April 3, 1995

Mr. Jerry W. Yelverton
Vice President, Operations ANO
Entergy Operations, Inc.
Route 3 Box 137G
Russellville, Arkansas 72801

SUBJECT: ISSUANCE OF AMENDMENT NO. 159 TO FACILITY OPERATING LICENSE NO. DPR-51 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M87147)

Dear Mr. Yelverton:

The Commission has issued the enclosed Amendment No.159to Facility Operating License No. DPR-51 for the Arkansas Nuclear One, Unit No. 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TS) in response to your application dated July 22, 1993.

The amendment revises operability requirements for the reactor protection system and the engineered safety features actuation system.

A copy of our related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY:
George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures: 1. Amendment No159to DPR-51
2. Safety Evaluation

cc w/encls: See next page

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

April 3, 1995

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Entergy Operations, Inc.
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George Kalman, Senior Project Manager
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2. Safety Evaluation

cc w/encls: See next page

Mr. Jerry W. Yelverton
Entergy Operations, Inc.

Arkansas Nuclear One, Unit 2

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

ENTERGY OPERATIONS INC.

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 159
License No. DPR-51

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee) dated July 22, 1993, 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 license 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. DPR-51 is hereby amended to read as follows:

   2. <u>Technical Specifications</u>

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 159, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 3, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 159

FACILITY OPERATING LICENSE NO. DPR-51

DOCKET NO. 50-368

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE PAGES	INSERT PAGES
3/4 3-2	3/4 3-2
3/4 3-3	3/4 3-3
3/4 3-5	3/4 3-5
3/4 3-5a	3/4 3-5a
-	3/4 3-5b
-	3/4 3-5c
3/4 3-7	3/4 3-7
3/4 3-11	3/4 3-11
-	3/4 3-11a
3/4 3-12	3/4 3-12
3/4 3-13	3/4 3-13
3/4 3-14	3/4 3-14
3/4 3-15	3/4 3-15
-	B 3/4 3-1a
6-7	6-7

4.3.1.1.5 The Core Protection Calculator System shall be determined OPERABLE at least once per 12 hours by verifying that less than three auto restarts have occurred on each calculator during the past 12 hours.

4.3.1.1.6 The Core Protection Calculator System shall be subjected to a CHANNEL FUNCTIONAL TEST to verify OPERABILITY within 12 hours of receipt of a valid High CPC Room Temperature alarm.

TABLE 3.3-1

REACTOR PROTECTIVE INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. Manual Reactor Trip	2 sets of 2 2 sets of 2	1 set of 2 1 set of 2	2 sets of 2 2 sets of 2	1, 2 3*,4*,5*	5 8
2. Linear Power Level - High	4	2	3	1, 2	2,3
3. Logarithmic Power Level-High					
a. Startup and *	4	2(a)(d)	3	2 ,3*,4*,5*	2,3
b. Shutdown	4	0	2	3, 4, 5	4
4. Pressurizer Pressure - High	4	2	3	1, 2	2,3
5. Pressurizer Pressure - Low	4	2(b)	3	1, 2 ,3*,4*,5*	2,3
6. Containment Pressure - High	4	2	3	1, 2	2,3
7. Steam Generator Pressure - Low	4/SG	2/SG	3/SG	1, 2 ,3*,4*,5*	2,3
8. Steam Generator Level - Low	4/SG	2/SG	3/SG	1, 2	2,3
9. Local Power Density - High	4	2(c)(d)	3	1, 2	2,3

TABLE 3.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
10. DNBR - Low	4	2(c)(d)	3	1, 2	2,3
11. Steam Generator Level - High	4/SG	2/SG	3/SG	1,2	2,3
12. Reactor Protection System Logic					
A. Matrix Logic	6	1	3	1,2	1
	6	1	3	3*,4*,5*	8
B. Initiation Logic	4	2	4	1,2	5
	4	2	4	3*,4*,5*	8
13. Reactor Trip Breakers	4(f)	2	4	1, 2	5
	4(f)	2	4	3*,4*,5*	8
14. Core Protection Calculators	4	2(c)(d)	3	1, 2	2,3,7
15. CEA Calculators	2	1	2(e)	1, 2	6,7

TABLE NOTATION

*With the protective system trip breakers in the closed position and the CEA drive system capable of CEA withdrawal.

(a) Trip may be manually bypassed above 10^{-4}% of RATED THERMAL POWER: bypass shall be automatically removed when THERMAL POWER is ≤ 10^{-4}% of RATED THERMAL POWER.

(b) Trip may be manually bypassed below 400 psia; bypass shall be automatically removed whenever pressurizer pressure is ≥ 500 psia.

(c) Trip may be manually bypassed below 10^{-4}% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is ≥ 10^{-4}% of RATED THERMAL POWER. During testing pursuant to Special Test Exception 3.10.3, trip may be manually bypassed below 1% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is ≥ 1% of RATED THERMAL POWER.

(d) Trip may be bypassed during testing pursuant to Special Test Exception 3.10.3.

(e) See Special Test Exception 3.10.2.

(f) Each channel shall be comprised of two trip breakers; actual trip logic shall be one-out-of-two taken twice.

ACTION STATEMENTS

ACTION 1 - With the number of channels OPERABLE one less than required by 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 and/or open the protective system trip breakers.

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

ACTION 2 - With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. If the inoperable channel is bypassed for greater than 48 hours, the desirability of maintaining this channel in the bypassed condition shall be reviewed at the next regularly scheduled PSC meeting in accordance with Specification 6.5.1.7.n. The channel shall be returned to OPERABLE status prior to startup following the next COLD SHUTDOWN.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below.

