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. 57
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 April 12, 1990 as supplemented by letter dated July 7, 1990 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:

(2) <u>Technical Specifications and Environmental Protection Plan</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 57, 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 immediately to be implemented upon startup from the 1990 refueling outage. The licensee has agreed to immediately inform the Commission, in writing, of the implementation date.

FOR THE NUCLEAR REGULATORY COMMISSION

John N. Hannon

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: September 20, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 57

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
2-4	2-4
2-5	2-5
2-5a	2-5a
2-7	2-7
2-9	2-9
2-10	2-10
B 2-5	B 2-5
3/4 3-9	3/4 3-9
3/4 3-12a	3/4 3-12a
3/4 3-25(a)	3/4 3-25(a)
3/4 3-25(b)	3/4 3-25(b)
3/4 3-25(d)	3/4 3-25(d)
3/4 3-25(e)	3/4 3-25(e)

2.2 LIMITING SAFETY SYSTEM SETTINGS

REACTOR TRIP SYSTEM INSTRUMENTATION SETPOINTS

2.2.1 The Reactor Trip System Instrumentation and Interlocks Setpoints shall be set consistent with the Trip Setpoint values shown in Table 2.2-1.

APPLICABILITY: As shown for each channel in Table 3.3-1.

ACTION:

a. With a Reactor Trip System Instrumentation or Interlock Setpoint less conservative than the value shown in the Trip Setpoint column but more conservative than the value shown in the Allowable Value column of Table 2.2-1, adjust the Setpoint consistent with the Trip Setpoint value.

b. With the Reactor Trip System Instrumentation or Interlock Setpoint less conservative than the value shown in the Allowable Values column of Table 2.2-1, either:

   1. Adjust the Setpoint consistent with the Trip Setpoint value of Table 2.2-1 and determine within 12 hours that Equation 2.2-1 was satisfied for the affected channel, or

   2. Declare the channel inoperable and apply the applicable ACTION statement requirement of Specification 3.3.1 until the channel is restored to OPERABLE status with its Setpoint adjusted consistent with the Trip Setpoint value.

Equation 2.2-1 $$Z + R + S \leq TA$$

Where:

Z = The value from Column Z of Table 2.2-1 for the affected channel,

R = The "as measured" value (in percent span) of rack error for the affected channel,

S = Either the "as measured" value (in percent span) of the sensor error, or the value from Column S (Sensor Error) of Table 2.2-1 for the affected channel, and

TA = The value from Column TA (Total Allowance) of Table 2.2-1 for the affected channel.

TABLE 2.2-1

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TOTAL ALLOWANCE (TA)	SENSOR ERROR Z	SENSOR ERROR (S)	TRIP SETPOINT	ALLOWABLE VALUE
1. Manual Reactor Trip	N.A.	N.A.	N.A.	N.A.	N.A.
2. Power Range, Neutron Flux					
a. High Setpoint	7.5	4.56	0	$\leq$109% of RTP*	$\leq$112.3% of RTP*
b. Low Setpoint	8.3	4.56	0	$\leq$25% of RTP*	$\leq$28.3% of RTP*
3. Power Range, Neutron Flux, High Positive Rate	2.4	0.5	0	$\leq$4% of RTP* with a time constant $\geq$2 seconds	$\leq$6.3% of RTP* with a time constant $\geq$2 seconds
4. Deleted					
5. Intermediate Range, Neutron Flux	17.0	8.41	0	$\leq$25% of RTP*	$\leq$35.3% of RTP*
6. Source Range, Neutron Flux	17.0	10.01	0	$\leq 10^5$ cps	$\leq 1.6 \times 10^5$ cps
7. Overtemperature ΔT	9.3	6.47	1.83 +1.24***	See Note 1	See Note 2
8. Overpower ΔT	5.7	1.90	1.65	See Note 3	See Note 4
9. Pressurizer Pressure-Low	5.0	2.21	2.0	$\geq$1885 psig	$\geq$1874 psig
10. Pressurizer Pressure-High	7.5	4.96	1.0	$\leq$2385 psig	$\leq$2400 psig
11. Pressurizer Water Level-High	8.0	2.18	2.0	$\leq$92% of instrument span	$\leq$93.8% of instrument span
12. Reactor Coolant Flow-Low	2.5	1.38	0.6	$\geq$90% of loop minimum measured flow**	$\geq$88.8% of loop minimum measured flow**

