TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. TRIP GENERATION		
A. Process		
1. Pressurizer Pressure - High	≤ 2383 psia	≤ 2388 psia
2. Pressurizer Pressure - Low	≥ 1837 psia (2)	(1821) → ≥ ~~1822~~ psia (2)
3. Steam Generator Level - Low	≥ 44.2% (4)	≥ 43.7% (4)
4. Steam Generator Level - High	≤ 91.0% (9)	≤ 91.5% (9)
5. Steam Generator Pressure - Low	≥ 919 psia (3)	(911) → ≥ ~~912~~ psia (3)
6. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
7. Reactor Coolant Flow - Low		
a. Rate	≤ 0.115 psi/sec (6)(7)	≤ 0.118 psi/sec (6)(7)
b. Floor	≥ 11.9 psid (6)(7)	≥ 11.7 psid(6)(7)
c. Band	≤ 10.0 psid (6)(7)	≤ 10.2 psid (6)(7)
8. Local Power Density - High	≤ 21.0 kW/ft (5)	≤ 21.0 kW/ft (5)
9. DNBR - Low	≥ 1.24 (5)	≥ 1.24 (5)
B. Excore Neutron Flux		
1. Variable Overpower Trip		
a. Rate	≤ 10.6%/min of RATED THERMAL POWER (8)	≤ 11.0%/min of RATED THERMAL POWER (8)
b. Ceiling	≤ 110.0% of RATED THERMAL POWER (8)	≤ 111.0% of RATED THERMAL POWER (8)
c. Band	(9.7%) → ≤ ~~9.8%~~ of RATED THERMAL POWER (8)	(9.9%) → ≤ ~~10.0%~~ of RATED THERMAL POWER (8)

TABLE 4.3-1

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
I. TRIP GENERATION				
A. Process				
1. Pressurizer Pressure - High	S	R	Q #	1, 2
2. Pressurizer Pressure - Low	S	R	Q #	1, 2
3. Steam Generator Level - Low	S	R	Q #	1, 2
4. Steam Generator Level - High	S	R	Q #	1, 2
5. Steam Generator Pressure - Low	S	R	Q #	1, 2, 3*, 4*
6. Containment Pressure - High	S	R	Q #	1, 2
7. Reactor Coolant Flow - Low	S	R	Q #	1, 2
8. Local Power Density - High	S	D (2, 4), R (4, 5)	Q #, R (6)	1, 2
9. DNBR - Low	S	D (2, 4), R (4, 5) M (8), S (7)	Q #, R (6)	1, 2
B. Excore Neutron Flux				
1. Variable Overpower Trip	S	D (2, 4), M (3, 4) Q (4)	Q #	1, 2
2. Logarithmic Power Level - High	S	R (4)	Q # and S/U (1)	1, 2, 3, 4, 5 and *
C. Core Protection Calculator System				
1. CEA Calculators	S	R	Q #, R (6)	1, 2
2. Core Protection Calculators	S	D (2, 4), R (4, 5) M (8), S (7)	Q # (9), R (6)	1, 2

TABLE 4.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
D. Supplementary Protection System				
Pressurizer Pressure - High	S	R	Q ~~M~~	1, 2
II. RPS LOGIC				
A. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
B. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
III. RPS ACTUATION DEVICES				
A. Reactor Trip Breakers	N.A.	N.A.	M, R (10)	1, 2, 3*, 4*, 5*
B. Manual Trip	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*

TABLE 4.3-1 (Continued)

TABLE NOTATIONS

* - With reactor trip breakers in the closed position and the CEA drive system capable of CEA withdrawal, and fuel in the reactor vessel.

(1) - Each STARTUP or when required with the reactor trip breakers closed and the CEA drive system capable of rod withdrawal, if not performed in the previous 7 days.

(2) - Heat balance only (CHANNEL FUNCTIONAL TEST not included), above 15% of RATED THERMAL POWER; adjust the linear power level, the CPC delta T power and CPC nuclear power signals to agree with the calorimetric calculation if absolute difference is greater than 2%. During PHYSICS TESTS, these daily calibrations may be suspended provided these calibrations are performed upon reaching each major test power plateau and prior to proceeding to the next major test power plateau.

