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

50-368

December 31, 1998

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

SUBJECT: ISSUANCE OF AMENDMENT NO. 196 TO FACILITY OPERATING LICENSE NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT 2 (TAC NO. MA3602)

Dear Mr. Hutchinson:

The Commission has issued the enclosed Amendment No. 196 to Facility Operating License No. NPF-6 for the Arkansas Nuclear One, Unit 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 17, 1998.

This amendment modifies TS 3/4.10.3, Table 2.2-1, Table 3.3-1, Table 3.3-3, Table 3.3-4, Bases 2.2.1, Bases 3/4.3 and Bases 3/4.10.3 to compensate for a limitation associated with the use of a bistable to automatically enable the core protection calculator (CPC) trip functions whenever a permissive exits to bypass the high logarithmic power level trip function. Likewise, this same bistable was used to automatically enable the high logarithmic power level trip function whenever a permissive exists to bypass the CPC trip functions. The TSs were written such that the bypass for both of these trip functions would be automatically removed at 10E-4 percent power. However, the use of a single bistable in the design of the plant protection system (PPS) to perform both of these functions prevents literal compliance with this requirement. The bistable operates at one of two states defined by its setpoint value and reset value. The setpoint and reset states of the bistable are separated by a small deadband inherent in the bistable's ability to change state on increasing and decreasing power. This deadband prevents the use of a single bistable to perform both functions at the same value. This amendments approves a range within which both functions must occur to ensure that the design of the PPS is adequately reflected in the TSs. The proposed change will resolve the stated deficiency. In addition, other editorial changes were made to clarify the TS requirements associated with reactor trip setpoints.

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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:

M. Christopher Nolan, 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. 196 to NPF-6
2. Safety Evaluation

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DATE	12/23/98	12/23/98	12/17/98	12/17/98	12/24/98	12/29/98
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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:

M. Christopher Nolan, 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. 196 to NPF-6
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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. 196
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 September 17, 1998, 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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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. 196, 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

ORIGINAL SIGNED BY:

M. Christopher Nolan, Project Manger
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 31, 1998

ATTACHMENT TO LICENSE AMENDMENT NO.

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
2-5	2-5
2-6	2-6
B 2-3	B 2-3
3/4 3-4	3/4 3-4
3/4 3-14	3/4 3-14
3/4 3-18	3/4 3-18
3/4 10-3	3/4 10-3
B 3/4 3-1a	B 3/4 3-1a
	B 3/4 3-1b

TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. Manual Reactor Trip	Not Applicable	Not Applicable
2. Linear Power Level - High		
a. Four Reactor Coolant Pumps Operating	≤ 110% of RATED THERMAL POWER	≤ 110.712% of RATED THERMAL POWER
b. Three Reactor Coolant Pumps Operating	*	*
c. Two Reactor Coolant Pumps Operating - Same Loop	*	*
d. Two Reactor Coolant Pumps Operating - Opposite Loops	*	*
3. Logarithmic Power Level - High (1)	≤ 0.75%	≤ 0.819%
4. Pressurizer Pressure - High	≤ 2362 psia	≤ 2370.887 psia
5. Pressurizer Pressure - Low	≥ 1717.4 psia (2)	≥ 1686.3 psia (2)
6. Containment Pressure - High	≤ 18.3 psia	≤ 18.490 psia
7. Steam Generator Pressure - Low	≥ 712 psia (3)	≥ 699.6 psia (3)
8. Steam Generator Level - Low	≥ 23% (4)	≥ 22.111% (4)

* These values left blank pending NRC approval of safety analyses for operation with less than four reactor coolant pumps operating.

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
9. Local Power Density - High	≤ 21.0 kw/ft (5)	≤ 21.0 kw/ft (5)
10. DNBR - Low	≥ 1.25 (5)	≥ 1.25 (5)
11. Steam Generator Level - High	≤ 93.7% (4)	≤ 94.589% (4)

TABLE NOTATION

(1) Trip may be manually bypassed above 10^{-4}% power; bypass shall be automatically removed before decreasing below 10^{-4}% power.

(2) Value may be decreased manually, to a minimum value of 100 psia, during a planned reduction in pressurizer pressure, provided the margin between the pressurizer pressure and this value is maintained at ≤ 200 psi; the setpoint shall be increased automatically as pressurizer pressure is increased until the trip setpoint is reached. Trip may be manually bypassed below 400 psia; bypass shall be automatically removed before pressurizer pressure exceeds 500 psia.

(3) Value may be decreased manually during a planned reduction in steam generator pressure provided the margin between the steam generator pressure and this value is maintained at ≤ 200 psi; the setpoint shall be increased automatically as steam generator pressure is increased until the trip setpoint is reached.

(4) % of the distance between steam generator upper and lower level instrument nozzles.

(5) As stored within the Core Protection Calculator (CPC). Calculation of the trip setpoint includes measurement, calculational and processor uncertainties, and dynamic allowances. Trip may be manually bypassed below 10^{-2}% power; bypass shall be automatically removed before exceeding 10^{-2}% power.

To maintain the margins of safety assumed in the safety analyses, the calculations of the trip variables for the DNBR - Low and Local Power Density - High trips include the measurement, calculational and processor uncertainties and dynamic allowances as defined in CEN 305-P, "Functional Design Requirement for a Core Protection Calculator," July 1985; CEN-304-P, "Functional Design Requirements for a Control Element Assembly Calculator," July 1985; CEN-310-P, "CPC and Methodology Changes for the CPC Improvement Program," October 1985; and CEN-308-P, "CPC/CEAC Software Modifications for the CPC Improvement Program," August 1985.

The operating bypasses associated with the notations of Table 2.2-1 are discussed in the bases for specifications 3.3.1.1 and 3.3.2.1.

Manual Reactor Trip

The Manual Reactor Trip is a redundant channel to the automatic protective instrumentation channels and provides manual reactor trip capability.

Linear Power Level - High

The Linear Power Level - High trip provides reactor core protection against rapid reactivity excursions which might occur as the result of an ejected CEA. This trip initiates a reactor trip at a linear power level of ≤ 110.712% of RATED THERMAL POWER.

Logarithmic Power Level - High

The Logarithmic Power Level - High trip is provided to protect the integrity of fuel cladding and the Reactor Coolant System pressure boundary in the event of an unplanned criticality from a shutdown condition. A reactor trip is initiated by the Logarithmic Power Level - High trip at a logarithmic power level of ≤ 0.819% unless this trip is manually bypassed by the operator. The operator may manually bypass this trip when the logarithmic power level is above 10^{-4}% power; this bypass is automatically removed before the logarithmic power level decreases below 10^{-4}% power.

Pressurizer Pressure-High

The Pressurizer Pressure-High trip, in conjunction with the pressurizer safety valves and main steam safety valves, provides reactor coolant system protection against overpressurization in the event of loss of load without reactor trip. This trip's setpoint is at ≤2370.887 psia which is below the nominal lift setting (2500 psia) of the pressurizer safety valves and its operation avoids the undesirable operation of the pressurizer safety valves.

Pressurizer Pressure-Low

The Pressurizer Pressure-Low trip is provided to trip the reactor and to assist the Engineered Safety Features System in the event of a Loss of Coolant Accident. During normal operation, this trip's setpoint is set at ≥1686.3 psia. This trip's setpoint may be manually decreased, to a minimum value of 100 psia, as pressurizer pressure is reduced during plant shutdowns, provided the margin between the pressurizer pressure and this trip's setpoint is maintained at ≤200 psi; this setpoint increases automatically as pressurizer pressure increases until the trip setpoint is reached.

Containment Pressure-High

The Containment Pressure-High trip provides assurance that a reactor trip is initiated concurrently with a safety injection. The setpoint for this trip is identical to the safety injection setpoint.

Steam Generator Pressure-Low

The Steam Generator Pressure-Low trip provides protection against an excessive rate of heat extraction from the steam generators and subsequent cooldown of the reactor coolant. The setpoint is sufficiently below the full load operating point of approximately 900 psia so as not to interfere with normal operation, but still high enough to provide the required protection in the event of excessively high steam flow. This trip's setpoint may be manually decreased as steam generator pressure is reduced during plant shutdowns, provided the margin between the steam generator pressure and this trip's setpoint is maintained at ≤200 psi; this setpoint increases automatically as steam generator pressure increases until the trip setpoint is reached.

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

Correction letter of 5-10-95

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}% power; bypass shall be automatically removed before decreasing below 10^{-4}% power.