Process Measurement Circuit	Functional Unit Bypassed
1. Linear Power (Subchannel or Linear)	Linear Power Level - High Local Power Density - High DNBR - Low Log Power Level - High*
2. Pressurizer Pressure - NR	Pressurizer Pressure - High Local Power Density -High DNBR - Low
3. Containment Pressure - NR	Containment Pressure - High (RPS) Containment Pressure - High (ESFAS) Containment Pressure - High-High (ESFAS)
4. Steam Generator 1 Pressure	Steam Generator 1 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
5. Steam Generator 2 Pressure	Steam Generator 2 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
6. Steam Generator 1 Level	Steam Generator 1 Level - Low Steam Generator 1 Level - High Steam Generator 1 ΔP (EFAS 1)
7. Steam Generator 2 Level	Steam Generator 2 Level - Low Steam Generator 2 Level - High Steam Generator 2 ΔP (EFAS 2)
8. Core Protection Calculator	Local Power Density - High DNBR - Low

* Only for failure common to both linear power and log power.

ACTION STATEMENTS

ACTION 3 - With the number of channels OPERABLE one less than the Minimum Channels OPERABLE requirement, STARTUP and/or POWER OPERATION may continue provided the following conditions are satisfied:

a. Verify that one of the inoperable channels has been bypassed and place the other inoperable channel in the tripped condition within 1 hour, and

b. All functional units affected by the bypassed/tripped channel shall also be placed in the bypassed/tripped condition as listed below:

Process Measurement Circuit	Functional Unit Bypassed/Tripped
1. Linear Power (Subchannel or Linear)	Linear Power Level - High Local Power Density - High DNBR - Low Log Power Level - High**
2. Pressurizer Pressure - NR	Pressurizer Pressure - High Local Power Density -High DNBR - Low
3. Containment Pressure - NR	Containment Pressure - High (RPS) Containment Pressure - High (ESFAS) Containment Pressure - High-High (ESFAS)
4. Steam Generator 1 Pressure	Steam Generator 1 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
5. Steam Generator 2 Pressure	Steam Generator 2 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
6. Steam Generator 1 Level	Steam Generator 1 Level - Low Steam Generator 1 Level - High Steam Generator 1 ΔP (EFAS 1)
7. Steam Generator 2 Level	Steam Generator 2 Level - Low Steam Generator 2 Level - High Steam Generator 2 ΔP (EFAS 2)
8. Core Protection Calculator	Local Power Density - High DNBR - Low

STARTUP and/or POWER OPERATION may continue until the performance of the next required CHANNEL FUNCTIONAL TEST. Subsequent STARTUP and/or POWER OPERATION may continue if one channel is restored to OPERABLE status and the provisions of ACTION 2 are satisfied.

** Only for failure or activities common to both linear power and log power.

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter.

ACTION 5 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, place the reactor trip breakers of the inoperable channel in the tripped condition within 1 hour or be in HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 1 hour for surveillance testing per Specification 4.3.1.1.1.

ACTION 6 -

a. With one CEAC inoperable, operation may continue for up to 7 days provided that at least once per 4 hours, each CEA is verified to be within 7 inches (indicated position) or all other CEAs in its group. After 7 days, operation may continue provided that ACTION 6.b is met.

b. With both CEACs inoperable, operation may continue provided that:

1. Within 1 hour the margin required by Specification 3.2.4.b (COLSS in service) or Specification 3.2.4.d (COLSS out of service) is satisfied.

2. Within 4 hours:

a) All full length and part length CEA groups are withdrawn to and subsequently maintained at the "Full Out" position, except during surveillance testing pursuant to the requirements of Specification 4.1.3.1.2 or for control when CEA group 6 may be inserted no further than 127.5 inches withdrawn.

b) The "RSPT/CEAC Inoperable" addressable constant in the CPCs is set to both CEACs inoperable.

c) The Control Element Drive Mechanism Control System (CEDMCS) is placed in and subsequently maintained in the "OFF" mode except during CEA motion permitted by a) above, when the CEDMCS may be operated in either the "Manual Group" or "Manual Individual" mode.

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

3. At least once per 4 hours, all full length and part length CEAs are verified fully withdrawn, except as permitted by 2. a) above, then verify at least once per 4 hours that the inserted CEAs are aligned within 7 inches (indicated position) of all other CEAs in their group.

ACTION 7 - With three or more auto restarts of one non-bypassed calculator during a 12-hour interval, demonstrate calculator OPERABILITY by performing a CHANNEL FUNCTIONAL TEST within the next 24 hours.

ACTION 8 - 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 affected reactor trip breakers within the next hour. The trip breakers associated with the inoperable channel may be closed for up to 1 hour for surveillance testing per Specification 4.3.1.1.

