March 11, 1988

Docket No. 50-368

Mr. T. Gene Campbell
Vice President, Nuclear
Operations
Arkansas Power and Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Dear Mr. Campbell:

SUBJECT: ISSUANCE OF AMENDMENT NO. 82 TO FACILITY OPERATING LICENSE NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NOS. 66521 AND 66556)

The Commission has issued the enclosed Amendment No. 82 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 (TSs) in response to your applications dated October 28, 1987 (2CAN108704 and 2CAN108705) and supplemented by letter dated January 19, 1988 (2CAN018801).

The amendment approves changes in the boron concentration in the refueling tank, safety injection tanks, and boric acid makeup tank. The changes provide safety and operational enhancements specifically suited to the use of extended cycle cores.

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

Sincerely,

/s/

George F. Dick, Jr., Project Manager
Project Directorate - IV
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 82 to NPF-6
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosures:
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Docket File	JPartlow	PNoonan (3)	ACRS (10)
NRC PDR	TBarnhart (4)	GDick	GPA/PA
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PD4 Reading	EButcher	OGC-Rockville	DHagan
EJordan	Plant File	C. Harbuck	

PD4/LA	PD4/PM	OGC-Rockville	PD4/D
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PNoonan	GDick:	SETurk	JCalvo
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4815 West Markham Street
Little Rock, Arkansas 72201

Honorable William Abernathy
County Judge of Pope County
Pope County Courthouse
Russelville, Arkansas 72801

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

ARKANSAS POWER AND LIGHT COMPANY

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 82
License No. NPF-6

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

   A. The applications for amendment by Arkansas Power and Light Company (the licensee) dated October 28, 1987 and supplemented by letter dated January 19, 1988, comply 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, as amended, 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. NPF-6 is hereby amended to read as follows:

   2. <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 82 , 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

Jose A. Calvo

Jose A. Calvo, Director
Project Directorate - IV
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: March 11, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 82

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.

REMOVE PAGES	INSERT PAGES
3/4 1-1	3/4 1-1
3/4 1-3	3/4 1-3
3/4 1-7	3/4 1-7
3/4 1-8	3/4 1-8
-	3/4 1-8a
3/4 1-12	3/4 1-12
3/4 1-13	3/4 1-13
3/4 1-14	3/4 1-14
3/4 1-15	3/4 1-15
3/4 1-16	3/4 1-16
3/4 5-1	3/4 5-1
3/4 5-7	3/4 5-7
3/4 9-1	3/4 9-1
3/4 10-1	3/4 10-1
B 3/4 1-2	B 3/4 1-2
B 3/4 1-3	B 3/4 1-3
B 3/4 5-1	B 3/4 5-1
B 3/4 5-2	B 3/4 5-2
B 3/4 6-3	B 3/4 6-3

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg}>200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be ≧ 5.5% Δk/k.

APPLICABILITY: MODES 1, 2*, 3 and 4.

ACTION:

With the SHUTDOWN MARGIN <5.5% Δk/k, immediately initiate and continue boration at ≧40 gpm of 2500 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be ≧5.5% Δk/k.

a. Within one hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable or untrippable, the above required SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2##, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the CEA groups at the Transient Insertion Limits of Specification 3.1.3.6.

* See Special Test Exception 3.10.1.

\# With $K_{eff} \geq 1.0$.

\## With $K_{eff} < 1.0$.

SHUTDOWN MARGIN - T_{avg} ≤200°F

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be ≥5.0 Δk/k.

APPLICABILITY: MODE 5

ACTION:

With the SHUTDOWN MARGIN <5.0% Δk/k, immediately initiate and continue boration at ≥40 gpm of 2500 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be ≥5.0% Δk/k:

a. Within one hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable or untrippable, the above required SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the immovable or untrippable CEA(s).

b. At least once per 24 hours by consideration of at least the following factors:

1. Reactor coolant system boron concentration,
2. CEA position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid makeup tank via either a boric acid makeup pump or a gravity feed connection and charging pump to the Reactor Coolant System if only the boric acid makeup tank in Specification 3.1.2.7a is OPERABLE, or

b. The flow path from the refueling water tank via either a charging pump or a high pressure safety injection pump to the Reactor Coolant System if only the refueling water tank in Specification 3.1.2.7b is OPERABLE.