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

(c) Trip may be manually bypassed below 10^{-2}% power; bypass shall be automatically removed before exceeding 10^{-2}% power. During testing pursuant to Special Test Exception 3.10.3, trip may be manually bypassed below 1% power; bypass shall be automatically removed before exceeding 1% 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 3.3-3 (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 before pressurizer pressure exceeds 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 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT	TRIP VALUE	ALLOWABLE VALUES
4. MAIN STEAM AND FEEDWATER ISOLATION (MSIS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Steam Generator Pressure - Low	≥ 712 psia (2)	≥ 699.6 psia (2)
5. CONTAINMENT COOLING (CCAS)		
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)	≥ 1686.3 psia (1)
6. RECIRCULATION (RAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Refueling Water Tank - Low	54,400 ± 2,370 gallons (equivalent to 6.0 ± 0.5% indicated level)	between 51,050 and 58,600 gallons (equivalent to between 5.111% and 6.889% indicated level)
7. LOSS OF POWER		
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)	3120 volts (4)	3120 volts (4)
b. 460 volt Emergency Bus Undervoltage (Degraded Voltage)	423 ± 2.0 volts with an 8.0 ± 0.5 second time delay	423 ± 4.0 volts with an 8.0 ± 0.8 second time delay

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT	TRIP VALUE	ALLOWABLE VALUES
8. EMERGENCY FEEDWATER (EFAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Steam Generator (A&B) Level-Low	≥ 23% (3)	≥ 22.111% (3)
c. Steam Generator ΔP-High (SG-A > SG-B)	≤ 90 psi	≤ 99.344 psi
d. Steam Generator ΔP-High (SG-B > SG-A)	≤ 90 psi	≤ 99.344 psi
e. Steam Generator (A&B) Pressure - Low	≥ 712 psia (2)	≥ 699.6 psia (2)

(1) Value may be decreased manually, to a minimum of ≥ 100 psia, during a planned reduction in pressurizer pressure, provided the margin between the pressurizer pressure and this value is maintained at ≤ 200 psi; the setpoint shall be increased automatically as pressurizer pressure is increased until the trip setpoint is reached. Trip may be manually bypassed below 400 psia; bypass shall be automatically removed before pressurizer pressure exceeds 500 psia.

(2) Value may be decreased manually during a planned reduction in steam generator pressure, provided the margin between the steam generator pressure and this value is maintained at ≤ 200 psi; the setpoint shall be increased automatically as steam generator pressure is increased until the trip setpoint is reached.

(3) % of the distance between steam generator upper and lower level instrument nozzles.

(4) Inverse time relay set value, not a trip value. The zero voltage trip will occur in 0.75 ± 0.075 seconds.

REACTOR COOLANT LOOPS

LIMITING CONDITION FOR OPERATION

3.10.3 The limitations of Specification 3.4.1.1 and noted requirements of Tables 2.2-1 and 3.3-1 may be suspended during the performance of startup and PHYSICS TESTS, provided:

a. The THERMAL POWER does not exceed 5% of RATED THERMAL POWER, and

b. The reactor trip setpoints of the OPERABLE power level channels are set at ≤ 20% of RATED THERMAL POWER.

APPLICABILITY: During startup and PHYSICS TESTS.

ACTION:

With the THERMAL POWER > 5% of RATED THERMAL POWER, immediately trip the reactor.

SURVEILLANCE REQUIREMENTS

4.10.3.1 The THERMAL POWER shall be determined to be ≤ 5% of RATED THERMAL POWER at least once per hour during startup and PHYSICS TESTS.

4.10.3.2 Each wide range logarithmic and power level neutron flux monitoring channel shall be subjected to a CHANNEL FUNCTIONAL TEST within 12 hours prior to initiating startup or PHYSICS TESTS.

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. The RPS and ESFAS response time tables have been relocated to the Safety Analysis Report (SAR). 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.

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.

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.

The LCOs for the RPS and the ESFAS instrumentation systems require the OPERABILITY of the bypass permissive removal channels. These LCOs require the automatic bypass removal feature of all four operating bypass channels to be OPERABLE for each of the RPS and ESFAS functions with an operating bypass in the MODES addressed in the specific LCO for each function. The operating bypasses required by these LCOs are the Pressurizer Pressure - Low, the CPC (DNBR - Low and LPD - High), and the Logarithmic Power Level - High trips. All four automatic bypass removal channels must be OPERABLE to ensure that none of the four RPS and ESFAS channels are inadvertently bypassed. The automatic removal feature of the operating bypasses is required to be verified

during surveillance testing and are not required to be verified during plant maneuvering.

The bypass term in the RPS and ESFAS LCOs applies to the automatic operating bypass removal feature and not the PPS trip channel bypass feature. If the bypass enable function is failed so as to prevent entering a bypass condition, operation may continue. In the case of the Logarithmic Power Level - High trip, the absence of a bypass will limit maximum power to below the trip setpoint.

Tables 3.3-1 notation (a) and 2.2-1 notation (1) allow the Logarithmic Power Level - High trip to be manually bypassed when above 10^{-4}% logarithmic power to allow the reactor to be brought to power during a reactor startup. The operating bypass is manually initiated in all four logarithmic power channels when the plant conditions do not warrant this trip protection and the operating bypass permissive has been enabled. The bistable design ensures that the CPC trips will be automatically enabled when the Logarithmic Power Level - High trip can be manually bypassed. The Logarithmic Power Level - High trip operating bypass is automatically removed before the logarithmic power level decreases below 10^{-4}% power.

Tables 3.3-1 notation (c) and 2.2-1 notation (5) allow the CPC trips to be manually bypassed below 10^{-2}% logarithmic power. The operating bypass effectively removes the CPC trips from the RPS. This allows closure of the reactor trip circuit breakers and thus enabling the CEA operation necessary for a plant startup. The operating bypass is manually initiated in all four CPC channels when the plant conditions do not warrant this trip protection and the operating bypass permissive has been enabled. The bistable design ensures that the Logarithmic Power Level - High trip will be automatically enabled when the CPC trips can be manually bypassed. The CPC operating bypass is automatically removed before the logarithmic power level exceeds 10^{-2}% power.

The bistable for the operating bypasses for the CPC and Logarithmic Power Level - High trips is required to be set within the two decade range allowed by Table 3.3-1 notations (a) and (c) and Table 2.2-1 notations (1) and (5). These limits provide the bistable with the appropriate range to account for the bistable hysteresis and to provide margin for the applicable uncertainties. Regardless of the actual bistable setpoint within the two decade band, the single bistable design ensures that either the CPC or the Logarithmic Power Level - High trips are available to provide reactor trip protection. During testing pursuant to Special Test Exception 3.10.3, the bistable setpoint for these operating bypasses is increased to automatically remove the CPCs from bypass before the logarithmic power level exceeds 1% power.

Tables 2.2-1 notation (2), 3.3-1 notation (b), 3.3-3 notation (a), and 3.3-4 notation (1) allow the Pressurizer Pressure - Low function to be manually bypassed below 400 psia when the operating bypass permissive has been enabled. The margin between the pressurizer pressure and the setpoint is maintained ≤ 200 psia as pressurizer pressure is reduced during controlled plant cooldowns. This allows for controlled depressurization of the RCS while still maintaining an active trip setpoint until the trip is no longer needed to protect the plant. Since the Pressurizer Pressure - Low bistable is shared with RPS, SIAS, and CCAS an inadvertent actuation of these systems due to low pressurizer pressure is prevented while bypassed. The Pressurizer Pressure - Low bypass is required to be automatically removed before RCS pressure exceeds 500 psia. The difference between the 400 psia allowance for the manual bypass and 500 psia automatic bypass removal feature allows for the bistable hysteresis.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 196 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 September 17, 1998, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit 2 (ANO-2), Technical Specifications (TSs). The requested changes would resolve one technical deficiency identified by the licensee and provide clarifying statements in two general areas affecting the ANO-2 TSs. In addition, following discussions with the licensee, the staff has taken this opportunity to make a clarifying change in the use of the term "Rated Thermal Power" when referring to the high logarithmic power level trip setpoint and other power level setpoints in the source and intermediate range.

Although the editorial change clarifying the use of the term "Rated Thermal Power" was not included in the licensee's submittal, the staff finds that it is consistent with other editorial changes discussed and, therefore, did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

2.1 High Logarithmic Power Level and Core Power Calculator Trip Bypass Permissives

The first change involves the use of the high logarithmic power level and the core power calculator (CPC) trip bypass permissives associated with the design of the plant protection system (PPS). The PPS encompasses both the reactor protective system (RPS) which generates the signals required to actuate a reactor trip and the engineered safety features actuation system (ESFAS) which generates the signals required to actuate the engineered safety features (ESF) designed to mitigate the consequences of postulated accidents. Operating bypass features are used during routine reactor startup and shutdown evolutions to minimize the potential for unwanted ESF actuations or reactor trips when the specific protection is not required based on plant conditions. These operating bypasses can be manually inserted when the permissive logic is satisfied. The operating bypasses are designed to be removed automatically when plant conditions reach a point where the trip function is necessary. Per FSAR Section 7.2.2.2.2, the high logarithmic power level trip is designed to ensure protection for unplanned criticality from a shutdown condition resulting from a boron dilution or control element assembly (CEA) withdrawal events. This trip must be in effect and the manual bypass automatically removed for power levels at or below 10E-4 percent power as measured from the ex-core neutron flux monitoring system.

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This requirement is specified in TS Table 2.2-1, "Reactor Protective Instrumentation Trip Setpoint Limits," note (1) and Table 3.3-1, "Reactor Protective Instrumentation," note (a). The trip bypass permissive is satisfied for power levels above 10E-4 percent power. The CPC generated trips with bypass permissives are the low departure from nucleate boiling ratio (DNBR) trip and the high local power density (LPD) trip. Per FSAR Sections 7.2.2.2.3 and 7.2.2.2.4, these trips are provided to ensure that the core does not exceed its design fuel limits during power operations. These trips must be in effect and the manual bypass automatically removed for power levels at or above 10E-4 percent power as measured from the ex-core neutron flux monitoring system. This requirement is specified in TS Table 2.2-1, note (5) and Table 3.3-1, note (c). Therefore, the high logarithmic power level and the above mentioned CPC generated trips are required to be active at 10E-4 percent power.

The design of the PPS at ANO-2 utilizes a single bistable to control the permissives for these trips. The single bistable control of these functions ensures that CPC trip protection is automatically enabled any time that a permissive exists to bypass the high logarithmic power level trip. Likewise, the bistable function ensures that high logarithmic power level trip protection is automatically enabled any time a permissive exits to bypass the CPC generated trips. The CPC operating bypass at ANO-2 is currently removed automatically at the setpoint value of the bistable on an increasing signal. The high logarithmic power level trip operating bypass is automatically removed at the reset value of the bistable on a decreasing signal. The reset value of the bistable is below its setpoint value by the deadband characteristic of the bistable. This design makes it physically impossible to comply with both TS notes simultaneously because both functions can not be physically set at 10E-4 percent power. Historically, ANO-2 has established the bistable setpoint at a value that automatically removes the CPC bypass before exceeding 10E-4 percent power during startup. This results in the bypass for the high logarithmic power level trip not being automatically removed until power decreases to the reset value of the bistable which is slightly less than 10E-4 percent power. The proposed change would be to establish a range between 10E-4 and 10E-2 percent power for the automatic removal of the bypass for the high logarithmic power level trip and the CPC generated trips in order to permit future TS compliance. The TS requirement will be such that the CPC generated trips will automatically come out of bypass before power exceeds 10E-2 percent power. The CPC generated trips will be allowed to be manually bypassed below 10E-2 percent power. The requirements for the high logarithmic power level trip will continue to be required to automatically come out of bypass before power decreases below 10E-4 percent power and will continue to allow manual bypassed above 10E-4 percent power. This change effects TS Table 2.2-1, notes (1) and (5); Table 3.3-1, notes (a) and (c); Bases 2.2.1; and Bases 3/4.3.

The proposed change does not alter the existing requirements for the high logarithmic power level trip. The high logarithmic power level trip is credited in providing protection in the event of an uncontrolled boron dilution incident or an uncontrolled CEA withdrawl from subcritical conditions. The trip setpoint is 0.75 percent power. The manual initiation of the high logarithmic power level trip operating bypass only occurs during a controlled power increase and thus these trips would not be bypassed if the power increase was due to an inadvertent reactivity addition. In addition, since there is only a short period of time between the bypass permissive and the high logarithmic power trip, it is assumed in the analysis that this trip remains active and is not bypassed. The proposed change does not impact the analysis assumptions, the trip setpoint, or the range over which this trip is required. Since the bypass permissive feature for this trip is linked to the setpoint for automatic removal of the CPC generated trip operating bypasses via the bistable design

feature, the proposed change may result in the setting of the bypass permissive for the high logarithmic power trip at a higher power level. This condition is conservative in nature and will not prevent the trip from performing its design function.

The proposed change does impact the point at which the operating bypass for the CPC generated trips must be automatically removed. The proposed change would raise the power level for this requirement from 10E-4 percent power to 10E-2 percent power. The CEA bank withdrawl event from hot zero power (HZP) critical conditions was analyzed for ANO-2 with the reactor initially assumed to be critical at a power level of 10E-4 percent power. This value was chosen as the lowest power level for which the high logarithmic power level trip can be manually bypassed maximizing the amount of positive reactivity inserted prior to the initiation of a reactor trip. The analysis demonstrated that the CEA bank continues to withdrawl until the CPC variable overprower trip (VOPT) provides a trip function at 30 percent power. Neither the low DNBR trip or the high LPD trip are credited for this event. Therefore, the change to 10E-2 percent power for the automatic removal of operating bypasses for the CPC generated trips does not impact the existing analysis. Thus, the low DNBR trip and high LPD trip will be automatically enabled with an initial power level allowing sufficient response time such that these trips can perform their design function for all credited anticipated operation occurrences and accident conditions.

