, and the EAM containment pressure setpoint. The licensee analyzed various accident conditions for the applicability of the EAM/TTD concepts to the Callaway plant and developed limits for the steam generator low-low level trip setpoint used in the determination of post-accident containment temperature, and the EAM containment pressure setpoint. The licensee also evaluated the impact of the specified limits on design basis LOCA and non-LOCA containment analyses. The licensee performed containment analyses for the feedwater line rupture inside containment consistent with previously-approved Westinghouse Topical Report, WCAP-11342-P-A (Reference 5) and determined the most limited mass and energy release rates (from feedwater line breaks) through the containment pressure and temperature analyses. The licensee calculated a minimum pressure for which the containment environment is assumed normal and a maximum containment temperature rise for heat-up of the steam generator level transmitter reference leg.

The staff has reviewed the licensee's submittals and applicable Westinghouse topical reports and finds that the containment analyses to establish limits for the steam generator low-low level trip setpoints and the adverse containment condition trip setpoint were within the design basis containment temperature and pressure analysis limits in the FSAR. The methodology and computer codes used for the analysis are consistent with those used in the FSAR and the Westinghouse topical reports which were

previously approved by the staff. The staff, therefore, finds the licensee's safety analyses for the plant modification to be acceptable.

SUMMARY

Based on the above, the staff concludes that the licensee's safety analyses and evaluations for the containment to support proposed changes in the steam generator low-low level trip setpoints are within the previously-approved containment design limits, and therefore, are accetpable.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register on April 12, 1989(54 FR14713). Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

REFERENCES

1. Licensing Topical Report, Westinghouse Owners Group, WCAP-11325, "Steam Generator Low Water Level Protection System Modifications to Reduce Feedwater-Related Trips," November 1986.

2. Licensing Topical Report, Westinghouse Owners Group, WCAP-11342, "Modification of the Steam Generator Low-Low Level Trip Setpoint to Reduce Feedwater-Related Trips," November 1986.

3. Letter, NRC (A. C. Thadani) to Westinghouse Owners Group (R. A. Newton), "Acceptance for Referencing of Licensing Topical Reports WCAP-11325, "Steam Generator Low Water Level Protection System Modifications to Reduce Feedwater-Related Trips," and WCAP-11342, "Modification of the Steam Generator Trip Setpoint to Reduce Feedwater-Related Trips"," January 7, 1988.

4. Licensing Topical Report, Westinghouse Owners Group, WCAP-11325-P-A Revision 1, "Steam Generator Low Water Level Protection System Modifications to Reduce Feedwater-Related Trips," February 1988.

5. Licensing Topical Report, Westinghouse Owners Group, WCAP-11342-P-A Revision 1, "Modification of the Steam Generator Low-Low Level Trip Setpoint to Reduce Feedwater-Related Trips," February 1988.

6. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," August 30, 1988, ULNRC-1822.

7. Licensing Topical Report, Westinghouse Electric Company, WCAP-11883, "Implementation of the Steam Generator Low Low Level Reactor Trip Time Delay and Environmental Allowance Modifier in the Callaway Plant," August 1988.

8. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," November 18, 1988, ULNRC-1863.

9. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," December 28, 1988, ULNRC-1884.

10. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," February 7, 1989, ULNRC-1905.

11. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," February 10, 1989, ULNRC-1911.

12. Letter, Union Electric (D. F. Schnell) to NRC (Document Control Desk), "Steam Generator Level Reactor Trip Modification," February 15, 1989, ULNRC-1913.

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Dated: April 14, 1989

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UNITED STATES NUCLEAR REGULATORY COMMISSION

UNION ELECTRIC COMPANY

DOCKET NO. 50-483

NOTICE OF ISSUANCE OF AMENDMENT TO

FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (Commission) has issued Amendment No. 43 to Facility Operating License No. NPF-30, issued to Union Electric Company, which revised the Technical Specifications for operation of the Callaway Plant, Unit 1, located in Callaway County, Missouri. The amendment was effective as of the date of issuance.

The amendment modified the Technical Specifications relating to the steam generator low-low level trip circuitry by adding an Environmental Allowance Modifier (EAM) and a Trip Time Delay (TTD).

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

Notice of Consideration of Issuance of Amendment and Opportunity for Prior Hearing in connection with this action was published in the FEDERAL REGISTER on October 13, 1988 (53 FR 40148). No request for a hearing or petition for leave to intervene was filed following this notice.

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The Commission has prepared an Environmental Assessment related to the action and has determined not to prepare an environmental impact statement. Based upon the environmental assessment, the Commission has concluded that the issuance of this amendment will not have a significant effect on the quality of the human environment.

For further details with respect to the action see (1) the application for amendment dated August 30, 1988, and supplemented November 18 (2 letters) and December 28, 1988, and February 7, 10 and 15, 1989, (2) Amendment No. 43 to License No. NPF-30, (3) the Commission's related Safety Evaluation dated April 14, 1989 and (4) the Environmental Assessment dated April 4, 1989. All of these items are available for public inspection at the Commission's Public Document Room, Gelman Building 2120 L Street NW, and at the Callaway County Public Library, 710 Court Street, Fulton, Missouri 65251 and the John M. Olin Library, Washington University, Skinker and Lindell Boulevards, St. Louis, Missouri 63130. Acopy of items (2), (3), and (4) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Reactor Projects III, IV, V and Special Projects.

Dated at Rockville, Maryland this 14th day of April 1989.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas V. Wambach

Thomas V. Wambach, Acting Director
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation