Mr. C. Randy Hutchinso
Vice President, Operat...s ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

MAY 21 1997

SUBJECT: ISSUANCE OF AMENDMENT NO. 186 TO FACILITY OPERATING LICENSE NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M97697)

Dear Mr. Hutchinson:

The Commission has issued the enclosed Amendment No. 186 to Facility Operating License No. NPF-6 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 October 7, 1996, as supplemented February 10, and May 8, 1997.

The amendment revises the channel functional testing frequency for most of the Reactor Protection System (RPS) and Engineered Safety Feature Actuation System (ESFAS) instrumentation from monthly to every 4 months. The amendment also allows the use of cycle independent shape annealing matrix (CISAM) elements to be used in the Core Protection Calculators (CPC).

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,

Orig. 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 No. 186 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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JWermiel	LHurley, RIV	JKilcrease, RIV f/r	

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Signed 5/21/97

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PDR ADOCK 05000368
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 21, 1997

Mr. C. Randy Hutchinson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

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Sincerely,

George Kalman

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Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures: 1. Amendment No. 186 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 186
License No. NPF-6

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee) dated October 7, 1996, as supplemented February 10, and May 8, 1997, 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.

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P PDR

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-6 is hereby amended to read as follows:

   2. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 186, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

George Kalman

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: May 21, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 186

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Revise 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
1-9	1-9
3/4 3-5	3/4 3-5
3/4 3-7	3/4 3-7
3/4 3-8	3/4 3-8
3/4 3-9	3/4 3-9
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 3-21	3/4 3-21
3/4 3-22	3/4 3-22
3/4 3-23	3/4 3-23
B 3/4 3-1	B 3/4 3-1

TABLE 1.2

FREQUENCY NOTATION

NOTATION	FREQUENCY
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
TA	At least once per 123 days.
SA	At least once per 184 days.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Completed prior to each release.
N.A.	Not applicable.

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 the QA Manual Operations. 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 Chann 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.

Correction letter of 5-10-95

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)	TA(10)	1, 2
3. Logarithmic Power Level - High	S	R(4)	TA(10), S/U(1)	1, 2, 3, 4, 5 and *
4. Pressurizer Pressure - High	S	R	TA(10)	1, 2
5. Pressurizer Pressure - Low	S	R	TA(10)	1, 2 ,3*,4*,5*
6. Containment Pressure - High	S	R	TA(10)	1, 2
7. Steam Generator Pressure - Low	S	R	TA(10)	1, 2 ,3*,4*,5*
8. Steam Generator Level - Low	S	R	TA(10)	1, 2
9. Local Power Density - High	S	D(2,4), R(4,5)	TA(10), R(6)	1, 2
10. DNBR - Low	S	S(7), D(2,4), M(8), R(4,5)	TA(10), R(6)	1, 2
11. Steam Generator Level - High	S	R	TA(10)	1, 2
12. Reactor Protection System Logic	N.A.	N.A.	TA(10)	1, 2 ,3*,4*,5*
13. Reactor Trip Breakers	N.A.	N.A.	M	1, 2 ,3*,4*,5*
14. Core Protection Calculators	S	D(2,4) R(4,5)	TA(9,10), R(6)	1, 2
15. CEA Calculators	S	R	TA(10), R(6)	1, 2

TABLE 4.3-1 (Continued)

TABLE NOTATIONS

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

(1) - If not performed in previous 7 days.

(2) - Heat balance only (CHANNEL FUNCTIONAL TEST not included):

a. Between 15% and 80% of RATED THERMAL POWER, compare the Linear Power Level, the CPC ΔT power, and the CPC nuclear power signals to the calorimetric calculation.

If any signal is within -0.5% to +10% of the calorimetric calculation, then do not calibrate except as required during initial power ascension following refueling.

If any signal is less than the calorimetric calculation by more than 0.5%, then adjust the affected signal(s) to within 0.0% to +10.0% of the calorimetric calculation.

If any signal is greater than the calorimetric calculation by more than 10%, then adjust the affected signal(s) to within 8% to 10% of the calorimetric calculation.

b. At or above 80% of RATED THERMAL POWER, compare the Linear Power Level, the CPC ΔT power, and CPC nuclear power signals to the calorimetric calculation. If any signal differs from the calorimetric calculation by an absolute difference of > 2%, then adjust the affected signal(s) to within ± 2% of the calorimetric calculation.

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 or verify the shape annealing matrix elements used in the CPCs.

(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 7[illegible] of RATED THERMAL POWER, verify [illegible]t the total 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 (conservatively compensate for measurement uncertainties) or by calorimetric calculations (conservatively compensated for measurement uncertainties) 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 RCS flow rate as indicated by each CPC is less than or equal to the actual RCS total flow rate determined by calorimetric calculations (conservatively compensated for measurement uncertainties).

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

(10) - On a STAGGERED TEST BASIS.

3/4.3.2 ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.2.1 The Engineered Safety Feature Actuation System (ESFAS) instrumentation channels and bypasses shown in Table 3.3-3 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4 and with RESPONSE TIMES as shown in Table 3.3-5.

APPLICABILITY: As shown in Table 3.3-3.

ACTION:

a. With an ESFAS instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3-4, declare the channel inoperable and apply the applicable ACTION requirement of Table 3.3-3 until the channel is restored to OPERABLE status with the trip setpoint adjusted consistent with the Trip Setpoint value.

b. With an ESFAS instrumentation channel inoperable, take the ACTION shown in Table 3.3-3.

SURVEILLANCE REQUIREMENTS

4.3.2.1.1 Each ESFAS instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-2.

4.3.2.1.2 The logic for the bypasses shall be demonstrated OPERABLE during the at power CHANNEL FUNCTIONAL TEST of channels affected by bypass operation. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation.

4.3.2.1.3 The ENGINEERED SAFETY FEATURES RESPONSE TIME of each ESFAS function shall be demonstrated to be within the limit at least once per 18 months. Each test shall include at least one channel per function such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific ESFAS function as shown in the "Total No. of Channels" Column of Table 3.3-3.

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	2 sets of 2	2 sets of 2	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

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
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 Switches)	2 sets of 2 per S/G	2 sets 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 the QA Manual Operations. 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 4.3-2

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. SAFETY INJECTION (SIAS)				
a. Manual (Trip Buttons)	N.A.	N.A.	R	N.A.
b. Containment Pressure - High	S	R	TA(2)	1, 2, 3
c. Pressurizer Pressure - Low	S	R	TA(2)	1, 2, 3
d. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3
2. CONTAINMENT SPRAY (CSAS)				
a. Manual (Trip Buttons)	N.A.	N.A.	R	N.A.
b. Containment Pressure - High - High	S	R	TA(2)	1, 2, 3
c. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3
3. CONTAINMENT ISOLATION (CIAS)				
a. Manual (Trip Buttons)	N.A.	N.A.	R	N.A.
b. Containment Pressure - High	S	R	TA(2)	1, 2, 3
c. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3
4. MAIN STEAM AND FEEDWATER ISOLATION (MSIS)				
a. Manual (Trip Buttons)	N.A.	N.A.	R	N.A.
b. Steam Generator Pressure - Low	S	R	TA(2)	1, 2, 3
c. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
5. CONTAINMENT COOLING (CCAS)				
a. Manual (Trip Buttons)	N.A.	N.A.	R	N.A.
b. Containment Pressure - High	S	R	TA(2)	1, 2, 3
c. Pressurizer Pressure - Low	S	R	TA(2)	1, 2, 3
d. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3
6. RECIRCULATION (RAS)				
a. Manual (Trip Buttons)(a)	N.A.	N.A.	R	N.A.
b. Refueling Water Tank - Low	S	R	TA(2)	1, 2, 3
c. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3
7. LOSS OF POWER				
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)	S	R	R	1, 2, 3
b. 460 volt Emergency Bus Undervoltage (Degraded Voltage)	S	R	R	1, 2, 3
8. EMERGENCY FEEDWATER (EFAS)				
a. Manual (Trip Switches)	N.A.	N.A.	R	N.A.
b. SG Level and Pressure (A/B)-low and ΔP (A/B) - High	S	R	TA(2)	1, 2, 3
c. SG Level (A/B) - Low and No Pressure - Low Trip (A/B)	S	R	TA(2)	1, 2, 3
d. Automatic Actuation Logic	N.A.	N.A.	TA(1,2)	1, 2, 3

Table 4.3-2 (Continued)

TABLE NOTATION

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

(1) The logic circuits shall be tested manually at least once per 123 days.

(2) On a STAGGERED TEST BASIS.

3/4.3.3 MONITORING INSTRUMENTATION

RADIATION MONTIORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in Table 3.3-6, adjust the setpoint to within the limit within 4 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels inoperable, take the ACTION shown in Table 3.3-6.

c. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the modes and at the frequencies shown in Table 4.3-3.

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 triannual channel functional testing frequency is to be performed on a STAGGERED TEST BASIS.

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.

Correction letter of 5-10-95

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 186 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 October 7, 1996, and as supplemented February 10, and May 8, 1997, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TS). The requested changes would revise the channel functional testing frequency for most of the Reactor Protection System (RPS) and Engineered Safety Feature Actuation System (ESFAS) instrumentation from monthly sequential testing to triannual (once every 123 days) staggered testing. The amendment would also allow the use of cycle independent shape annealing matrix (CISAM) elements to be used in the Core Protection Calculators (CPC). Presently, cycle-specific SAM elements are determined during startup testing after each core reload. Use of CISAM elements would eliminate several hours of critical path work after a refueling outage. The amendment would further make some administrative changes to the TS for clarification and editorial purposes.

In the licensee's October 7, 1996, letter, reference was made to a Combustion Engineering (CE) topical report that had not yet been submitted to the Nuclear Regulatory Commission (NRC). The report was referenced in support of modification of the RPS and ESFAS surveillance frequencies. As a result, the licensee, in a letter to the staff dated February 10, 1997, withdrew all references to the topical report and its 120-day frequency and submitted plant-specific information in an attachment to the February 10, 1997, letter. In a letter dated May 8, 1997, the licensee resubmitted TS page B 3/4 3-1 to remove any reference to the CE report. The information in the February 10, and May 8, 1997, submittals only clarified the original submittal and did not expand the scope of the original no significant hazards determination published in the Federal Register on January 29, 1997 (62 FR 4346).

2.0 EVALUATION

The following changes to TS Table 4.3-1 and 4.3-2 are proposed:

1. The monthly (M) channel functional testing requirement in Table 4.3-1 would be changed to triannual (TA) for all functional units except for the reactor trip breakers. The TA testing requirement is modified by

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Note 10 requiring the channel functional testing to be performed on a staggered test basis. The TS Bases for this TS would also be modified to incorporate these changes.

2. The weekly core protection calculator (CPC) addressable constant channel check requirement in Table 4.3-1 would be removed. Note 9 would be modified to require the addressable constant verification to be performed as part of the channel functional test.

3. Note 5 to Table 4.3-1 would be modified to allow a "verification" of the shape annealing matrix (SAM) elements used in the CPCs. This change would allow the use of CISAM elements in the CPCs.

4. The channel functional testing requirements in Table 4.3-2 would be changed from monthly to triannual. The TA testing requirement would be modified by Note 2 requiring the channel functional testing to be performed on a staggered test basis. The Note 1 requirement to manually test the actuation logic for the functional units would also be changed from 31 to 123 days to reflect the TA frequency. The Bases for this TS would also be modified to incorporate these changes.

2.1 Change in RPS and ESFAS Surveillance Frequencies

The proposed change to increase the RPS and ESFAS surveillance frequencies from monthly to triannual is based on topical reports CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation," Supplement 1 to CEN-327-A, and the supplemental information provided by the licensee in its February 10, 1997, submittal. Both CEN-327-A and CEN-327-A, Supplement 1, were prepared by Combustion Engineering for the Combustion Engineering Owners Group (CEOG). The purpose of these reports was to evaluate the safety impact and provide justification for extending the current monthly surveillance test interval for both RPS and ESFAS instrumentation. Both reports used probability risk analysis techniques to demonstrate that the proposed surveillance interval extensions do not result in increased plant risk when compared with current TS requirements.

The NRC's evaluation and acceptance of these topical reports were documented by a safety evaluation report (SER) that was sent to the chairman of the CEOG on November 6, 1989. The NRC found that the referenced topical reports provide an acceptable generic basis to support plant specific TS changes for extending both RPS and ESFAS channel functional test intervals from monthly to quarterly. The licensee is proposing, however, to extend the surveillance interval from monthly to triannual. Triannual has been defined by the licensee as "at least once per 123 days." The 123 days comes from adding up the total number of days from the longest four sequential calendar months.