The single bistable control of these functions ensures that CPC generated trip bypass is automatically removed any time that a permissive exists to bypass the high logarithmic power level trip. Likewise, the bistable function ensures that high logarithmic power level trip protection is automatically enabled any time a permissive exits to bypass the CPC generated trips. This design feature provides positive control to ensure that one of the two trip functions is in effect over the entire range of power such that at no point can both the high logarithmic power level trip and the CPC generated trips be simultaneously bypassed. Therefore, the staff finds the proposed change to be acceptable.

2.2 Low Pressurizer Pressure Trip Bypass Permissive

The second change was a clarification for the wording of the setpoint for the automatic removal of the bypass permissive for the low pressurizer pressure trip. This change affects TS Table 2.2-1, "Reactor Protective Instrumentation Trip Setpoint Limits," note (2); Table 3.3-1, "Reactor Protective Instrumentation," note (b); Table 3.3-3, "Engineered Safety Feature Actuation System Instrumentation," note (a); Table 3.3-4, "Engineered Safety Feature Actuation System Instrumentation Trip Values," note (1); and Bases 3/4.3. This clarification was made to promote consistency for the table notes with respect to other changes authorized by this amendment. This changes is editorial in nature and does not impact the limitation of the TSs. Therefore, the staff concludes that the licensee's proposal is acceptable.

2.3 Special Test Exceptions

The third change will add TS Table 2.2-1 to the discussion of TS 3.10.3, "Special Test Exceptions - Reactor Coolant Loops," which allows the suspension of certain requirements during the performance of startup and physics testing. TS Table 3.3-1 is already discussed by TS 3.10.3. The addition of TS Table 2.2-1 to the discussion of TS 3.10.3 corrects an omission that occurred in the original issuance of TS 3.10.3. This change does not impose any new requirements nor relax existing restrictions. This change is an editorial clarification intended to eliminate confusion

that could be created by suspending the application of TS Table 3.3-1 without simultaneously including TS Table 2.2-1 during startup and physics testing. Therefore, the staff concludes that the licensee's proposal is acceptable.

2.4 Clarification Regarding The Definition Of Rate Thermal Power

In addition, following discussions with the licensee, the staff has taken this opportunity to make a clarifying change in the use of the term "Rated Thermal Power" when referring to the high logarithmic power level trip setpoint and other power level setpoints in the source and intermediate range. The term "Rated Thermal Power" will be replaced with the term "Power" for these cases. The following areas of the TSs are effected: TS Table 2.2-1, "Reactor Protective Instrumentation Trip Setpoint Limits," item 1, notes (1) and (5); TS Table 3.3-1, "Reactor Protective Instrumentation," notes (a) and (c); and Bases 2.2.1. Per TS definition 1.3, Rated Thermal Power is described as the total reactor core heat transfer rate to the reactor coolant of 2815 MWt. Thus, rated thermal power is a composite term that describes the combined effect of fission power and decay heat as compared to the licensed thermal power for the reactor coolant system. The decay heat component of rated thermal power results in an erroneous application of this term to power levels in the source and intermediate range follow initial plant startup. Per FSAR Section 7.2.2.2, the ex-core neutron flux monitoring system which monitors neutron flux rather then the combination of neutron flux and decay heat is provided as an input value for the high logarithmic power level trip and the CPC generated trips. Therefore, a clarification was made to replace "Rated Thermal Power" with "Power" to eliminate the potential for confusion. The staff has taken this opportunity to implement this clarification based on the experience with other plants (e.g., San Onofre Nuclear Generating Station, Unit 2 and Waterford Steam Electric Station, Unit 3) which have required this change on an emergency basis. This change is considered to be an appropriate clarification. Therefore, the staff concludes that this change is 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 comment.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 change surveillance requirements. The Nuclear Regulatory Commission staff has determined that the amendments involve 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 amendments involve no significant hazards consideration and there has been no public comment on such finding (63 FR 56247). Accordingly, the amendments meet 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 amendments.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Chris Nolan

Date: December 31, 1998