*RTP = RATED THERMAL POWER
**Minimum Measured Flow = 95,660 gpm
***Two Allowances (temperature and pressure, respectively)

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 $\leq$ 10% RTP Vessel ΔT (Power 1)	6.0	2.72	1.65	$\leq$ Vessel ΔT Equivalent to 10% RTP	$\leq$ Vessel ΔT Equivalent to 13.9% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	$\geq$ 20.2% of Narrow Range Instrument Span	$\geq$ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	$\leq$ 1.5 psig	$\leq$ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	$\geq$ 14.8% of Narrow Range Instrument Span	$\geq$ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				$\leq$ 232 seconds	$\leq$ 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	2.72	1.65	≤ Vessel ΔT Equivalent to 20% RTP	≤ Vessel ΔT Equivalent to 23.9% 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)

TABLE NOTATIONS

NOTE 1: OVERTEMPERATURE ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{1 + \tau_3 S}\right) \leq \Delta T_o \left\{K_1 - K_2 \frac{(1 + \tau_4 S)}{(1 + \tau_5 S)} \left[T \left(\frac{1}{1 + \tau_6 S}\right) - T'\right] + K_3(P - P') - f_1(\Delta I)\right\}$$

Where:	ΔT	=	Measured ΔT
	$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
	τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, τ_1 = 8 s, τ_2 = 3 s;
	$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
	τ_3	=	Time constant utilized in the lag compensator for ΔT, τ_3 = 0 s;
	ΔT_o	=	Indicated ΔT at RATED THERMAL POWER:
	K_1	=	1.15;
	K_2	=	0.0251/°F;
	$\frac{1 + \tau_4 S}{1 + \tau_5 S}$	=	The function generated by the lead-lag compensator for T_{avg} dynamic compensation;
	τ_4, τ_5	=	Time constants utilized in the lead-lag compensator for T_{avg}, τ_4 = 28 s, τ_5 = 4 s;
	T	=	Average temperature, °F;
	$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};
	τ_6	=	Time constant utilized in the measured T_{avg} lag compensator, τ_6 = 0 s;

TABLE 2.2-1 (Continued)

TABLE NOTATIONS (Continued)

NOTE 1: (Continued)

T' $\leq$ 588.4°F (Referenced T_{avg} at RATED THERMAL POWER);

K_3 = 0.00116;

P = Pressurizer pressure, psig;

P' = 2235 psig (Nominal RCS operating pressure);

S = Laplace transform operator, s^{-1};

and $f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with gains to be selected based on measured instrument response during plant STARTUP tests such that:

(i) For $q_t - q_b$ between -35% and + 6%, $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER,

(ii) For each percent that the magnitude of $q_t - q_b$ exceeds -35%, the ΔT Trip Setpoint shall be automatically reduced by 1.91% of its value at RATED THERMAL POWER; and

(iii) For each percent that the magnitude of $q_t - q_b$ exceeds +6%, the ΔT Trip Setpoint shall be automatically reduced by 1.89% of its value at RATED THERMAL POWER.

NOTE 2: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 2.3% of ΔT span.

TABLE 2.2-1 (Continued)

TABLE NOTATIONS (Continued)

NOTE 3: OVERPOWER ΔT

$$\Delta T \frac{(1 + \tau_1 S)}{(1 + \tau_2 S)} \left(\frac{1}{1 + \tau_3 S}\right) \le \Delta T_0 \left\{K_4 - K_5 \left(\frac{\tau_7 S}{1 + \tau_7 S}\right) \left(\frac{1}{1 + \tau_6 S}\right) T - K_6 \left[T \left(\frac{1}{1 + \tau_6 S}\right) - T''\right] - f_2(\Delta I)\right\}$$

Where:

ΔT	=	Measured ΔT;
$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	Lead-lag compensator on measured ΔT;
τ_1, τ_2	=	Time constants utilized in lead-lag compensator for ΔT, τ_1, = 8 s., τ_2 = 3 s;
$\frac{1}{1 + \tau_3 S}$	=	Lag compensator on measured ΔT;
τ_3	=	Time constant utilized in the lag compensator for ΔT, τ_3 = 0 s;
ΔT_0	=	Indicated ΔT at RATED THERMAL POWER;
K_4	=	1.080;
K_5	=	0.02/°F for increasing average temperature and 0 for decreasing average temperature;
$\frac{\tau_7 S}{1 + \tau_7 S}$	=	The function generated by the rate-lag compensator for T_{avg} dynamic compensation;
τ_7	=	Time constant utilized in the rate-lag compensator for T_{avg}, τ_7 = 10 s;
$\frac{1}{1 + \tau_6 S}$	=	Lag compensator on measured T_{avg};
τ_6	=	Time constant utilized in the measured T_{avg} lag compensator, τ_6 = 0 s;

