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

JUN 19 1979

The Honorable W. Henderson Moore
United States House of Representatives
Washington, D. C. 20515

Dear Congressman Moore:

This is in response to your letter of May 21, 1979, in which you desired to know if the Nuclear Regulatory Commission (NRC) was considering shutting down all nuclear power plants with Babcock & Wilcox (B&W) reactors. Additionally, if this was being considered, you requested to know the reasoning behind it. Your letter also enclosed a telegram from Mr. J. M. Mooney of Louisiana Power & Light Company, which contained information relating to the impact on the Middle South Utilities System of a shutdown of Arkansas Nuclear One (ANO-1).

In the course of our evaluation to date of the accident at the Three Mile Island Unit No. 2 (TMI-2) facility, which utilitizes a B&W designed pressurized water reactor, the NRC staff has ascertained that B&W designed reactors appear to be unusually sensitive to certain transient conditions originating in the secondary system. The sensitivity of the design places a large burden on the plant operators in the event of such a transient. This is especially important since the preliminary review of the TMI-2 accident chronology has identified several human errors that occurred during the accident which contributed significantly to its severity.

All holders of operating licenses were subsequently instructed to take a number of immediate actions to avoid repetition of these errors. In addition, the NRC staff began an immediate reevaluation of the design features of B&W reactors to determine whether additional safety corrections or improvements were necessary with respect to these reactors. As a result of this reevaluation, a series of actions, both immediate and long term, were identified for all operating facilities using B&W designed reactors. ANO-1, operated by Arkansas Power & Light Company (AP&L), is one of the operating facilities affected by these required actions. AP&L agreed, in a letter dated May 11, 1979, to perform the required actions. At the time ANO-1 was shutdown. AP&L agreed to remain shutdown until all required actions were completed. The Commission issued a confirmatory Order on May 17, 1979, which required the licensee to maintain ANO-1 in a shutdown condition until all requirements were satisfactorily completed and found acceptable to the NRC staff. Enclosure 1 is a copy of the May 17 Order. This Order specifies the actions required by AP&L before the Order would be lifted.

On May 31, 1979, the NRC staff completed its review of the actions taken by AP&L in response to the May 17 Order and found them to be acceptable. A Notice of Authorization to Resume Operation was issued to AP&L on May 31, 1979. Enclosure 2 is a copy of the letter from the NRC to AP&L forwarding the Notice and the NRC staff's evaluation of the licensee's compliance with the May 17 Order.

In the course of ANO-1's authorized return to power from a cold shutdown condition, an NRC inspector observed a potentially unsafe plant condition resulting from the use of an established but apparently deficient procedure for a routine surveillance test of the check valves in the main feedwater system. The procedure was deficient because it did not specify that operators would bypass the emergency feedwater system (EFS) during the test and then return the system to normal following the test. The plant staff bypassed the controls that automatically start the EFS by placing the control switches in a position that would not allow for the automatic initiation of emergency feedwater. By taking such an action and lacking a procedural requirement to return these switches to normal, there was no assurance that emergency feedwater would be provided automatically, if needed, later during power operation. In view of these circumstances, an Order was issued on June 2, 1979 for AP&L to proceed to place ANO-1 in cold shutdown and not restart until the Acting Director, Office of Inspection and Enforcement, has confirmed in writing that the following actions have been completed by AP&L and found acceptable to the NRC staff: (1) evaluate and modify as appropriate its methods for the development, review and approval of procedures for all modes of plant operation; (2) evaluate existing procedures to assure that such procedures include all actions necessary for safety; and (3) take appropriate steps to assure that all plant personnel adhere to approved procedures and do not add unauthorized steps to any procedures. An NRC task force was sent to ANO-1 on June 4, 1979 to evaluate the licensee's compliance with the June 2 Order. A copy of this order is included as Enclosure 3 to this letter.

The NRC certainly views the impacts outlined in your enclosed telegram as serious; however, the NRC believes this action is required in order to assure continued protection to public health and safety.

If you desire further information on this matter, please let us know.

Sincerely,
(Signed) Lee V. Gossick

Lee V. Gossick
Executive Director
for Operations

Enclosures:
As stated

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
ARKANSAS POWER & LIGHT COMPANY	)	Docket No. 50-313
	)	
ARKANSAS NUCLEAR ONE, UNIT 1	)	

ORDER

I.

The Arkansas Power & Light Company (the licensee or AP&L) is the holder of Facility Operating License No. DPR-51 which authorizes the operation of the nuclear power reactor known as the Arkansas Nuclear One, Unit 1 (the facility or ANO-1), at steady state power levels not in excess of 2568 megawatts thermal (rated power). The facility is a Babcock & Wilcox (B&W) designed pressurized water reactor (PWR) located at the licensee's site in Pope County, Arkansas.

II.

In the course of its evaluation to date of the accident at the Three Mile Island Unit No. 2 facility, which utilizes a B&W designed PWR, the Nuclear Regulatory Commission staff has ascertained that B&W designed reactors appear to be unusually sensitive to certain off-normal transient conditions originating in the secondary system. The features of the [illegible] contribute to this sensitivity are: (1) design of the steam generators to operate with relatively small liquid volumes in the

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secondary side; (2) the lack of direct initiation of reactor trip upon the occurrence of off-normal conditions in the feedwater system; (3) reliance on an integrated control system (ICS) to automatically regulate feedwater flow; (4) actuation before reactor trip of a pilot-operated relief valve on the primary system pressurizer (which, if the valve sticks open, can aggravate the event); and (5) a low steam generator elevation (relative to the reactor vessel) which provides a smaller driving head for natural circulation.

Because of these features, B&W designed reactors place more reliance on the reliability and performance characteristics of the auxiliary feedwater system, the integrated control system, and the emergency core cooling system (ECCS) performance to recover from frequent anticipated transients, such as loss of offsite power and loss of normal feedwater, than do other PWR designs. This, in turn, places a large burden on the plant operators in the event of off-normal system behavior during such anticipated transients.

As a result of a preliminary review of the Three Mile Island Unit No. 2 accident chronology, the NRC staff initially identified several human errors that occurred during the accident and contributed significantly to its severity. All holders of operating licenses were subsequently [illegible] to take a number of immediate actions to avoid repetition of these errors, in accordance with bulletins issued by the Commission's

Office of Inspection and Enforcement (IE). In addition, the NRC staff began an immediate reevaluation of the design features of B&W reactors to determine whether additional safety corrections or improvements were necessary with respect to these reactors. This evaluation involved numerous meetings with B&W and certain of the affected licensees.

The evaluation identified design features as discussed above which indicated that B&W designed reactors are unusually sensitive to certain off-normal transient conditions originating in the secondary system. As a result, an additional bulletin was issued by IE which instructed holders of operating licenses for B&W designed reactors to take further actions, including immediate changes to decrease the reactor high pressure trip point and increase the pressurizer pilot-operated relief valve setting. Also, as a result of this evaluation, the NRC staff identified certain other safety concerns that warranted additional short-term design and procedural changes at operating facilities having B&W designed reactors. These were identified as items (a) through (e) on page 1-7 of the Office of Nuclear Reactor Regulation Status Report to the Commission of April 25, 1979.

After a series of discussions between the NRC staff and the licensee concerning possible design modifications and changes in operating procedures, the licensee agreed in a letter dated May 11, 1979, to perform promptly the following actions:

(a) Upgrade of the timeliness and reliability of the Emergency Feedwater (EFW) system by performing the items specified in Enclosure 1 of the licensee's May 11, 1979, letter. Changes in design will be submitted to the NRC staff for review.

(b) Develop and implement operating procedures for initiating and controlling EFW independent of Integrated Control System (ICS) control.

(c) Implement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or on turbine trip.

(d) Complete analyses for potential small breaks and develop and implement operating instructions to define operator action.

(e) At least one Licensed Operator who has had Three Mile Island Unit No. 2 (TMI-2) training on the B&W simulator will be assigned to the control room (one each shift).

In its letter the licensee also stated that ANO-1 was currently shut down and would remain shut down until (a) through (e) above are completed.

In addition to these modifications to be implemented promptly, the licensee has also proposed to carry out certain additional long-term modifications to further enhance the capability and reliability of the reactor to respond to various transient events. These are:

1) The items in Enclosure 2 of the licensee's letter of May 11, 1979, will be implemented during the next outage (following completion of the design change engineering) to cold shutdown conditions which is of sufficient length to accommodate the change, but no later than the next refueling outage. Further, the licensee will provide a schedule for implementing any other modifications identified as necessary as a result of the licensee's reviews shown on Enclosure 1 of the licensee's letter. The design changes will be submitted to the NRC staff for review.

2) The failure modes and effects analysis (FMEA) of the ICS is underway with high priority by B&W and will be submitted as soon as practicable.