(3) - Above 15% of RATED THERMAL POWER, verify that the linear power sub-channel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the Core Protection Calculators.

(4) - Neutron detectors may be excluded from CHANNEL CALIBRATION.

(5) - After each fuel loading and prior to exceeding 70% of RATED THERMAL POWER, the incore detectors shall be used to determine the shape annealing matrix elements and the Core Protection Calculators shall use these elements.

(6) - This CHANNEL FUNCTIONAL TEST shall include the injection of simulated process signals into the channel as close to the sensors as practicable to verify OPERABILITY including alarm and/or trip functions.

(7) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation or by calorimetric calculations and if necessary, adjust the CPC addressable constant flow coefficients such that each CPC indicated flow is less than or equal to the actual flow rate. The flow measurement uncertainty may be included in the BERR1 term in the CPC and is equal to or greater than 4%.

(8) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation and the ultrasonic flow meter adjusted pump curves or calorimetric calculations.

(9) - The ~~monthly~~ quarterly CHANNEL FUNCTIONAL TEST shall include verification that the correct current values of addressable constants are installed in each OPERABLE CPC.

(10) - At least once per 18 months and following maintenance or adjustment of the reactor trip breakers, the CHANNEL FUNCTIONAL TEST shall include independent verification of the undervoltage and shunt trips.

TABLE 3.3-4

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

ESFA SYSTEM FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. SAFETY INJECTION (SIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	≥ ~~1822~~ 1821 psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
II. CONTAINMENT ISOLATION (CIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	≥ ~~1822~~ 1821 psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
III. CONTAINMENT SPRAY (CSAS)		
A. Sensor/Trip Units		
Containment Pressure High - High	≤ 8.5 psig	≤ 8.9 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
IV. MAIN STEAM LINE ISOLATION (MSIS)		
A. Sensor/Trip Units		
1. Steam Generator Pressure - Low	≥ 919 psia(3)	≥ ~~912~~ 911 psia(3)
2. Steam Generator Level - High	≤ 91.0% NR(2)	≤ 91.5% NR(2)
3. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable

TABLE 4.3-2

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
I. SAFETY INJECTION (SIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual SIAS	NA	NA	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~NA~~	~~NA~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
II. CONTAINMENT ISOLATION (CIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual CIAS	NA	NA	Q ~~M~~	1, 2, 3, 4
4. Manual SIAS	NA	NA	Q ~~M~~	1, 2, 3, 4

[illegible] [illegible] [illegible] [illegible] [illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
II. CONTAINMENT ISOLATION (Continued)				
C. Automatic Actuation Logic	~~NA~~	~~NA~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1) (3)	1, 2, 3, 4
III. CONTAINMENT SPRAY (CSAS)				
A. Sensor/Trip Units				
1. Containment Pressure -- High - High	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual CSAS	NA	NA	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~NA~~	~~NA~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1) (3)	1, 2, 3, 4

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
IV. MAIN STEAM LINE ISOLATION (MSIS)				
A. Sensor/Trip Units				
1. Steam Generator Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
2. Steam Generator Level - High	S	R	Q ~~M~~	1, 2, 3, 4
3. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual MSIS	NA	NA	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~NA~~	~~NA~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
V. RECIRCULATION (RAS)				
A. Sensor/Trip Units				
Refueling Water Storage Tank - Low	S	R	Q #	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q #	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q #	1, 2, 3, 4
3. Manual RAS	NA	NA	Q #	1, 2, 3, 4
C. Automatic Actuation Logic (except subgroup relays)	~~NA~~ NA	~~NA~~ NA	~~M(1) (2) (3)~~ Q(2)	~~1, 2, 3, 4~~ 1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1)				
A. Sensor/Trip Units				
1. Steam Generator #1 Level - Low	S	R	Q #	1, 2, 3
2. Steam Generator Δ Pressure SG2 > SG1	S	R	Q #	1, 2, 3