TABLE 2.2-1 (Continued)

TABLE NOTATIONS (Continued)

NOTE 3: (Continued)

K_6	=	0.0065/°F for $T > T''$ and $K_6 = 0$ for $T \leq T''$;
T	=	Average Temperature, °F;
T''	=	Indicated T_{avg} at RATED THERMAL POWER (Calibration temperature for ΔT instrumentation, $\leq$ 588.4°F);
S	=	Laplace transform operator, s^{-1}; and
$f_2(\Delta I)$	=	0 for all ΔI.

NOTE 4: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 3.0% of ΔT span.

Intermediate and Source Range, Neutron Flux

The Intermediate and Source Range, Neutron Flux trips provide core protection during reactor startup to mitigate the consequences of an uncontrolled rod cluster control assembly bank withdrawal from a subcritical condition. These trips provide redundant protection to the Low Setpoint trip of the Power Range, Neutron Flux channels. The Source Range channels will initiate a Reactor trip at about 10^5 counts per second unless manually blocked when P-6 becomes active. The Intermediate Range channels will initiate a Reactor trip at a current level equivalent to approximately 25% of RATED THERMAL POWER unless manually blocked when P-10 becomes active.

Overtemperature ΔT

The Overtemperature ΔT trip provides core protection to prevent DNB for all combinations of pressure, power, coolant temperature, and axial power distribution, provided that the transient is slow with respect to piping transit delays from the core to the temperature detectors, and pressure is within the range between the Pressurizer High and Low Pressure trips. The Setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water and includes dynamic compensation for piping delays from the core to the loop temperature detectors, (2) pressurizer pressure, and (3) axial power distribution. With normal axial power distribution, this Reactor trip limit is always below the core Safety Limit as shown in Figure 2.1-1. If axial peaks are greater than design, as indicated by the difference between top and bottom power range nuclear detectors, the Reactor trip is automatically reduced according to the notations in Table 2.2-1.

Delta-T_0, as used in the Overtemperature and Overpower ΔT trips, represents the 100% RTP value as measured by the plant for each loop. This normalizes each loop's ΔT trips to the actual operating conditions existing at the time of measurement, thus forcing the trip to reflect the equivalent full power conditions as assumed in the accident analyses. These differences in vessel ΔT can arise due to several factors, the most prevalent being measured RCS loop flows greater than Minimum Measured Flow, and slightly asymmetric power distributions between quadrants. While RCS loop flows are not expected to change with cycle life, radial power redistribution between quadrants may occur, resulting in small changes in loop specific vessel ΔT values. Accurate determination of the loop specific vessel ΔT value should be made when performing the Incore/Excore quarterly recalibration and under steady state conditions (i.e., power distributions not affected by Xe or other transient conditions).

Overpower ΔT

The Overpower ΔT trip provides assurance of fuel integrity (e.g., no fuel pellet melting and less than 1% cladding strain) under all possible overpower conditions, limits the required range for Overtemperature ΔT trip, and provides

Overpower ΔT (Continued)

a backup to the High Neutron Flux trip. The Setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water, and (2) rate of change of temperature for dynamic compensation for piping delays from the core to the loop temperature detectors, to ensure that the allowable heat generation rate (kW/ft) is not exceeded. The Overpower ΔT trip provides protection to mitigate the consequences of various size steam breaks as reported in WCAP-9226, "Reactor Core Response to Excessive Secondary Steam Releases."

Delta-T_0, as used in the Overtemperature and Overpower ΔT trips, represents the 100% RTP value as measured by the plant for each loop. This normalizes each loop's ΔT trips to the actual operating conditions existing at the time of measurement, thus forcing the trip to reflect the equivalent full power conditions as assumed in the accident analyses. These differences in vessel ΔT can arise due to several factors, the most prevalent being measured RCS loop flows greater than Minimum Measured Flow, and slightly asymmetric power distributions between quadrants. While RCS loop flows are not expected to change with cycle life, radial power redistribution between quadrants may occur, resulting in small changes in loop specific vessel ΔT values. Accurate determination of the loop specific vessel ΔT value should be made when performing the Incore/Excore quarterly recalibration and under steady state conditions (i.e., power distributions not affected by Xe or other transient conditions).