3) The hard-wired trips addressed in Item (c) above will be [illegible] quality guide. [illegible] design change will be submitted to the NRC staff for review.

4) The licensee will continue operator training and drilling of response procedures as a part of an ongoing program to assure the high state of readiness and safe operation at ANO-1.

The Commission has concluded that the prompt actions set forth as (a) through (e) above are necessary to provide added reliability to the reactor system to respond safely to feedwater transients and should be confirmed by a Commission order.

The Commission finds that operation of ANO-1 should not be resumed until the actions described in paragraphs (a) through (e) above have been satisfactorily completed.

For the foregoing reasons, the Commission has found that the public health, safety and interest require that this Order be effective immediately.

III.

Copies of the following documents are available for inspection at the Commission's Public Document Room at 1717 H Street, N. W., Washington, D. C. 20555, and are being placed in the Commission's local public document room at Arkansas Polytechnic College, Russellville, Arkansas:

(1) Office of Nuclear Reactor Regulation Status Report on Feedwater Transients in B&W Plants, April 25, 1979.

(2) Letter from William Cavanaugh III (AP&L) to Harold Denton (NRR) dated May 11, 1979.

IV.

Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations in 10 CFR Parts 2 and 50, IT IS HEREBY ORDERED THAT:

(1) The licensee shall take the following actions with respect to ANO-1:

(a) Upgrade of the timeliness and reliability of the EFW system by performing the items specified in Enclosure 1 of the licensee's letter of May 11, 1979. Provide changes in design for NRC review.

(b) Develop and implement operating procedures for initiating and controlling EFW independent of Integrated Control System control.

(c) Implement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or on turbine trip.

(d) Complete analyses for potential small breaks and develop and implement operating instructions to define operator action.

(e) Assign at least one Licensed Operator who has had TMI-2 training on the B&W simulator to the control room (one each shift).

(2) The licensee shall maintain ANO-1 in a shutdown condition until items (a) through (e) in paragraph (1) above are satisfactorily completed. Satisfactory completion will require confirmation by the Director, Office of Nuclear Reactor Regulation, that the actions specified have been taken, the specified analyses are acceptable, and the specified implementing procedures are appropriate.

(3) The licensee shall as promptly as practicable also accomplish the long-term modifications set forth in Section II of this Order.

V.

Within twenty (20) days of the date of this Order, the licensee or any person whose interest may be affected by this Order may request a hearing with respect to this Order. Any such request shall not stay the immediate effectiveness of this Order.

FOR THE NUCLEAR REGULATORY COMMISSION

Samuel J. Chilk
Secretary of the Commission

Dated at Washington, D. C.
this 17th day of May 1979.

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

May 31, 1979

Docket No.: 50-313

Mr. William Cavanaugh, III
Vice President, Generation
and Construction
Arkansas Power & Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Dear Mr. Cavanaugh:

By Order of May 17, 1979, the Commission confirmed your undertaking a series of actions, both immediate and long term, to increase the capability and reliability of Arkansas Nuclear One, Unit No. 1 (ANO-1) to respond to various transient events. In addition, the Order confirmed that ANO-1 was shutdown and would not be restarted until the following actions had been accomplished:

(a) Upgrade of the timeliness and reliability of the Emergency Feedwater System (EFW) by performing the items specified in Enclosure 1 of the licensee's letter of May 11, 1979. Provide changes in design for NRC review.

(b) Develop and implement operating procedures for initiating and controlling EFW independent of Integrated Control System (ICS) control.

(c) Implement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or on turbine trip.

(d) Complete analyses for potential small breaks and develop and implement operating instructions to define operator action.

(e) Assign at least one Licensed Operator who has had Three Mile Island, Unit No. 2 training on the Babcock & Wilcox simulator to the control room (one each shift).

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By submittal of May 17, 1979, as supplemented by letters dated May 21, 22, 23, 24 and 29, 1979, you have documented the actions taken in response to the May 17 Order. I have reviewed this submittal, and am satisfied that, with respect to ANO-1, you have satisfactorily completed the actions prescribed in items (a) through (e) of paragraph (1) of Section IV of the Order, the specified modifications and analyses are acceptable, and the specified implementing procedures are appropriate. The bases for these conclusions are set forth in the enclosed Safety Evaluation.