The CE analysis estimated a slight increase in RPS unavailability as a result of extending the surveillance test interval. The analysis also estimated a reduced core melt frequency based on a reduction in surveillance test induced transients. The overall effect of the proposed change on safety was

determined to be negligible. The result of the reduced ESFAS testing on core melt frequency was found to be similar to that for RPS.

The ANO-2 TS Section 3/4.3.1 provides instrumentation operability and surveillance requirements for the RPS. TS Table 4.3-1 specifies the modes and frequency for the performance of channel checks, channel functional tests and channel calibration for each RPS channel. TS Table 4.3-2 specifies the functional test surveillance requirements for the ESFAS.

The staff SER for CEN-327 concluded that the CE report did not address the effects of drift in both the sensors or instrument strings. The effects of drift are plant specific and; therefore, should be included with each individual plant analysis. The licensee stated that, for ANO-2, CE performed the required setpoint drift analysis assuming a triannual surveillance frequency. The licensee reviewed and approved the CE analysis. ANO calculation 92-E-0084-01, "Plant Protection System Bistable Drift Analysis," dated June 1993, evaluated the effect on instrument uncertainties of extending the RPS and ESFAS functional surveillance test frequencies from monthly to triannual. The licensee's analysis determined that the only components requiring analysis were the RPS and ESFAS bistables and the variable setpoint cards. The licensee stated that the results of the analysis demonstrated that the observed changes in instrument uncertainties for the extended surveillance test frequencies do not exceed the current monthly setpoint assumptions. The licensee has reviewed the instrument uncertainty information for each channel involved and has determined that the drift occurring in that channel over the proposed 4-month period would not cause the setpoint value to exceed the allowable value.

The staff confirmed that the licensee's evaluation for the proposed surveillance extension was derived from the RPS and ESFAS fault tree models developed for and presented in topical report CEN-327-A, CEN-327-A, Supplement 1, and the licensee's own analysis provided in its February 10, 1997, submittal. Therefore, the staff found the licensee's proposed surveillance frequency extension for the RPS and ESFAS from monthly to triannual acceptable. The licensee, however, should maintain onsite records of the setpoint calculations and associated data to support planned future staff audits.

2.2 Use of CISAM

The Core Protection Calculators (CPCs) rely upon the excore detector signals to trip the reactor in the event of an anticipated operational occurrence (AOO) to ensure that the specified acceptable fuel design limits on minimum departure from nucleate boiling ratio (DNBR) and peak linear heat rate are not violated. To do this, each CPC channel synthesizes the core average axial power shape from three levels of excore detector signals. The relative excore detector readings are subsequently adjusted within the CPCs by a set of channel dependent shape annealing constants. These SAM constants are typically measured during the reload startup power ascension and installed into the CPC channels. Incore and excore signal data are taken at regular intervals during the initial startup power ascension and the incore data is

subsequently processed through a computer code to determine the relative power at the core periphery. An automated data reduction code is then used to verify the data, calculate the SAM constants, and determine whether the measured SAM meets a set of review and acceptance criteria to justify its implementation into the CPC channels.

The licensee has proposed to change Note 5 of Table 4.3-1 in TS 3/4.3.1 to allow either a determination of a cycle-dependent SAM or verification of the acceptability of a CISAM to be used in the CPCs. The cycle-specific SAMs from previous cycles have been found not to be reload dependent and, in fact, would have been acceptable for other cycles, even other units. In addition, since the cycle-specific SAM is only measured once during reload startup, the representation has been observed to be less accurate as the cycle progresses and the power shape evolves from a flattened cosine to a saddle shape. The CISAM would be based on middle-of-cycle data and; therefore, would be more representative of the entire cycle. If the CISAM is used, the matrix elements will be validated each cycle during startup testing and must meet the same acceptance criteria as the cycle-specific SAM elements. This ensures that the axial power shapes generated by the CPCs will trip the reactor so that minimum DNBR and peak linear heat rate are not violated in the event of an AOO. If these criteria are not met, the licensee would calculate a cycle-specific SAM to be used in the CPCs.