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1) (Continued)				
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual AFAS	NA	NA	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	NA	NA	M(1) (2) (3)	1, 2, 3, 4
VII. AUXILIARY FEEDWATER (SG-2)(AFAS-2)				
A. Sensor/Trip Units				
1. Steam Generator #2 Level - Low	S	R	Q ~~M~~	1, 2, 3
2. Steam Generator Δ Pressure SG1 > SG2	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	NA	NA	Q ~~M~~	1, 2, 3, 4
3. Manual AFAS	NA	NA	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	NA	NA	M(1) (2) (3)	1, 2, 3, 4
VIII. LOSS OF POWER (LOV)				
A. 4.16 kV Emergency Bus Under-voltage (Loss of Voltage)	S	R	R	1, 2, 3, 4
B. 4.16 kV Emergency Bus Under-voltage (Degraded Voltage)	S	R	R	1, 2, 3, 4

3/4.3.1 and 3/4.3.2 REACTOR PROTECTIVE AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

The OPERABILITY of the reactor protective and Engineered Safety Features Actuation Systems instrumentation and bypasses ensures that (1) the associated Engineered Safety Features Actuation action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof reaches its setpoint, (2) the specified coincidence logic is maintained, (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance, and (4) sufficient system functional capability is available from diverse parameters.

The OPERABILITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

Response time testing of resistance temperature devices, which are a part of the reactor protective system, shall be performed by using in-situ loop current test techniques or another NRC approved method.

The Core Protection Calculator (CPC) addressable constants are provided to allow calibration of the CPC system to more accurate indications of power level, RCS flow rate, axial flux shape, radial peaking factors and CEA deviation penalties. Administrative controls on changes and periodic checking of addressable constant values (see also Technical Specifications 3.3.1 and 6.8.1) ensure that inadvertent misloading of addressable constants into the CPCs is unlikely.

The design of the Control Element Assembly Calculators (CEAC) provides reactor protection in the event one or both CEACs become inoperable. If one CEAC is in test or inoperable, verification of CEA position is performed at least every 4 hours. If the second CEAC fails, the CPCs in conjunction with plant Technical Specifications will use DNBR and LPD penalty factors and increased DNBR and LPD margin to restrict reactor operation to a power level that will ensure safe operation of the plant. If the margins are not maintained, a reactor trip will occur.

The quarterly frequency for the channel functional tests for these systems is based on the analyses presented in the NRC approved topical report CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation", and CEN-327-A, Supplement 1, and calculation 13-JC-SB-200-Rev.01.

TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. TRIP GENERATION		
A. Process		
1. Pressurizer Pressure - High	≤ 2383 psia	≤ 2388 psia
2. Pressurizer Pressure - Low	≥ 1837 psia (2)	≥ ~~1822~~ 1821 psia (2)
3. Steam Generator Level - Low	≥ 44.2% (4)	≥ 43.7% (4)
4. Steam Generator Level - High	≤ 91.0% (9)	≤ 91.5% (9)
5. Steam Generator Pressure - Low	≥ 919 psia (3)	≥ ~~912~~ 911 psia (3)
6. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
7. Reactor Coolant Flow - Low		
a. Rate	≤ 0.115 psi/sec (6)(7)	≤ 0.118 psi/sec (6)(7)
b. Floor	≥ 11.9 psid(6)(7)	≥ 11.7 psid (6)(7)
c. Band	≤ 10.0 psid(6)(7)	≤ 10.2 psid (6)(7)
8. Local Power Density - High	≤ 21.0 kW/ft (5)	≤ 21.0 kW/ft (5)
9. DNBR - Low	≥ 1.24 (5)	≥ 1.24 (5)
B. Excore Neutron Flux		
1. Variable Overpower Trip		
a. Rate	< 10.6%/min of RATED THERMAL POWER (8)	< 11.0%/min of RATED THERMAL POWER (8)
b. Ceiling	< 110.0% of RATED THERMAL POWER (8)	< 111.0% of RATED THERMAL POWER (8)
c. Band	< ~~9.8%~~ 9.7% of RATED THERMAL POWER (8)	< ~~10.0%~~ 9.9% of RATED THERMAL POWER (8)