As noted on page 5 of the Safety Evaluation you will be required to conduct a test during power operation to demonstrate operator capability to assume manual control of the EFW system independent of ICS. In addition, we have discussed the need for monitoring core exit temperature with your staff and they have agreed to provide a minimum of sixteen thermocouple indications of core exit temperature in the control room prior to startup. Also, your staff has agreed to provide an additional sixteen thermocouple indications of core exit temperature in the control room by October 31, 1979.

Appropriate Technical Specifications for Limiting Conditions for Operation and for surveillance requirements should be developed as soon as practicable and provided to the staff within seven days with regard to the design and procedural changes which have been completed in compliance with the provisions of the May 17, 1979 Commission Order. The revised Technical Specifications should cover:

(1) Changes to the EFW System;

(2) Plant alignment changes made to ensure control of the EFW independnt of the ICS;

(3) Addition of the Anticipatory Reactor Trip; and

(4) EFW capacity.

We note that by letter dated April 24, 1979, you have submitted proposed Technical Specifications for changes in setpoints for high pressure reactor trip and pilot operated relief valve actuation.

Also by letter dated May 16, 1979 you have submitted proposed changes to the Technical Specifications which define limiting conditions of operation upon loss of EFW equipment.

Within 30 days of receipt of this letter, you should provide us with your schedule for completion of the long-term modifications described in Section II of the May 17 Order.

My finding of satisfactory compliance with the requirements of items (a) through (e) of paragraph (.) of Section IV of the Order will permit resumption of operation in accordance with the terms of the Commission's Order; it in no way affects your duty to continue in effect all of the above provisions of the Order pending your submission and approval by the Commission of the Technical Specification changes necessary for each of the required modifications.

Sincerely,

Harold R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor
Regulation

Enclosure:
Notice of Authorization
to Resume Operation

cc w/enclosure:
See next page

cc w/enclosure(s):
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Honorable Ermil Grant
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Director, Technical Assessment
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U. S. Environmental Protection Agency
Region VI Office
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First International Building
Dallas, Texas 75270

Director, Bureau of Environmental
Health Services
4815 West Markham Street
Little Rock, Arkansas 72201

UNITED STATES NUCLEAR REGULATORY COMMISSION

ARKANSAS POWER & LIGHT COMPANY

DOCKET NO. 50-313

NOTICE OF AUTHORIZATION TO RESUME OPERATION

The United States Nuclear Regulatory Commission issued an Order on May 17, 1979 (44 FR 29997, May 23, 1979), to Arkansas Power & Light Company (the licensee), holder of Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit No. 1 (ANO-1), confirming that the licensee accomplish a series of actions, both immediate and long term, to increase the capability and reliability of ANO-1 to respond to various transient events. In addition, the Order confirmed that the licensee would maintain ANO-1 in a shutdown condition until the following actions had been satisfactorily completed:

(a) Upgrade of the timeliness and reliability of the Emergency Feedwater (EFW) System by performing the items specified in Enclosure 1 of the licensee's letter of May 11, 1979. Provide changes in design for NRC review.

(b) Develop and implement operating procedures for initiating and controlling EFW independent of Integrated Control System control.

(c) Implement a hard-wired control-grade reactor trip that would be actuated on loss of main feedwater and/or on turbine trip.

(d) Complete analyses for potential small breaks and develop and implement operating instructions to define operator action.

(e) Assign at least one licensed Operator who has had Three Mile Island Unit No. 2 training on the Babcock & Wilcox simulator to the control room (one each shift).

By submittal of May 17, 1979, as supplemented by letters dated May 21 and 22, 1979, the licensee has documented the actions taken in response to the May 17, Order. Notice is hereby given that the Director of Nuclear Reactor Regulation (the Director) has reviewed this submittal and has concluded that the licensee has satisfactorily completed the actions prescribed in items (a) through (e) of paragraph (1) of Section IV of the Order, that the specified modifications and analyses are

acceptable and the specified implementing procedures are appropriate. Accordingly, by letter dated May 31, 1979 the Director has authorized the licensee to resume operation of ANO-1. The bases for the Director's conclusions are more fully set forth in a Safety Evaluation dated May 31, 1979.

Copies of (1) the licensee's letters dated May 17, 21 and 22, 1979, (2) the Director's letter dated May 31, 1979, and (3) the Safety Evaluation dated May 31, 1979 are available for inspection at the Commission's Public Document Room at 1717 H Street, N. W., Washington, D. C. 20555, and are being placed in the Commission's local public document room at the Arkansas Polytechnic College, Russellville, Arkansas. 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 Operating Reactors.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Dated at Bethesda, Maryland
this 31st day of May 1979.