TABLE 3.3-2

REACTOR PROTECTIVE INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
1. Manual Reactor Trip	Not Applicable
2. Linear Power Level - High	≤ 0.40 seconds*
3. Logarithmic Power Level - High	≤ 0.40 seconds*
4. Pressurizer Pressure - High	≤ 0.90 seconds
5. Pressurizer Pressure - Low	≤ 0.90 seconds
6. Containment Pressure - High	≤ 1.59 seconds
7. Steam Generator Pressure - Low	≤ 0.90 seconds
8. Steam Generator Level - Low	≤ 0.90 seconds
9. Local Power Density - High	
a. Neutron Flux Power from Excore Neutron Detectors	≤ 2.58 seconds*
b. CEA Positions	≤ 1.58 seconds**

TABLE 4.3-1

REACTOR PROTECTION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TESTS	MODES IN WHICH SURVEILLANCE REQUIRED
1. Manual Reactor Trip	N.A.	N.A.	S/U(1)	N.A.
2. Linear Power Level - High	S	D(2,4), M(3,4), Q(4)	M	1, 2
3. Logarithmic Power Level - High	S	R(4)	M and S/U (1)	1, 2, 3, 4, 5 and *
4. Pressurizer Pressure - High	S	R	M	1, 2
5. Pressurizer Pressure - Low	S	R	M	1, 2 ,3*,4*,5*
6. Containment Pressure - High	S	R	M	1, 2
7. Steam Generator Pressure - Low	S	R	M	1, 2 ,3*,4*,5*
8. Steam Generator Level - Low	S	R	M	1, 2
9. Local Power Density - High	S	D(2,4), R(4,5)	M, R(6)	1, 2
10. DNBR - Low	S	S(7), D(2,4), M(8), R(4,5)	M, R(6),	1, 2
11. Steam Generator Level - High	S	R	M	1, 2
12. Reactor Protection System Logic	N.A.	N.A.	M	1, 2 ,3*,4*,5*
13. Reactor Trip Breakers	N.A.	N.A.	M	1, 2 ,3*,4*,5*
14. Core Protection Calculators	S, W(9)	D(2,4) R(4,5)	M, R(6),	1, 2
15. CEA Calculators	S	R	M, R(6),	1, 2

TABLE 3.3-3

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. SAFETY INJECTION (SIAS)					
a. Manual (Trip Buttons)	2 sets of 2	1 set of 2	2 sets of 2	1, 2, 3, 4	9
b. Containment Pressure - High	4	2	3	1, 2, 3	10,11
c. Pressurizer Pressure - Low	4	2	3	1, 2, 3(a)	10,11
d. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
e. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13
2. CONTAINMENT SPRAY (CSAS)					
a. Manual (Trip Buttons)	2 sets of 2	1 set of 2	2 sets of 2	1, 2, 3, 4	9
b. Containment Pressure -- High - High	4	2(b)	3	1, 2, 3	10,11
c. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
d. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13

TABLE 3.3-3

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
3. CONTAINMENT ISOLATION (CIAS)					
a. Manual (Trip Buttons)	2 sets of 2	1 set of 2	2 sets of 2	1, 2, 3, 4	9
b. Containment Pressure - High	4	2	3	1, 2, 3	10,11
c. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
d. Automatic Actuation Logic	2	1	[illegible]	1, 2, 3, 4	13
4. MAIN STEAM AND FEEDWATER ISOLATION (MSIS)					
a. Manual (Trip Buttons)	2 sets of 2	1 set of 2	2 sets of 2	1, 2, 3, 4	9
b. Steam Generator Pressure - Low	4/steam generator	2/steam generator	3/steam generator	1, 2, 3	10,11
c. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
d. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
5. CONTAINMENT COOLING (CCAS)					
a. Manual (Trip Buttons)	2 sets of 2	1 set of 2	2 sets of 2	1, 2, 3, 4	9
b. Containment Pressure - High	4	2	3	1, 2, 3	10,11
c. Pressurizer Pressure - Low	4	2	3	1, 2, 3(a)	10,11
d. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
e. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13
6. RECIRCULATION (RAS)					
a. Manual (TRIP Buttons)(c)	2 sets of 2 per train	1 set of 2 per train	2 sets of 2 per train	1, 2, 3, 4	9
b. Refueling Water Tank - Low	4	2	3	1, 2, 3	10,11
c. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
d. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. LOSS OF POWER					
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)	2/Bus	1/Bus	2/Bus	1, 2, 3	9
b. 460 volt Emergency Bus Undervoltage (Degraded Voltage)	1/Bus	1/Bus	1/Bus	1, 2, 3	9
8. EMERGENCY FEEDWATER (EFAS)					
a. Manual (Trip Buttons)	2 sets of 2 per S/G	1 set of 2 per S/G	2 sets of 2 per S/G	1, 2, 3, 4	9
b. SG Level and Pressure (A/B) - Low and ΔP (A/B) - High	4/SG	2/SG	3/SG	1, 2, 3, 4	10,11
c. SG Level (A/B) - Low and No S/G Pressure - Low Trip (A/B)	4/SG	2/SG	3/SG	1, 2, 3, 4	10,11
d. ESFAS Logic					
1. Matrix Logic	6	1	3	1, 2, 3, 4	12
2. Initiation Logic	4	2	4	1, 2, 3, 4	9
e. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	13

TABLE NOTATION

(a) Trip function may be bypassed in this MODE when pressurizer pressure is below 400 psia; bypass shall be automatically removed when pressurizer pressure is ≥ 500 psia.

(b) An SIAS signal is first necessary to enable CSAS logic.

(c) Remote manual not provided for RAS. These are local manuals at each ESF auxiliary relay cabinet.

ACTION STATEMENTS

ACTION 9 - 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 the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 10 - With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. If the inoperable channel is bypassed for greater than 48 hours, the desirability of maintaining this channel in the bypassed condition shall be reviewed at the next regularly scheduled PSC meeting in accordance with Specification 6.5.1.7.n. The channel shall be returned to OPERABLE status prior to startup following the next COLD SHUTDOWN.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below.

Process Measurement Circuit	Functional Unit Bypassed
1. Containment Pressure - NR	Containment Pressure - High (RPS) Containment Pressure - High (ESFAS) Containment Pressure - High-High (ESFAS)
2. Steam Generator 1 Pressure	Steam Generator 1 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
3. Steam Generator 2 Pressure	Steam Generator 2 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
4. Steam Generator 1 Level	Steam Generator 1 Level - Low Steam Generator 1 Level - High Steam Generator 1 ΔP (EFAS 1)
5. Steam Generator 2 Level	Steam Generator 2 Level - Low Steam Generator 2 Level - High Steam Generator 2 ΔP (EFAS 2)

TABLE NOTATION

ACTION 11 - With the number of channels OPERABLE one less than the Minimum Channels OPERABLE requirement, STARTUP and/or POWER OPERATION may continue provided the following conditions are satisfied:

a. Verify that one of the inoperable channels has been bypassed and place the other inoperable channel in the tripped condition within 1 hour, and

b. All functional units affected by the bypassed/tripped channel shall also be placed in the bypassed/tripped condition as listed below:

Process Measurement Circuit	Functional Unit Bypassed/Tripped
1. Containment Pressure - NR	Containment Pressure - High (RPS) Containment Pressure - High (ESFAS) Containment Pressure - High-High (ESFAS)
2. Steam Generator 1 Pressure	Steam Generator 1 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
3. Steam Generator 2 Pressure	Steam Generator 2 Pressure - Low Steam Generator 1 ΔP (EFAS 1) Steam Generator 2 ΔP (EFAS 2)
4. Steam Generator 1 Level	Steam Generator 1 Level - Low Steam Generator 1 Level - High Steam Generator 1 ΔP (EFAS 1)
5. Steam Generator 2 Level	Steam Generator 2 Level - Low Steam Generator 2 Level - High Steam Generator 2 ΔP (EFAS 2)

STARTUP and/or POWER OPERATION may continue until the performance of the next required CHANNEL FUNCTIONAL TEST. Subsequent STARTUP and/or POWER OPERATION may continue if one channel is restored to OPERABLE status and the provisions of ACTION 10 are satisfied.

ACTION 12 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 13 - 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 the next 6 hours and in COLD SHUTDOWN within the following 30 hours; however, one channel may be bypassed for up to 1 hour for surveillance testing provided the other channel is OPERABLE.

TABLE 3.3-4

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT			TRIP SETPOINT	ALLOWABLE VALUES
1.	SAFETY INJECTION (SIAS)			
	a.	Manual (Trip Buttons)	Not Applicable	Not Applicable
	b.	Containment Pressure - High	≤ 18.3 psia	≤ 18.490 psia
	c.	Pressurizer Pressure -Low	≥1717.4 psia (1)	≥1686.3psia (1)
2.	CONTAINMENT SPRAY (CSAS)			
	a.	Manual (Trip Buttons)	Not Applicable	Not Applicable
	b.	Containment Pressure -- High-High	≤ 23.3 psia	≤ 23.490 psia
3.	CONTAINMENT ISOLATION (CIAS)			
	a.	Manual (Trip Buttons)	Not Applicable	Not Applicable
	b.	Containment Pressure - High	≤ 18.3 psia	≤ 18.490 psia

3/4.3.1 and 3/4.3.2 PROTECTIVE AND ENGINEERED SAFETY FEATURES (ESF) INSTRUMENTATION

The OPERABILITY of the protective and ESF instrumentation systems and bypasses ensure that 1) the associated ESF 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 for protective and ESF purposes 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 accident analyses.

The surveillance requirements specified for these systems ensure that the overall system functional capability is maintained comparable to the original design standards. The periodic surveillance tests performed at the minimum frequencies are sufficient to demonstrate this capability.

The measurement of response time at the specified frequencies provides assurance that the protective and ESF action function associated with each channel is completed within the time limit assumed in the accident analyses. No credit was taken in the analyses for those channels with response times indicated as not applicable.

Response time may be demonstrated by any series of sequential, overlapping or total channel test measurements provided that such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either 1) in place, onsite or offsite test measurements or 2) utilizing replacement sensors with certified response times.

RTD response time is defined as the time interval required for the RTD output to achieve 63.2% of its total change when subjected to a step change in RTD temperature. The RTD response time for the Core Protection Calculator System (CPCS) is expressed as an effective time constant. For hot leg temperatures, the effective time constant for a given CPC channel is defined as the mean time constant for averaged pairs of hot leg RTD inputs to the channel. This is done because the CPCS utilizes the mean hot leg temperature in its calculations. The maximum hot leg effective time constant allowable for use in the CPCS is 13.0 seconds. For cold leg temperatures, the effective time constant to be used in Figure 3.3-1 is the maximum time constant of the two cold leg RTD inputs for a given channel. The CPCS utilizes the more conservative cold leg temperature in the various DNBR and LPD calculations. The maximum cold leg effective time constant allowable for use in the CPCS is 13.0 seconds.

Plant Protective System (PPS) logic is designed for operation as a 2-out-of-3 logic, although normally it is operated in a 2-out-of-4 mode.

The RPS Logic consists of everything downstream of the bistable relays and upstream of the Reactor Trip Circuit Breakers. The RPS Logic is divided into two parts, Matrix Logic, and Initiation Logic. Failures of individual bistables and their relays are considered measurement channel failures.

The ESFAS Logic consists of everything downstream of the bistable relays and upstream of the subgroup relays. The ESFAS Logic is divided into three parts, Matrix Logic, Initiation Logic, and Actuation Logic. Failures of individual bistables and their relays are considered measurement channel failures.

Matrix Logic refers to the matrix power supplies, trip channel bypass contacts, and interconnecting matrix wiring between bistable relay cards, up to, but not including the matrix relays. Matrix contacts on the bistable relay cards are excluded from the Matrix Logic definition since they are addressed as part of the measurement channel.

Initiation Logic consists of the trip path power source, matrix relays and their associated contacts, all interconnecting wiring, and the initiation relays (including contacts).

ESFAS Actuation Logic consists of all circuitry housed within the Auxiliary Relay Cabinets (ARCs) used to house the ESF Function; excluding the subgroup relays, and interconnecting wiring to the initiation relay contacts mounted in the PPS cabinet.

For the purposes of this LCO, de-energization of up to three matrix power supplies due to a single failure, such as loss of a vital instrument bus, is to be treated as a single matrix channel failure, providing the affected matrix relays de-energize as designed to produce a half-trip. Although each of the six matrices within an ESFAS Function (e.g., SIAS, MSIS, CSAS, etc.) uses separate power supplies, the matrices for the different ESFAS Functions share power supplies. Thus, failure of a matrix power supply may force entry into the Condition specified for each of the associated ESFAS Functional Units.

6.5.2 SAFETY REVIEW COMMITTEE (SRC)

FUNCTION

6.5.2.1 The Safety Review Committee shall function to provide independent review and audit of designated activities in the areas of:

a. nuclear power plant operations

b. nuclear engineering

c. chemistry and radiochemistry

d. metallurgy

e. instrumentation and control

f. radiological safety

g. mechanical and electrical engineering

h. quality assurance practices

COMPOSITION

6.5.2.2 The Safety Review Committee shall be composed of a Chairman and eight to twelve members which collectively have the experience and competence required by ANSI/ANS-3.1-1981 to review problems in the areas specified in Section 6.5.2.1, a-h.

The Vice President, Operations ANO shall designate, in writing, the Chairman and all SRC members.

The Chairman shall designate, in writing, the alternate Chairman in the absence of the SRC Chairman.

f. Review of all REPORTABLE EVENTS.

g. Review of facility operations to detect potential nuclear safety hazards.

h. Performance of special reviews, investigations or analyses, and reports thereon as requested by the Plant Manager, ANO-2, General Manager, Plant Operations or the Safety Review Committee.

i. Review of the Plant Security Plan and submittal of recommended changes to the General Manager, Plant Operations and the Safety Review Committee.

j. Review of the Emergency Plan and submittal of recommended changes to the General Manager, Plant Operations and Safety Review Committee.

k. Review of changes to the Offsite Dose Calculation Manual and Process Control Program.

l. Review of changes to the Fire Protection Program and submittal of recommended changes to the General Manager, Plant Operations and Safety Review Committee.

m. Review of proposed procedures and changes to procedures which involve an unreviewed safety question as defined in 10CFR50.59.

n. Review and documentation of judgment concerning extended operation (longer than 48 hours) with a PPS trip channel in bypass. Review shall determine whether to leave the trip channel in bypass, place the channel in trip, and/or repair the defective channel.

AUTHORITY

6.5.1.8 The Plant Safety Committee shall:

a. Recommend in writing their approval or disapproval of items considered under 6.5.1.6(a) through (d) above.

b. Render determinations in writing with regard to whether or not each item considered under 6.5.1.6(a) through (e) above constitutes an unreviewed safety question.

c. Provide written notification within 24 hours to the Vice President, Operations ANO and the Safety Review Committee of disagreement between the PSC and the Plant Manager, ANO-2 or the General Manager, Plant Operations; however, the General Manager, Plant Operations shall have responsibility for resolution of such disagreements pursuant to 6.1.1 above.

RECORDS

6.5.1.9 The Plant Safety Committee shall maintain written minutes of each PSC meeting that, at a minimum, document the results of all PSC activities performed under the responsibility and authority provisions of these technical specifications. Copies shall be provided to the Plant Manager, ANO-2, General Manager, Plant Operations and Chairman of the Safety Review Committee.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 159 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated July 22, 1993, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2) Technical Specification (TSs). The requested changes would increase the time allowed during plant operation at full power with one plant protection system (PPS) channel in bypass, from 48 hours to until the next cold shutdown. The proposed amendment would also incorporate certain editorial changes to maintain consistency between tables and clarify the intent of the TSs.

As part of the initial licensing review for ANO-2, the licensee proposed to operate the four channel PPS instrumentation in a two-out-of three logic with the fourth channel placed in an indefinite bypass. The NRC staff, however, required that the inoperable fourth channel be placed in the tripped condition within one hour, and at a later time approved a 48 hour bypass of the inoperable channel before it is placed in the tripped condition. The staff subsequently required all Combustion Engineering (CE) plant licensees to either limit the bypass of an inoperable channel to 48 hours or perform a specific review and analysis to justify a less stringent TS requirement. Licensees who performed the specific analysis were required to confirm that detailed documentation of the design review was available at the licensee's facility for staff audit. This staff requirement was transmitted to the licensee by letter dated March 31, 1982 (Ref. 1), and the licensee submitted a TS change request, dated July 22, 1993 (Ref. 2), to be allowed to operate the plant with an inoperable channel in bypass until the next cold shutdown if the repair cannot be made during plant operation. The submittal included a detailed analysis to justify the change request. The staff reviewed the proposed TS change and the detailed analysis and requested additional information which the licensee presented in a meeting with the staff on September 22, 1994. The staff evaluation is provided below.