TABLE 4.3-1

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
I. TRIP GENERATION				
A. Process				
1. Pressurizer Pressure - High	S	R	Q #	1, 2
2. Pressurizer Pressure - Low	S	R	Q #	1, 2
3. Steam Generator Level - Low	S	R	Q #	1, 2
4. Steam Generator Level - High	S	R	Q #	1, 2
5. Steam Generator Pressure - Low	S	R	Q #	1, 2, 3*, 4*
6. Containment Pressure - High	S	R	Q #	1, 2
7. Reactor Coolant Flow - Low	S	R	Q #	1, 2
8. Local Power Density - High	S	D (2, 4), R (4, 5)	Q #, R (6)	1, 2
9. DNBR - Low	S	D (2, 4), R (4, 5) M (8), S (7)	Q #, R (6)	1, 2
B. Excore Neutron Flux				
1. Variable Overpower Trip	S	D (2, 4), M (3, 4) Q (4)	Q #	1, 2
2. Logarithmic Power Level - High	S	R (4)	Q # and S/U (1)	1, 2, 3, 4, 5 and *
C. Core Protection Calculator System				
1. CEA Calculators	S	R	Q #, R (6)	1, 2
2. Core Protection Calculators	S	D (2, 4), R (4, 5) M (8), S (7)	Q # (9), R (6)	1, 2

TABLE 4.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
D. Supplementary Protection System				
Pressurizer Pressure - High	S	R	Q ~~M~~	1, 2
II. RPS LOGIC				
A. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
B. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
III. RPS ACTUATION DEVICES				
A. Reactor Trip Breakers	N.A.	N.A.	M, R(10)	1, 2, 3*, 4*, 5*
B. Manual Trip	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*

TABLE 4.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

* - With reactor trip breakers in the closed position and the CEA drive system capable of CEA withdrawal, and fuel in the reactor vessel.

(1) - Each STARTUP or when required with the reactor trip breakers closed and the CEA drive system capable of rod withdrawal, if not performed in the previous 7 days.

(2) - Heat balance only (CHANNEL FUNCTIONAL TEST not included), above 15% of RATED THERMAL POWER; adjust the linear power level, the CPC delta T power and CPC nuclear power signals to agree with the calorimetric calculation if absolute difference is greater than 2%. During PHYSICS TESTS, these daily calibrations may be suspended provided these calibrations are performed upon reaching each major test power plateau and prior to proceeding to the next major test power plateau.

(3) - Above 15% of RATED THERMAL POWER, verify that the linear power sub-channel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the Core Protection Calculators.

(4) - Neutron detectors may be excluded from CHANNEL CALIBRATION.

(5) - After each fuel loading and prior to exceeding 70% of RATED THERMAL POWER, the incore detectors shall be used to determine the shape annealing matrix elements and the Core Protection Calculators shall use these elements.

(6) - This CHANNEL FUNCTIONAL TEST shall include the injection of simulated process signals into the channel as close to the sensors as practicable to verify OPERABILITY including alarm and/or trip functions.

(7) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation or by calorimetric calculations and if necessary, adjust the CPC addressable constant flow coefficients such that each CPC indicated flow is less than or equal to the actual flow rate. The flow measurement uncertainty may be included in the BERR1 term in the CPC and is equal to or greater than 4%.

(8) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation and the ultrasonic flow meter adjusted pump curves or calorimetric calculations.

(9) - The ~~monthly~~ quarterly CHANNEL FUNCTIONAL TEST shall include verification that the correct (current) values of addressable constants are installed in each OPERABLE CPC.

(10) - At least once per 18 months and following maintenance or adjustment of the reactor trip breakers, the CHANNEL FUNCTIONAL TEST shall include independent verification of the undervoltage and shunt trips.