Pressurizer Pressure

In each of the pressurizer pressure channels, there are two independent bistables, each with its own Trip Setting to provide for a High and Low Pressure trip thus limiting the pressure range in which reactor operation is permitted. The Low Setpoint trip protects against low pressure which could lead to DNB by tripping the reactor in the event of a loss of reactor coolant pressure.

On decreasing power the Low Setpoint trip is automatically blocked by P-7 (a power level of approximately 10% of RATED THERMAL POWER with turbine impulse chamber pressure at approximately 10% of full power equivalent); and on increasing power, automatically reinstated by P-7.

The High Setpoint trip functions in conjunction with the pressurizer relief and safety valves to protect the Reactor Coolant System against system overpressure.

Pressurizer Water Level

The Pressurizer High Water Level trip is provided to prevent water relief through the pressurizer safety valves. On decreasing power the Pressurizer High Water Level trip is automatically blocked by P-7 (a power level of

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. Deleted						
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	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)

TABLE NOTATIONS

(10) Setpoint verification is not required.

(11) Following maintenance or adjustment of the Reactor trip breakers, the TRIP ACTUATING DEVICE OPERATIONAL TEST shall include independent verification of the Undervoltage and Shunt trips.

(12) At least once per 18 months during shutdown, verify that on a simulated Boron Dilution Doubling test signal the normal CVCS discharge valves will close and the centrifugal charging pumps suction valves from the RWST will open within 30 seconds.

(13) Deleted

(14) Each channel shall be tested at least every 92 days on a STAGGERED TEST BASIS.

(15) The surveillance frequency and/or MODES specified for these channels in Table 4.3-2 are more restrictive and, therefore, applicable.

(16) The TRIP ACTUATING DEVICE OPERATIONAL TEST shall independently verify the OPERABILITY of the Undervoltage and Shunt Trip circuits for the Manual Reactor Trip function. The test shall also verify the OPERABILITY of the Bypass Breaker trip circuit.

(17) Local manual shunt trip prior to placing breaker in service.

(18) Automatic Undervoltage Trip.

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 $\leq$ 10% RTP Vessel ΔT (Power-1)	6.0	2.72	1.65	$\leq$ Vessel ΔT Equivalent to 10% RTP	$\leq$ Vessel ΔT Equivalent to 13.9% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	$\geq$ 20.2% of Narrow Range Instrument Span	$\geq$ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure - Environmental Allowance Modifier	2.8	0.71	2.0	$\leq$ 1.5 psig	$\leq$ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	$\geq$ 14.8% of Narrow Range Instrument Span	$\geq$ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				$\leq$ 232 seconds	$\leq$ 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 $\leq$ Vessel ΔT Equivalent $\leq$ 20% RTP Vessel ΔT (Power-2)	6.0	2.72	1.65	$\leq$ Vessel ΔT Equivalent to 20% RTP	$\leq$ Vessel ΔT Equivalent to 23.9% RTP
Coincident with					
Steam Generator Water Level Low-Low (Adverse Containment Environment)	20.2	17.58	2.0	$\geq$ 20.2% of Narrow Range Instrument Span	$\geq$ 18.4% of Narrow Range Instrument Span
and					
Containment Pressure-Environmental Allowance Modifier	2.8	0.71	2.0	$\leq$ 1.5 psig	$\leq$ 2.0 psig
OR					
Steam Generator Water Level Low-Low (Normal Containment Environment)	14.8	12.18	2.0	$\geq$ 14.8% of Narrow Range Instrument Span	$\geq$ 13.0% of Narrow Range Instrument Span
With a Time Delay, (t)				$\leq$ 122 seconds	$\leq$ 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	2.72	1.65	≤ Vessel ΔT Equivalent to 10% RTP	≤ Vessel ΔT Equivalent to 13.9% 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)

NGINEERED 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	2.72	1.65	≤ Vessel ΔT Equivalent to 20% RTP	≤ Vessel ΔT Equivalent to 23.9% 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