2.0 EVALUATION

All CE plants with analog or digital PPS instrumentation have four separate trip channels for each trip parameter configured into a random two-out-of-four coincident logic. This design allows for bypassing one channel of a trip parameter while continuing to meet the single failure criterion with the remaining two-out-of-three coincident logic.

Although the two-out-of-three PPS coincident logic meets the single failure criterion, the fourth channel was not previously accepted by the staff as an installed spare, because of concerns with common mode failures. The staff was concerned that a single failure may affect more than one channel if adequate separation is not maintained between the channels. Walkdowns at some CE plants confirmed that adequate separation between channels was not maintained.

The current TS requirement of 48 hours permitted in bypass versus one hour was established because of the low likelihood of a fault affecting more than one channel during the short 48 hour period. Further, an indefinite bypass was determined to be acceptable by the staff for those plants which could demonstrate adequate independence between channels on a plant specific basis.

For demonstrating adequate PPS independence, the staff required licensees to verify the following:

(1) <u>High Energy Line Break</u>

High energy line break hazards in coincidence with the bypass of a channel should not negate the minimum acceptable redundancy required by IEEE Std. 279-1971. Credit was not given for the "fail-safe" mode of the channels affected by high energy line breaks.

(2) <u>Single Failure In Combination With Prolonged Bypass</u>

Bypass of a specific protection channel in coincidence with a single failure of a redundant channel should not prevent required protection functions for any transient or accident.

(3) <u>Channel Independence</u>

The four protection channels as installed should meet the physical independence criteria of Regulatory Guide (RG) 1.75.

(4) <u>Independence of the Vital Buses</u>

Tests and analyses have been performed to demonstrate independence of the redundant vital buses. The tests and supporting information should include:

(a) Use of a plant-specific mock-up representing one protection logic matrix system (i.e., two matrix power supplies, each with its own simulated 120 volt ac vital bus supply, matrix relays, bistable power supplies, bistable trip units, and isolation circuitry).

(b) Application of surges (internal and external transient voltages) and faults (including continuous phase-to-phase short-circuits, phase-to-ground short-circuits and continuous external high voltages) to the simulated 120 volt ac vital bus supplying power to an associated matrix power supply.

(c) Application of surges and faults between each matrix power supply input conductor and ground (common mode) and across (line-to-line) the matrix power supply input conductors (transverse mode).

(d) Monitoring of the redundant simulated 120 volt ac vital bus supplying power to its matrix power supply to measure any effect as a result of application of the faults or surges on the other bus.

(e) Acceptance criteria for perturbations which would be allowed within the redundant vital bus without interfering with any PPS actions.

(f) Justification that the faults and surges used during the testing exceed the maximum worst-case failures which could occur within the PPS circuits.

(5) Logic Matrix Circuitry Failure Due to a Vital Bus Single Failure

Tests and analyses have been performed to assure that with a channel bypassed, a vital bus single failure will not negate the required protective function. The tests and supporting information should include:

(a) Use of a plant-specific mock-up representing one protection logic matrix system (i.e., two matrix power supplies, each with its own simulated 120 volt ac vital bus supply, matrix relays, bistable power supplies, bistable trip units, and isolation circuitry).

(b) Application of surges (internal and external transient voltages) and faults (including continuous phase-to-phase short-circuits, phase-to-ground short-circuits and continuous external high voltages) to the simulated 120 volt ac vital bus supplying power to an associated matrix power supply.

(c) Application of surges and faults between each matrix power supply input conductor and ground (common mode) and across (line-to-line) the matrix power supply input conductors (transverse mode).

(d) Monitoring of the auctioneered matrix power supply output to measure any effect on the logic matrix circuitry as a result of application of the faults or surges.

(e) Verification that during and after the application of the surges and faults, the protection circuits will perform their protective actions.

(f) Justification that the faults and surges used during the testing exceed the maximum worst-case failures which could occur within the PPS circuits.

For licensees who propose a TS with a longer than 48 hour bypass of one process channel and whose PPS design and installation meets the above criteria, the staff allowed revision of current TSs as follows:

(1) When a protection channel of a given process variable becomes inoperable, the defective channel may be placed in bypass until the next Onsite Safety Review Group meeting.

(2) The Onsite Safety Review Group should review the situation and document their judgment concerning prolonged operation in bypass, channel trip, and/or repair. The goal should be to repair the inoperable channel and return it to service as quickly as practicable.

(3) Any inoperable protection channel must be repaired and restored to an operable state during the first cold shutdown operational mode following channel malfunction.

The staff review of the licensee's analysis (Ref 2) was performed to determine whether it met the staff's acceptance criteria.

Criterion 1: High Energy Line Break (HELB)

The ANO-2 Safety Analysis Report (SAR) identified all high energy lines and their credible break locations both inside and outside containment. Electrical penetration rooms which are not classified as harsh environment areas would be automatically isolated from the effect of an HELB in the associated piping penetration room by the closure of ventilation system dampers. The licensee's analysis included each break location identified in the SAR for pipe whip and jet impingement effects on those protection system components that were credited in the accident analysis for mitigating the consequences of a break at that location. No credit was taken for the fail-safe mode of the affected channels. The staff found that the analysis demonstrated that an HELB coincident with the bypass of a PPS channel will not negate the minimum acceptable redundancy required by IEEE Std. 279-1971.