APPLICABILITY: MODES 5 and 6

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one injection path is restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that the temperature of the flow path from the discharge of the boric acid makeup tank to the suction of the charging pump is above 55°F when a flow path from the boric acid makeup tanks is used.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 The following boron injection flow paths shall be OPERABLE, depending on the volume available in the boric acid makeup tanks.

a. If the contents of ONE boric acid makeup tank meet the volume requirements of Figure 3.1-1, two of the following three flow paths to the Reactor Coolant System shall be OPERABLE:

1. One flow path from the appropriate boric acid makeup tank via a boric acid makeup pump and a charging pump.
2. One flow path from the appropriate boric acid makeup tank via a gravity feed connection and a charging pump.
3. One flow path from the refueling water tank via a charging pump.

OR

b. If the contents of BOTH boric acid makeup tanks are needed to meet the volume requirements of Figure 3.1-1, four of the following five flow paths to the Reactor Coolant System shall be OPERABLE:

1. One flow path from boric acid makeup tank A via a boric acid makeup pump and a charging pump.
2. One flow path from boric acid makeup tank B via a boric acid makeup pump and a charging pump.
3. One flow path from boric acid makeup tank A via a gravity feed connection and a charging pump.
4. One flow path from boric acid makeup tank B via a gravity feed connection and a charging pump.
5. One flow path from the refueling water tank via a charging pump.

APPLICABILITY: MODES 1, 2, 3 and 4

ACTION:

With any of the boron injection flow paths to the Reactor Coolant System required in a or b above inoperable, restore the inoperable flow path to the Reactor Coolant System to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 5% $\Delta k/k$ at 200°F within the next 6 hours; restore the flow paths to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 The above required flow paths shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that the temperature of the flow path from the discharge of the boric acid makeup tank(s) to the suction of the charging pumps is above 55°F.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

c. At least once per 18 months during shutdown by verifying that each actuated valve in the flow path actuates to its correct position on a SIAS test signal.

BORIC ACID MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 At least the boric acid makeup pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2 shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if the flow path through the boric acid makeup pump(s) in Specification 3.1.2.2 is OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTION:

With one boric acid makeup pump required for the boron injection flow path(s) pursuant to Specification 3.1.2.2 inoperable, restore the boric acid makeup pump to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 5% $\Delta k/k$ at 200°F; restore the above required boric acid pump(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.7 As a minimum, one of the following borated water sources shall be OPERABLE:

a. One boric acid makeup tank with:

1. A minimum contained borated water volume of 3,400 gallons (equivalent to 31% of indicated tank level),
2. A boric acid concentration between 2.5 WT% and 3.5 WT%, and
3. A minimum solution temperature of 55°F.

b. The refueling water tank with:

1. A minimum contained borated water volume of 61,370 gallons (equivalent to 7.5% of indicated tank level),
2. A minimum boron concentration of 2500 ppm, and
3. A minimum solution temperature of 40°F.

APPLICABILITY: MODES 5 and 6

ACTION:

With no borated water sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one borated water source is restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.1.2.7 The above required borated water sources shall be demonstrated OPERABLE:

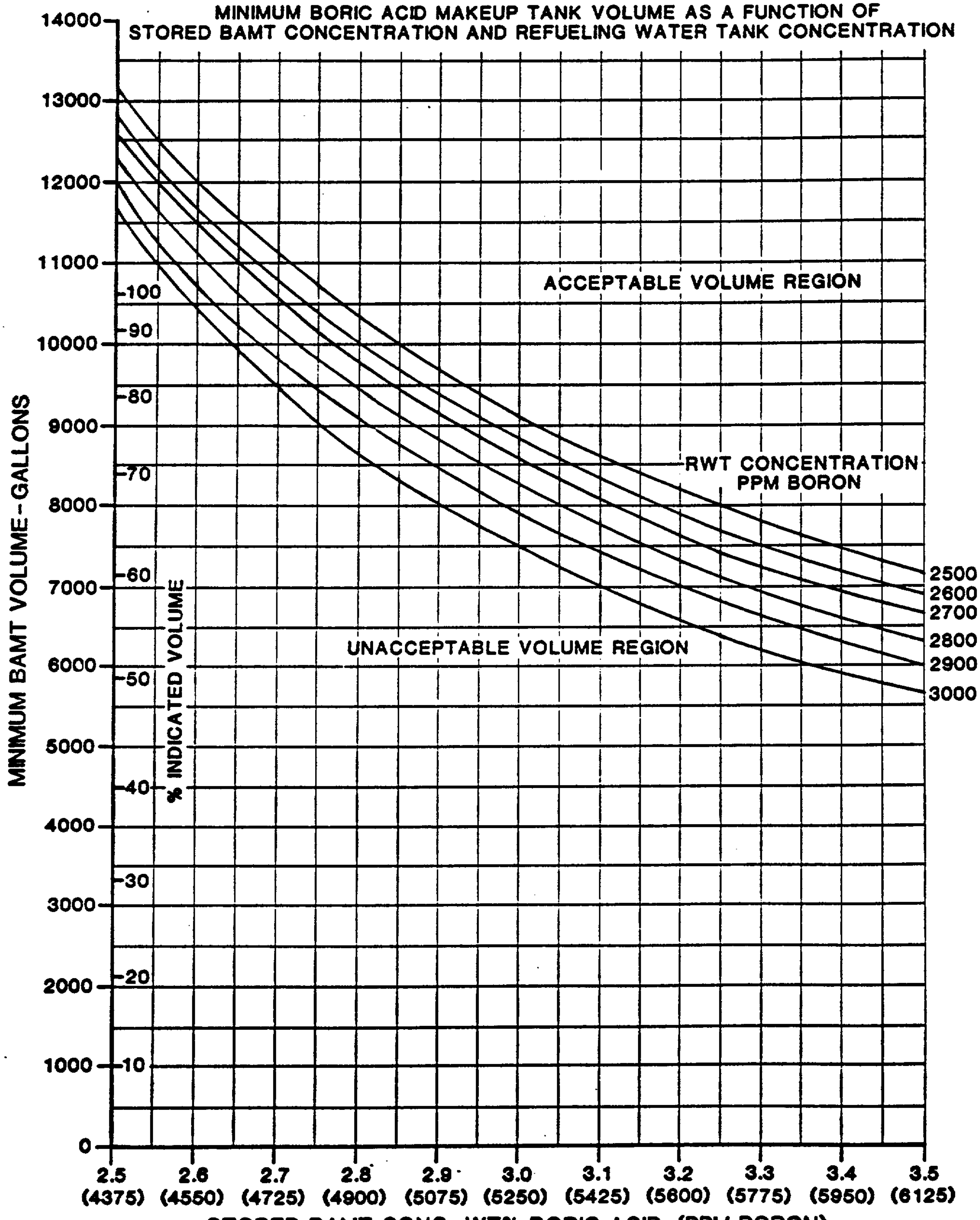
a. At least once per 7 days by:

1. Verifying the boron concentration of the water,
2. Verifying the contained borated water volume of the tank, and
3. Verifying the boric acid makeup tank solution temperature is greater than 55°F.

b. At least once per 24 hours by verifying the RWT temperature when it is the source of borated water and the outside air temperature is < 40°F.

FIGURE 3.1-1

MINIMUM BORIC ACID MAKEUP TANK VOLUME AS A FUNCTION OF STORED BAMT CONCENTRATION AND REFUELING WATER TANK CONCENTRATION



BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 Each of the following borated water sources shall be OPERABLE:

a. At least one of the following sources with a minimum solution temperature of 55°F:

   1. One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, or

   2. Two boric makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, and

b. The refueling water tank with:

   1. A contained borated water volume of between 464,900 and 500,500 gallons (equivalent to an indicated tank level of between 91.7% and 100%, respectively),

   2. Between 2500 and 3000 ppm of boron,

   3. A minimum solution temperature of 40°F, and

   4. A maximum solution temperature of 110°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the above required boric acid makeup tank(s) inoperable, restore the make up tank(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 5.0% $\Delta k/k$ at 200°F; restore the above required boric acid makeup tank(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each of the above required borated water sources shall be demonstrated OPERABLE:

SURVEILLANCE REQUIREMENTS (Continued)

a. At least one per 7 days by:

1. Verifying the boron concentration in each water source,

2. Verifying the contained borated water volume in each water source, and

3. Verifying the boric acid makeup tank(s) solution temperature is greater than 55°F.

b. At least once per 24 hours by verifying the RWT temperature.

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

3.5.1 Each reactor coolant system safety injection tank shall be OPERABLE with:

a. The isolation valve open,

b. A contained borated water volume of between 1413 and 1539 cubic feet (equivalent to an indicated level between 80.1% and 87.9%, respectively),

c. Between 2500 and 3000 ppm of boron, and

d. A nitrogen cover-pressure of between 600 and 624 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

a. With one safety injection tank inoperable, except as a result of a closed isolation valve, restore the inoperable tank to OPERABLE status within one hour or be in HOT SHUTDOWN within the next 12 hours.

b. With one safety injection tank inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1. Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and

2. Verifying that each safety injection tank isolation valve (2CV-5003, 2CV-5023, 2CV-5043 and 2CV-5063) is open.

*With pressurizer pressure $\geq$ 700 psia.

EMERGENCY CORE COOLING SYSTEMS

REFUELING WATER TANK

LIMITING CONDITION FOR OPERATION

3.5.4 The refueling water tank shall be OPERABLE with:

a. A contained borated water volume of between 464,900 and 500,500 gallons (equivalent to an indicated level between 91.7% and 100%, respectively),

b. Between 2500 and 3000 ppm of boron,

c. A minimum solution temperature of 40°F, and

d. A maximum solution temperature of 110°F

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the refueling water tank inoperable, restore tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The RWT shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the tank, and

2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the RWT temperature.

3/4.9 REFUELING OPERATIONS

BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 With the reactor vessel head unbolted or removed, the boron concentration of the reactor coolant and the refueling canal shall be maintained uniform and sufficient to ensure that the more restrictive of following reactivity conditions is met:

a. Either a K_{eff} of 0.95 or less, which includes a 1% $\Delta k/k$ conservative allowance for uncertainties, or

b. A boron concentration of $\geq$ 2500 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6*.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at $\geq$ 40 gpm until K_{eff} is reduced to $\leq$ 0.95 or the boron concentration is restored to $\geq$ 2500 ppm, whichever is the more restrictive. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.1.1 The more restrictive of the above two reactivity conditions shall be determined prior to:

a. Removing or unbolting the reactor vessel head, and

b. Withdrawal of any full length CEA in excess of 3 feet from its fully inserted position within the reactor pressure vessel.

4.9.1.2 The boron concentration of the reactor coolant and the refueling canal shall be determined by chemical analysis at least once per 72 hours.

*The reactor shall be maintained in MODE 6 when the reactor vessel head is unbolted or removed.

3/4.10 SPECIAL TEST EXCEPTIONS

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 may be suspended for measurement of CEA worth and shutdown margin provided reactivity equivalent to at least the highest estimated CEA worth is available for trip insertion from OPERABLE CEA(s).

APPLICABILITY: MODE 2.

ACTION:

a. With any full length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at ≧ 40 gpm of 2500 ppm boric acid solution or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length CEAs inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at ≧ 40 gpm of 2500 ppm boric acid solution or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each CEA not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 7 days prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 525°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operations. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid makeup pumps, and 5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of these systems is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 5.0% $\Delta k/k$ after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid makeup tanks in the allowable concentrations and volumes of Specification 3.1.2.8 and a small fraction of the borated water from the refueling water tank required in Specification 3.1.2.8.

The requirement in Technical Specification 3.1.2.8 for a minimum contained volume of 464,900 gallons of 2500-3000 ppm borated water in the refueling water tank ensures the capability for borating the RCS to the desired concentration. The value listed is consistent with the plant ECCS requirements.

With the RCS temperature below 200°F, one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 5% ΔK/K SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires either borated water from the refueling water tank or boric acid solution from the boric acid makeup tank(s) in accordance with the requirements of Specification 3.1.2.7.

The contained water volume limits includes allowance for water not available because of discharge line location and other physical characteristics. The 61,370 gallon limit for the refueling water tank is based upon having an indicated level in the tank of at least 7.5%.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in MODE 6.

The limits on contained water volume and boron concentration of the RWT also ensure a pH value of between 8.8 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of CEA misalignments are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original design criteria are met.

The ACTION statements applicable to a stuck or untripable CEA, to two or more inoperable CEAs, and to a large misalignment (≥ 19 inches) of two or more CEAs, require a prompt shutdown of the reactor since any of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of a stuck or untripable CEA, the loss of SHUTDOWN MARGIN.

For small misalignments (< 19 inches) of the CEAs, there is 1) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, 2) a small effect on the available SHUTDOWN MARGIN, and 3) a small effect on the ejected CEA worth used in the safety analysis. Therefore the ACTION

3/4.5.1 SAFETY INJECTION TANKS

The OPERABILITY of each of the RCS safety injection tanks ensures that a sufficient volume of borated water will be immediately forced into the reactor core through each of the cold legs in the event the RCS pressure falls below the pressure of the safety injection tanks. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

The limits on safety injection tank volume, and pressure ensure that the assumptions used for safety injection tank injection in the accident analysis are met.

The limits on safety injection tank boron concentration are conservatively set to be consistent with the refueling water tank (RWT) concentration. The upper limit supports the analysis for boron precipitation and minimum pH of the post LOCA containment solution. The lower limit is consistent with the RWT value for operational convenience. The accident analysis assumes a lower value of 2000 ppm boron.

The safety injection tank power operated isolation valves are considered to be "operating bypasses" in the context of IEEE Std. 279-1971, which requires that bypasses of a protective function be removed automatically whenever permissive conditions are not met. In addition, as these safety injection tank isolation valves fail to meet single failure criteria, removal of power to the valves is required.

The limits for operation with a safety injection tank inoperable for any reason except an isolation valve closed minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional safety injection tank which may result in unacceptable peak cladding temperatures. If a closed isolation valve cannot be immediately opened, the full capability of one safety injection tank is not available and prompt action is required to place the reactor in a mode where this capability is not required.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABLILTY of two separate and independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the safety injection tanks is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. In addition, each ECCS subsystem provides long term core cooling capability in the recirculation mode during the accident recovery period.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the accident analyses are met and that subsystem OPERABILITY is maintained. Surveillance requirements of throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

3/4.5.4 REFUELING WATER TANK (RWT)

The OPERABILITY of the RWT as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS and CSS in the event of a LOCA. The limits on RWT minimum volume and boron concentration ensure that 1) sufficient water is available within containment to permit recirculation cooling flow to the core, and (2) the reactor will remain subcritical in the cold condition following mixing of the RWT and the RCS water volumes with all control rods inserted except for the most reactive control assembly. These assumptions are consistent with the LOCA analyses.

The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.

The limits on contained water volume and boron concentration of the RWT also ensure a pH value of between 8.8 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

3/4.6.2.1 CONTAINMENT SPRAY SYSTEM

The OPERABILITY of the containment spray system ensures that containment depressurization and cooling capability will be available in the event of a LOCA. The pressure reduction and resultant lower containment leakage rate are consistent with the assumptions used in the accident analyses.

The containment spray system and the containment cooling system are redundant to each other in providing post accident cooling of the containment atmosphere. However, the containment spray system also provides a mechanism for removing iodine from the containment atmosphere and therefore the time requirements for restoring an inoperable spray system to OPERABLE status have been maintained consistent with that assigned other inoperable ESF equipment.

3/4.6.2.2 SODIUM HYDROXIDE ADDITION SYSTEM

The OPERABILITY of the sodium hydroxide addition system ensures that sufficient NaOH is added to the containment spray in the event of a LOCA. The limits on NaOH volume and concentration ensure a pH value of between 8.8 and 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components. The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics. These assumptions are consistent with the iodine removal efficiency assumed in the accident analyses.

3/4.6.2.3 CONTAINMENT COOLING SYSTEM

The OPERABILITY of the containment cooling system ensures that 1) the containment air temperature will be maintained within limits during normal operation, and 2) adequate heat removal capacity is available when operated in conjunction with the containment spray systems during post-LOCA conditions.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 82 TO

FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letters dated October 28, 1987 (2CAN108704 and 2CAN108705), Arkansas Power and Light Company (AP&L or the licensee) requested amendments to the Technical Specifications (TSs) appended to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2). The proposed amendments would change the boron concentration in certain tanks. Specifically the licensee requested approval to increase the refueling water concentration (from between 1731 ppm and 2250 ppm to between 2500 and 3,000 ppm), and the corresponding concentrations in the refueling water tank (RWT) and the safety injection tanks (SITs). Concurrently, the licensee requested approval to decrease the boron concentration in the Boric Acid Makeup Tank (BAMT) from between 5 wt% and 12 wt% to between 2.5 wt% and 3.5 wt%. Supplemental information on the boron dilution event was provided with licensee letter of January 19, 1988 (2CAN018801).

2.0 EVALUATION

2.1 Increased Boron Concentration in RWT and SIT

The licensee has evaluated the impact of increasing the minimum refueling water boron concentration and the boron concentration in the RWT and the SIT on the Safety Analysis Report (SAR) Chapter 15 events as well as on long term boric acid buildup calculations and post-LCOA containment pH values reported in SAR Chapter 6. In particular, the effect of an increase in RWT and SIT boron concentration on the boron dilution event was evaluated since this event could be the one most adversely affected by the increase. The effects on the steam line break and steam generator tube rupture events were also evaluated.

The results of the boron dilution event reanalyses verified that the calculated time from an alarm to the loss of shutdown margin for a boron dilution event initiated from Modes 3, 4, 5, or 6 satisfy the respective acceptance criteria of SRP 15.4.6. Since a boron dilution event during power operation (Modes 1 and 2) would cause the reactor to be rapidly shutdown by the reactor protection system, a Mode 1 and 2 reanalysis was not performed. The staff concludes that the results of any postulated boron dilution event occurring with the proposed increase in RWT and SIT boron concentration are acceptable.

Since the steam line break event is partially mitigated by the addition of borated water from the high pressure safety injection pumps and the SIT to the reactor coolant system, the proposed increased boron concentration will enhance the mitigation of the reactivity increase portion of this event. Therefore, since the proposed boron concentration increase would essentially increase the margin of safety for the steam line break event, the staff finds the proposed changes acceptable with respect to postulated steam line break events.

For the steam generator tube rupture event, the high pressure injection pumps inject borated water from the RWT into the reactor coolant system. Because the reactor will be scrammed, the increase in RWT and SIT boron concentration increases the shutdown margin and, therefore, makes the proposed changes acceptable with respect to a postulated steam generator tube rupture event.

2.2 Reduced Boron Concentration in the BAMT

The licensee has evaluated the impact of reducing the BAMT boron concentration on the ability to maintain required shutdown margins during a cooldown without letdown, the long term boric acid buildup, and the post-LOCA containment pH value. Safety Analysis Report (SAR) Chapter 15 transients and accidents were not reevaluated since addition of borated water from the BAMTs to the reactor coolant system for reactivity control were not credited in any of these events.

The original cooldown without letdown analysis assumed that all the boron necessary to achieve the required shutdown margin during the cooldown was provided by the BAMT during the initial stages of the event. The reanalysis also credits the boron contribution of the refueling water tank (RWT) thereby allowing the total boron inventory of the BAMTs to be reduced. Since the new analysis includes a detailed evaluation of shutdown margin requirements, which are satisfied throughout the event, the staff finds the crediting of both the BAMT and the RWT borated water sources acceptable.

Since the proposed revision would allow the boron concentration in the BAMTs to be as low as 2.5 weight percent, the minimum BAMT volume of approximately 13,150 gallons required by TS Figure 3.1-1 as a function of BAMT and RWT concentration would not be met with only one BAMT. Therefore, the proposed revision would provide an option for combining the contents of both BAMTs at low concentrations. When both BAMTs are required, two independent flow paths from each tank must be operable. This has been incorporated into the proposed Technical Specifications and the staff finds this acceptable.