TABLE 3.3-4

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

ESFA SYSTEM FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. SAFETY INJECTION (SIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	(1821) ≥ ~~1822~~ psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
II. CONTAINMENT ISOLATION (CIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	(1821) ≥ ~~1822~~ psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
III. CONTAINMENT SPRAY (CSAS)		
A. Sensor/Trip Units		
Containment Pressure High - High	≤ 8.5 psig	≤ 8.9 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
IV. MAIN STEAM LINE ISOLATION (MSIS)		
A. Sensor/Trip Units		
1. Steam Generator Pressure - Low	≥ 919 psia(3)	(911) ≥ ~~912~~ psia(3)
2. Steam Generator Level - High	≤ 91.0% NR(2)	≤ 91.5% NR(2)
3. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable

TABLE 4.3-2

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
I. SAFETY INJECTION (SIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual SIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic (except subgroup relays)	~~N.A.~~ NA	~~N.A.~~ NA	~~M(1) (2) (3)~~ Q(2)	~~1, 2, 3, 4~~ 1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
II. CONTAINMENT ISOLATION (CIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual CIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
4. Manual SIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4

[illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
II. CONTAINMENT ISOLATION (Continued)				
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
III. CONTAINMENT SPRAY (CSAS)				
A. Sensor/Trip Units				
1. Containment Pressure -- High - High	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual CSAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4

FOR INFORMATION ONLY

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
IV. MAIN STEAM LINE ISOLATION (MSIS)				
A. Sensor/Trip Units				
1. Steam Generator Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
2. Steam Generator Level - High	S	R	Q ~~M~~	1, 2, 3, 4
3. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual MSIS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4

[illegible]

[illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
V. RECIRCULATION (RAS)				
A. Sensor/Trip Units				
Refueling Water Storage Tank - Low	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual RAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic (except subgroup relays)	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
Actuation Subgroup Relays	NA	NA	Q(2)	1, 2, 3, 4
	NA	NA	M(1)(3)	1, 2, 3, 4
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1)				
A. Sensor/Trip Units				
1. Steam Generator #1 Level - Low	S	R	Q ~~M~~	1, 2, 3
2. Steam Generator Δ Pressure SG2 > SG1	S	R	Q ~~M~~	1, 2, 3

[illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1) (Continued)				
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q #	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q #	1, 2, 3, 4
3. Manual AFAS	N.A.	N.A.	Q #	1, 2, 3, 4
C. Automatic Actuation Logic	N.A.	N.A.	M(1) (2) (3)	1, 2, 3, 4
VII. AUXILIARY FEEDWATER (SG-2)(AFAS-2)				
A. Sensor/Trip Units				
1. Steam Generator #2 Level - Low	S	R	Q #	1, 2, 3
2. Steam Generator Δ Pressure SG1 > SG2	S	R	Q #	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q #	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q #	1, 2, 3, 4
3. Manual AFAS	N.A.	N.A.	Q #	1, 2, 3, 4
C. Automatic Actuation Logic	N.A.	N.A.	M(1) (2) (3)	1, 2, 3, 4
VIII. LOSS OF POWER (LOV)				
A. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)	S	R	R	1, 2, 3, 4
B. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)	S	R	R	1, 2, 3, 4

3/4.3.1 and 3/4.3.2 REACTOR PROTECTIVE AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

The OPERABILITY of the reactor protective and Engineered Safety Features Actuation Systems instrumentation and bypasses ensures that (1) the associated Engineered Safety Features Actuation action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof reaches its setpoint, (2) the specified coincidence logic is maintained, (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance, and (4) sufficient system functional capability is available from diverse parameters.

The OPERABILITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

Response time testing of resistance temperature devices, which are a part of the reactor protective system, shall be performed by using in-situ loop current test techniques or another NRC approved method.

The Core Protection Calculator (CPC) addressable constants are provided to allow calibration of the CPC system to more accurate indications of power level, RCS flow rate, axial flux shape, radial peaking factors and CEA deviation penalties. Administrative controls on changes and periodic checking of addressable constant values (see also Technical Specifications 3.3.1 and 6.8.1) ensure that inadvertent misloading of addressable constants into the CPCs is unlikely.

The design of the Control Element Assembly Calculators (CEAC) provides reactor protection in the event one or both CEACs become inoperable. If one CEAC is in test or inoperable, verification of CEA position is performed at least every 4 hours. If the second CEAC fails, the CPCs in conjunction with plant Technical Specifications will use DNBR and LPD penalty factors and increased DNBR and LPD margin to restrict reactor operation to a power level that will ensure safe operation of the plant. If the margins are not maintained, a reactor trip will occur.