Criterion 2: Single Failure in Combination With Prolonged Bypass

The licensee performed a review of transient and accident analyses to verify that bypass of a specific protection channel combined with a single failure of a redundant channel will not prevent the required protective action. In this review, special attention was placed on those events which could cause asymmetric effects on the plant. The review looked for cases where the remaining channels may not effectively detect transients and accidents for which the PPS is relied upon for protective actions.

The events involving assymetric detection of accident & transient conditions by the remaining instrumentation include; (1) increased heat removal and decreased heat removal affecting one steam generator, (2) loss of coolant accidents and steam generator tube ruptures involving one reactor coolant loop, (3) partial loss of flow, (4) sheared reactor coolant pump (RCP) shaft and locked RCP rotor events involving one RCP, (5) single control element assembly (CEA) drops, and (6) CEA withdrawals and ejection accident. The results of the evaluation indicate that the above listed transients accidents which may involve asymmetric effects could be protected by non-symmetry sensitive parameters such as high pressurizer pressure, low pressurizer pressure, core protection calculator (CPC) trip, and RCP speed and high power trip with the exception of the CEA ejection accident.

For the CEA ejection accident, a 10% power measurement uncertainty was included in the accident analysis which conservatively accounts for power asymmetry effects on the ex-core nuclear instrument detectors for any ejected CEA. The licensee performed several calculations using the FLAIR code to determine the bounding magnitude of this uncertainty. In these calculations, various ejected CEA locations and initial plant conditions were assumed, with only the "worst two" detectors assumed operable. The results of the calculation confirmed that the 10% bias conservatively bounds all analyzed cases. Therefore, based on the above evaluation, the staff concludes that design basis transients or accidents are not affected by the licensee proposed bypass of a PPS channel.

Criterion 3 : Channel Independence

The licensee's analysis included a detailed study of the PPS channel physical separation, for both inside and outside containment in accordance with the physical independence criteria of RG 1.75. The review identified the location of the transmitters, instrument taps and root valves, and traced the routings of the instrument sensing lines and the associated cables from the process to the transmitter inside the containment, and from electrical penetrations to the termination cabinets outside the containment. The staff reviewed the licensees study for the various process parameters and agrees with the licensee's conclusion that, as built, the four protection channels of each process instrumentation meet the physical separation criteria of RG 1.75.

Criterion 4: Independence of the Vital Buses

The staff was concerned that the auctioneered power supply to each logic matrix from two of the four class 1E independent 120 volt ac vital buses may challenge the isolation and hence independence of these vital buses. The licensee performed tests and analyses to demonstrate fault isolation between the vital buses and the PPS power supply, and adequate independence of the four vital buses which are supplied by only two class 1E batteries. Tests to demonstrate the isolation capability of the PPS power supplies were performed prior to the initial fuel loading assuming inadequate physical separation between the 480 volt ac/125 volt dc input and 120 volt ac output of the uninterruptible power supplies (UPS) and included input fault and surge tests and output fault and isolation tests in both common and transverse modes. The tests were intended to confirm that maximum credible faults applied to the input and output of the power supplies will not propagate through the redundant power supply to the second vital bus. These tests were performed on a mock-up of typical CE digital PPS power supplies in conformance with IEEE Std. 323-1971 "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," IEEE Std. 472-1974 "Guide For Surge Withstand

Capability Tests," and the licensee's various programs for power supply qualification testing. The tests demonstrated that the maximum credible faults of 142 volts dc, 508 volts ac, and surges of 1500 volts ac peak, applied to the various power supplies, do not propagate through the redundant power supply to the second vital bus.

Despite the above acceptable test results, the UPS were subsequently equipped with surge suppression circuits designed to attenuate the maximum transient output voltage below the PPS power supply damage threshold of 400 volts. The surge suppression circuits provide a low impedance shunt to ground for high frequency transverse and common mode transients. The surge suppression circuits were subsequently tested, and showed a maximum observed output voltage of 100 volt ac peak to peak. Based on this modification and test results, the licensee reduced the values of the qualification acceptance criteria from 508 volts ac to 132 volts ac (normal output voltage of 120 volts plus 10% for the UPS voltage regulation) for the maximum credible fault, and from 1500 volts ac peak surge to 100 volts ac.

To address independence of the vital buses, the licensee submittal included detailed information and drawings of the PPS power supply distribution, cable routing and component locations, and test procedures, results, and acceptance criteria to establish isolation capability and independence of the 120 volt ac vital buses. The staff reviewed this documentation and agrees with the licensee findings that no input power cables to the UPS (480 volt ac or 125 volt dc) are routed in any of the raceways utilized for the 120 volt ac vital power distribution system.

<u>Criterion 5: Logic Matrix Failure Due to a Vital Bus Single Failure</u>

Typically, process measurement sensors (e.g., pressure transmitters) feed signal conditioning modules located in the process protective cabinet, which in turn provide analog input signals to the bistables located in the PPS cabinet. When a setpoint is exceeded on a given channel, three associated bistable relays will be de-energized. Each bistable relay controls a contact in one of the six matrix relay ladder logic circuits. The six matrices correspond with all possible two-out-of-four coincidence logic combinations (AB, AC, AD, BC, BD, CD). When a bistable trips, one side of the ladder logic circuit is opened in each of the three matrices associated with that channel. Each ladder logic circuit controls four normally energized matrix relays. When two simultaneous trip signals from the same parameter are present, all four relays from one of the six matrices would de-energize, and will provide an activation signal in each of the four trip paths. Each of the six logic matrices are powered by two of four class 1E independent 120 volt ac vital buses. When one PPS trip parameter is placed in bypass, one side of three combination logic matrices will be negated (e.g. bypass of channel A will negate "A" side of AB, AC, and AD two-out-of-four trip logic matrices). Similarly, a single failure of a 120 volt ac vital bus will cause a loss of one of the two sources of power to three out of the six logic matrices.