Chemical analyses have shown that a 3.5 weight percent solution of boric acid will not precipitate at solution tempertures above 50°F. Since the revised minimum flow path temperture would be 55°F, the staff considers the 5°F margin over the maximum precipitation temperature to be sufficient to permit the proposed elimination of heat tracing operability requirements.

2.3 Combined Effect of all changes in the Boron Concentrations

The effect of the proposed changes on the long term boric acid buildup calculations previously reported in Chapter 6 of the SAR have been evaluated by the licensee. Since the change involves decreasing the boron concentration in the BAMT, the potential for boric acid precipitation during long term ECCS operation will be likewise reduced. However, the increase the boron concentration in the RWT and the SIT essentially offsets the BAMT inventory reduction with respect to post LOCA reactor coolant system boron concentration. Consequently there is no change in the potential for boric acid precipitation and no impact on the time requirement for initiation of the core flush flow.

The effects of the proposed changes on the post LOCA containment pH value calculations reported in SAR Chapter 6 have also been evaluated by the licensee. The result of a decrease in the BAMT boron concentration and an increase in the RWT and SIT boron concentration is a slight reduction in the calculated spray and sump pH values. The maximum spray pH of 11.0 remains bounding while the minimum equilibrium sump value of 8.9 decreases to 8.8. Since the original decontamination factors for iodine remain valid with the reduced pH value, the change has no significant impact on iodine removal capabilities. Also, since the solution is still basic, there is no significant impact on containment corrosion characteristics.

3.0 SUMMARY

Based on the above evaluation, the staff concludes that the proposed changes in the refueling water boron concentration and the corresponding concentration changes in the RWT, SIT and the BAMTs are acceptable.

Further, the elimination of heat tracing operability requirements associated with the change in the BAMT boron concentration is also acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The NRC staff has considered the environmental impact of the proposed changes to the TS. An "Environmental Assessment and Finding of No Significant Impact was published in the Federal Register on March 7, 1988 (53 FR 7268).

5.0 CONCLUSION

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

Date: March 11, 1988

Principal Contributors: L. Kopp

UNITED STATES NUCLEAR REGULATORY COMMISSION

ARKANSAS POWER AND LIGHT COMPANY

DOCKET NO. 50-368

NOTICE OF ISSUANCE OF AMENDMENT TO

FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 82 to Facility Operating License No. NPF-6, to Arkansas Power and Light Company, which revised the Technical Specifications for operation of the Arkansas Nuclear One, Unit No. 2, located in Pope County, Arkansas. The amendment was effective as of the date of its issuance.

The amendment approves changes in the boron concentration in the refueling tank, safety injection tanks, and boric acid makeup tank. The changes provide safety and operational enhancements specifically suited to the use of extended cycle cores.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

Notice of Consideration of Amendment and Opportunity for Prior Hearing in connection with this action was published in the FEDERAL REGISTER on December 21, 1987 (52 FR 48348). No request for a hearing or petition for leave to intervene was filed following this notice.

The Commission has prepared an Environmental Assessment and Finding of No Significant Impact related to the action and has concluded that an environmental impact statement is not warranted because there will be no environmental impact attributed to the action beyond that which has been predicted and described in the Commission's Final Environmental Statement for the facility dated June 1977.

For further details with respect to this action, see (1) the applications for amendment dated October 28, 1987, as supplemented by letter dated January 19, 1988, (2) Amendment No. 82 to Facility Operating License No. NPF-6, and (3) the Environmental Assessment and Finding of No Significant Impact (53 FR 7268). All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Tomlinson Library, Arkansas Technical University, Russelville, Arkansas 72801. A copy of items (2) and (3) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Reactor Projects - III, IV, V and Special Projects.

Dated at Rockville, Maryland, this 11th day of March, 1988.

FOR THE NUCLEAR REGULATORY COMMISSION

George F. Dick

George F. Dick, Project Manager
Project Directorate - IV
Division of Reactor Projects - III, IV, V and Special Projects
Office of Nuclear Reactor Regulation

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