The value of the DNBR in Specification 2.1 is conservatively compensated for measurement uncertainties. Therefore, the actual RCS total flow rate determined by the reactor coolant pump differential pressure instrumentation or by calorimetric calculations does not have to be conservatively compensated for measurement uncertainties.

The quarterly frequency for the channel functional tests for these systems is based on the analyses presented in the NRC approved topical report CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation," and CEN-327-A, Supplement 1, and calculation 13-JC-SB-200, Rev. 01.

TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. TRIP GENERATION		
A. Process		
1. Pressurizer Pressure - High	≤ 2383 psia	≤ 2388 psia
2. Pressurizer Pressure - Low	≥ 1837 psia (2)	≥ ~~1822~~ 1821 psia (2)
3. Steam Generator Level - Low	≥ 44.2% (4)	≥ 43.7% (4)
4. Steam Generator Level - High	≤ 91.0% (9)	≤ 91.5% (9)
5. Steam Generator Pressure - Low	≥ 919 psia (3)	≥ ~~912~~ 911 psia (3)
6. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
7. Reactor Coolant Flow - Low		
a. Rate	≤ 0.115 psi/sec (6)(7)	≤ 0.118 psi/sec (6)(7)
b. Floor	≥ 11.9 psid(6)(7)	≥ 11.7 psid (6)(7)
c. Band	≤ 10.0 psid(6)(7)	≤ 10.2 psid (6)(7)
8. Local Power Density - High	≤ 21.0 kW/ft (5)	≤ 21.0 kW/ft (5)
9. DNBR - Low	≥ 1.24 (5)	≥ 1.24 (5)
B. Excore Neutron Flux		
1. Variable Overpower Trip		
a. Rate	< 10.6%/min of RATED THERMAL POWER (8)	< 11.0%/min of RATED THERMAL POWER (8)
b. Ceiling	< 110.0% of RATED THERMAL POWER (8)	< 111.0% of RATED THERMAL POWER (8)
c. Band	< ~~9.8%~~ 9.7% of RATED THERMAL POWER (8)	< ~~10.0%~~ 9.9% of RATED THERMAL POWER (8)

FOR INFORMATION ONLY

TABLE 4.3-1

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
I. TRIP GENERATION				
A. Process				
1. Pressurizer Pressure - High	S	R	Q ~~M~~	1, 2
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2
3. Steam Generator Level - Low	S	R	Q ~~M~~	1, 2
4. Steam Generator Level - High	S	R	Q ~~M~~	1, 2
5. Steam Generator Pressure - Low	S	R	Q ~~M~~	1, 2, 3*, 4*
6. Containment Pressure - High	S	R	Q ~~M~~	1, 2
7. Reactor Coolant Flow - Low	S	R	Q ~~M~~	1, 2
8. Local Power Density - High	S	D (2, 4), R (4, 5)	Q ~~M~~; R (6)	1, 2
9. DNBR - Low	S	D (2, 4), R (4, 5) M (8), S (7)	Q ~~M~~; R (6)	1, 2
B. Excore Neutron Flux				
1. Variable Overpower Trip	S	D (2, 4), M (3, 4) Q (4)	Q ~~M~~	1, 2
2. Logarithmic Power Level - High	S	R (4)	Q ~~M~~ and S/U (1)	1, 2, 3, 4, 5 and *
C. Core Protection Calculator System				
1. CEA Calculators	S	R	Q ~~M~~; R (6)	1, 2
2. Core Protection Calculators	S	D (2, 4), R (4, 5) M (8), S (7)	Q ~~M~~ (9), R (6)	1, 2

FOR INFORMATION ONLY

TABLE 4.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
D. Supplementary Protection System				
Pressurizer Pressure - High	S	R	Q ~~M~~	1, 2
II. RPS LOGIC				
A. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
B. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*
III. RPS ACTUATION DEVICES				
A. Reactor Trip Breakers	N.A.	N.A.	M, R(10)	1, 2, 3*, 4*, 5*
B. Manual Trip	N.A.	N.A.	Q ~~M~~	1, 2, 3*, 4*, 5*

TABLE 4.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

* - With reactor trip breakers in the closed position and the CEA drive system capable of CEA withdrawal, and fuel in the reactor vessel.