The licensee analyzed the effects of a postulated single failure on vital bus "B" with protective channel "A" in bypass to determine the PPS capability to perform its protective function. The licensee assumed that the vital bus fault or surge will not exceed the inverter maximum credible fault, the surge withstand capability as defined in IEEE Std. 472-1974, and the maximum fault and surge for which the system was tested (explained in the evaluation under Criteria 4). The licensee determined that to adversely affect the PPS trip capability, the postulated single failure must propagate through each of the three matrix power supplies which power the six matrix trip relay coils. All six matrix trip relays must fail in a manner that welds, bends, or otherwise renders the relay contacts inoperable. The licensee further ascertained that both the coil and the pressurized glass encapsulated reed switch of these PPS matrix relays are enclosed in a hermetically sealed assembly and the switch contacts are designed to "fail open." There are 8,540 of these relays currently in use in seven different PPS systems at four different power plants with approximately 59 years of cumulative operation. The operating history of these relays does not show any evidence of a common mode failure. Additionally, all PPS power supplies provide overvoltage and overcurrent protection for their respective loads. Each two-out-of-four trip logic matrix power supply has an undervoltage relay that provides alarm indication and annunciation in the event the power supply voltage drops below the undervoltage alarm relay coil minimum dropout voltage.

In addition, the licensee submitted an updated "Failure Modes and Effect Analysis (FMEA)" which is currently part of the ANO-2 FSAR and addresses failures in the PPS system from the sensors to the activation devices. The FMEA also addresses failures of the power supplies to the PPS. This analysis was performed to demonstrate defense against single failure with one of the four PPS channels in a bypass condition. The results of this analysis shows that with one channel in bypass, no single failure in the remaining channels will prevent the PPS from performing its safety function. Therefore, based on the matrix relay design, operating history, and test results, the licensee concluded that a single vital bus failure would not cause multiple failures of the matrix trip relays and would not prevent the PPS from performing its protective function with a single PPS trip channel in bypass.

Based on the above analysis and test results, the licensee proposed a revision to the ANO-2 TS consistent with the staff acceptance criteria identified in Reference 2. The proposed changes revise RPS and ESFAS instrumentation LCO actions and add a new administrative control requirement in the plant TSs. In addition, pertinent sections of the SAR for Instrumentation and Controls (Chapter 7), Electric Power (Chapter 8), Accident Analysis (Chapter 15), and Design of Structures, Components, Equipment and Systems (Chapter 3) are also revised to reflect the analysis results. Furthermore, the proposed changes reflect incorporation of the indefinite bypass of one protective channel, include various editorial changes, changes necessary for consistency in format and entries with the new standard TSs (NUREG-1432), and various other table entries, such as matrix logic which were not included in the ANO-2 TSs and are not related to the indefinite bypass issue.

The proposed TS changes require that if an inoperable channel is placed in bypass for greater than 48 hours, the desirability of maintaining it in this condition shall be reviewed at the next regularly scheduled Plant Safety Committee (PSC) meeting in accordance with the proposed administrative controls. The PSC review shall determine whether to place the inoperable channel in trip, repair the defective channel as quickly as possible, or leave it in the bypass mode to be returned to operable status prior to the start-up following the next cold shutdown. The goal will be to repair the inoperable channel and return it to service as quickly as practical.

The staff reviewed the proposed changes and determined that they have improved procedures such that they are easier for the operators to understand and use, are consistent with the new improved standard TSs, and the justification for these changes is in accordance with the criteria provided by the staff in Reference 2.

3.0 CONCLUSION OF TECHNICAL ISSUES

Based on the above, the staff concludes that the licensee analyses and tests were performed in accordance with the staff acceptance criteria identified in Reference 2 and adequately demonstrate that:

(a) With no credit taken for the fail safe mode of the affected PPS channel, an HELB coincident with the bypass of an inoperable channel will not negate the minimum acceptable redundancy for protective channels required by IEEE 279-1971.

(b) With one channel in bypass and a second channel subjected to a single failure, the PPS will provide the protection functions required by the accident analysis.

(c) The four protection channels meet the physical separation criteria of RG 1.75.

(d) The maximum credible dc and ac power faults and surges at the inputs of the PPS power supplies do not propagate through the redundant power supply to the second vital bus, and the vital bus power feeds to the PPS and the inverter input and output circuit are adequately separated. Additionally, the four vital buses are adequately independent given that there are only two batteries supplying the emergency power source to the inverters of these vital buses.

(e) With one PPS protective channel in bypass, no credible single failure of a vital bus could be identified to affect the six matrix trip relays and jeopardize the actuation of PPS.

The staff, therefore concludes that the proposed changes to the ANO-2 TSs to incorporate an indefinite bypass of a PPS channel will not prevent the PPS from performing its safety function and are, therefore, acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (58 FR 46229). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

REFERENCES

1. NRC Letter from Robert A. Clark to AP&L, William Cavanaugh, dated March 31, 1982.

2. AP&L Letter from Jerry W. Yelverton to NRC Public Document Control Desk, dated July 22, 1993.

Principal Contributors: I. Ahmed

Date: **April 3, 1995**