The licensee has stated that the CISAM elements will be validated during startup testing by monitoring the same parameters used for the cycle-specific SAM elements. The cycle-specific acceptance criteria will be expanded to include additional CISAM acceptance criteria. If the CISAM is determined to be no longer valid, a cycle-specific SAM will be calculated and used in the CPCs until conditions allow for the measurements or reanalysis of the CISAM. The CISAM performance will be monitored throughout the cycle on a frequency of approximately every 90 effective full power days (EFPD).

Based on the above review, the staff finds the proposed TS change to provide the option of using CISAM elements in the CPCs acceptable.

2.3 Administrative Changes

The following administrative changes to the TS are proposed:

1. TS Table 1.2 is being modified by adding a new surveillance frequency notation of triannual (TA) with a frequency of "At least once per 123 days." The triannual term is derived from the frequency of every 4 months or three times a year. The change to this table is needed to support the frequency changes associated with TS 3/4.3.1 and 3/4.3.2.

2. Action 2 on TS Table 3.3-1 and Action 10 on TS Table 3.3-3 are being modified to reference the Quality Assurance (QA) Manual Operations. Specification 6.5.1.7.n was removed from the TS by Amendment 160, which relocated this requirement to the QA Manual Operations.

3. Minor formatting changes are being made to TS Table 4.3-1 to make the data in the Channel Functional tests column more closely match the Channel Calibration column by placing one requirement per line for human factors considerations.

4. The proposed changes to TS Table 3.3-3, functional unit 6.a, are being made to more accurately reflect the design of the Recirculation Actuation System (RAS). The changes listed below for this table are not due to a change in the plant design or operation, but simply a correction to the table. The RAS does not have remote manual trip buttons like all the other functional units on this table. This difference is described in Note (c) for functional unit 6.a. As stated in the note, the manual trip buttons for RAS are located in the Auxiliary Relay Cabinets (ARCs). There are two ARCs, with a set of 2 manual trip buttons per ARC, for a total of four manual trip buttons for RAS. The simultaneous operation of both buttons on an ARC will result in the actuation of a single train of RAS. The operation of all four manual trip buttons in the ARCs is required to initiate a full RAS actuation. The following changes are being made to functional unit 6.a:

   a. In the Total No. of Channels column, for all the other manual trip functional units on this table, the number of channels listed is the total number of manual trip buttons that are installed. For RAS, the "2 sets of 2" is accurate because there is a set of two buttons installed in each of the two ARCs for a total of four buttons.

   b. In the Channels To Trip column, for all the previous manual trip functional units on this table, the number of channels listed in this column is the number of buttons required to be operated to initiate a full actuation of the functional unit. For RAS, the simultaneous operation of both buttons on an ARC will result in the actuation of a single train of RAS, but a full actuation will not occur until all four buttons on the ARCs are actuated. Therefore, for a full RAS actuation, it requires operation of "2 sets of 2" manual trip buttons.

   c. In the Minimum Channels Operable column, for all the previous manual trip functional units on this table, the number of channels listed in this column is the total number of buttons installed. The total number of RAS buttons installed is "2 sets of 2" or four buttons.

5. The proposed changes to TS Table 3.3-3, functional unit 8.a, are being proposed to correct the designation of manual trip buttons to manual trip switches and to consistently reflect the number of switches required to be operated to get a full actuation. These changes are not due to a modification to the plant design or operation, but simply corrections to this table to make it reflect the as-built configuration of this system. The Emergency Feedwater Actuation System (EFAS) has four remote manual trip switches per steam generator (SG). All four switches are required to be operated to manually initiate a full EFAS actuation for that SG. In the Channels To Trip column, for all the functional units (including

RAS with the proposed change described above), the number of channels listed in the column are the number of buttons or switches required to get a full actuation of the function. The number of trip switches that are required to be operated to get a full actuation on EFAS is "2 sets of 2 per SG."

6. Note (a) is being added to TS Table 4.3-2 functional unit 6.a to indicate the manual trip buttons are the local buttons on the ARCs. This note was copied from TS Table 3.3-2 Note (c) for consistency. Functional unit 8.a is also being modified to correct the designation of manual trip "buttons" to manual trip "switches."

The staff has reviewed the above changes and has determined they are administrative in nature and only serve to clarify the existing TS or correct previous errors. Therefore, the above administrative changes are acceptable.

3.0 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.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a surveillance requirement. 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 (62 FR 4346). 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.

5.0 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.

Principal Contributor: J. Kennedy

Date: May 21, 1997