(1) - Each STARTUP or when required with the reactor trip breakers closed and the CEA drive system capable of rod withdrawal, if not performed in the previous 7 days.

(2) - Heat balance only (CHANNEL FUNCTIONAL TEST not included), above 15% of RATED THERMAL POWER; adjust the linear power level, the CPC delta T power and CPC nuclear power signals to agree with the calorimetric calculation if absolute difference is greater than 2%. During PHYSICS TESTS, these daily calibrations may be suspended provided these calibrations are performed upon reaching each major test power plateau and prior to proceeding to the next major test power plateau.

(3) - Above 15% of RATED THERMAL POWER, verify that the linear power subchannel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the Core Protection Calculators.

(4) - Neutron detectors may be excluded from CHANNEL CALIBRATION.

(5) - After each fuel loading and prior to exceeding 70% of RATED THERMAL POWER, the incore detectors shall be used to determine the shape annealing matrix elements and the Core Protection Calculators shall use these elements.

(6) - This CHANNEL FUNCTIONAL TEST shall include the injection of simulated process signals into the channel as close to the sensors as practicable to verify OPERABILITY including alarm and/or trip functions.

(7) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation or by calorimetric calculations and if necessary, adjust the CPC addressable constant flow coefficients such that each CPC indicated flow is less than or equal to the actual flow rate. The flow measurement uncertainty may be included in the BERR1 term in the CPC and is equal to or greater than 4%.

(8) - Above 70% of RATED THERMAL POWER, verify that the total steady-state RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by either using the reactor coolant pump differential pressure instrumentation and the ultrasonic ~~flow meter adjusted~~ pump curves or calorimetric calculations.

(9) - The ~~monthly~~ quarterly CHANNEL FUNCTIONAL TEST shall include verification that the correct (current) values of addressable constants are installed in each OPERABLE CPC.

(10) - At least once per 18 months and following maintenance or adjustment of the reactor trip breakers, the CHANNEL FUNCTIONAL TEST shall include independent verification of the undervoltage and shunt trips.

TABLE 3.3-4

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

ESFA SYSTEM FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. SAFETY INJECTION (SIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	≥ ~~1822~~ 1821 psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
II. CONTAINMENT ISOLATION (CIAS)		
A. Sensor/Trip Units		
1. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
2. Pressurizer Pressure - Low	≥ 1837 psia(1)	≥ ~~1822~~ 1821 psia(1)
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
III. CONTAINMENT SPRAY (CSAS)		
A. Sensor/Trip Units		
Containment Pressure High - High	≤ 8.5 psig	≤ 8.9 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable
IV. MAIN STEAM LINE ISOLATION (MSIS)		
A. Sensor/Trip Units		
1. Steam Generator Pressure - Low	≥ 919 psia(3)	≥ ~~912~~ 911 psia(3)
2. Steam Generator Level - High	≤ 91.0% NR(2)	≤ 91.5% NR(2)
3. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
B. ESFA System Logic	Not Applicable	Not Applicable
C. Actuation Systems	Not Applicable	Not Applicable

FOR INFORMATION ONLY

TABLE 4.3-2

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
I. SAFETY INJECTION (SIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual SIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic (except subgroup relays)	~~N.A.~~ NA	~~N.A.~~ NA	~~M(1) (2) (3)~~ Q(2)	~~1, 2, 3, 4~~ 1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
II. CONTAINMENT ISOLATION (CIAS)				
A. Sensor/Trip Units				
1. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3
2. Pressurizer Pressure - Low	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual CIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
4. Manual SIAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
II. CONTAINMENT ISOLATION (Continued)				
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
III. CONTAINMENT SPRAY (CSAS)				
A. Sensor/Trip Units				
1. Containment Pressure -- High - High	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual CSAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4

FOR INFORMATION ONLY

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
IV. MAIN STEAM LINE ISOLATION (MSIS)				
A. Sensor/Trip Units				
1. Steam Generator Pressure - Low	S	R	Q ~~M~~	1, 2, 3, 4
2. Steam Generator Level - High	S	R	Q ~~M~~	1, 2, 3, 4
3. Containment Pressure - High	S	R	Q ~~M~~	1, 2, 3, 4
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual MSIS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic (except subgroup relays)	~~N.A.~~ NA	~~N.A.~~ NA	~~M(1) (2) (3)~~ Q(2)	~~1, 2, 3, 4~~ 1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4

[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
V. RECIRCULATION (RAS)				
A. Sensor/Trip Units				
Refueling Water Storage Tank - Low	S	R	Q ~~M~~	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
3. Manual RAS	N.A.	N.A.	Q ~~M~~	1, 2, 3, 4
C. Automatic Actuation Logic	~~N.A.~~	~~N.A.~~	~~M(1) (2) (3)~~	~~1, 2, 3, 4~~
(except subgroup relays)	NA	NA	Q(2)	1, 2, 3, 4
Actuation Subgroup Relays	NA	NA	M(1)(3)	1, 2, 3, 4
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1)				
A. Sensor/Trip Units				
1. Steam Generator #1 Level - Low	S	R	Q ~~M~~	1, 2, 3
2. Steam Generator Δ Pressure SG2 > SG1	S	R	Q ~~M~~	1, 2, 3

[illegible]

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

ESFA SYSTEM FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
VI. AUXILIARY FEEDWATER (SG-1)(AFAS-1) (Continued)				
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
3. Manual AFAS	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
C. Automatic Actuation Logic	N.A.	N.A.	M(1) (2) (3)	1, 2, 3, 4
VII. AUXILIARY FEEDWATER (SG-2)(AFAS-2)				
A. Sensor/Trip Units				
1. Steam Generator #2 Level - Low	S	R	Q [illegible]	1, 2, 3
2. Steam Generator Δ Pressure SG1 > SG2	S	R	Q [illegible]	1, 2, 3
B. ESFA System Logic				
1. Matrix Logic	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
2. Initiation Logic	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
3. Manual AFAS	N.A.	N.A.	Q [illegible]	1, 2, 3, 4
C. Automatic Actuation Logic	N.A.	N.A.	M(1) (2) (3)	1, 2, 3, 4
VIII. LOSS OF POWER (LOV)				
A. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)	S	R	R	1, 2, 3, 4
B. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)	S	R	R	1, 2, 3, 4

[illegible]

FOR INFORMATION ONLY

3/4.3.1 and 3/4.3.2 REACTOR PROTECTIVE AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

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The OPERABILITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

Response time testing of resistance temperature devices, which are a part of the reactor protective system, shall be performed by using in-situ loop current test techniques or another NRC approved method.

The Core Protection Calculator (CPC) addressable constants are provided to allow calibration of the CPC system to more accurate indications of power level, RCS flow rate, axial flux shape, radial peaking factors and CEA deviation penalties. Administrative controls on changes and periodic checking of addressable constant values (see also Technical Specifications 3.3.1 and 6.8.1) ensure that inadvertent misloading of addressable constants into the CPCs is unlikely.

The design of the Control Element Assembly Calculators (CEAC) provides reactor protection in the event one or both CEACs become inoperable. If one CEAC is in test or inoperable, verification of CEA position is performed at least every 4 hours. If the second CEAC fails, the CPCs in conjunction with plant Technical Specifications will use DNBR and LPD penalty factors and increased DNBR and LPD margin to restrict reactor operation to a power level that will ensure safe operation of the plant. If the margins are not maintained, a reactor trip will occur.

The value of the DNBR in Specification 2.1 is conservatively compensated for measurement uncertainties. Therefore, the actual RCS total flow rate determined by the reactor coolant pump differential pressure instrumentation or by calorimetric calculations does not have to be conservatively compensated for measurement uncertainties.

The quarterly frequency for the channel functional tests for these systems is based on the analyses presented in the NRC approved topical report CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation", and CEN-327-A, Supplement 1, and calculation 13-JC-SB-200, Rev.01.