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T. G. Campbell Vice President Nuclear

September 26, 1989

1CANØ989Ø3

U. S. Nuclear Regulatory Commission Document Control Desk Mail Station P1-137 Washington, DC 20555

> SUBJECT: Arkansas Nuclear One - Unit 1 Docket No. 50-313 License No. DPR-51 Request for License Amendment to Increase Reactor Power to a Level of 100%

Gentlemen:

Facility Operating License Amendment No. 120, transmitted by NRC letter dated May 16, 1989 (1CNAØ589Ø4), authorized operation of ANO-1 up to a maximum steady-state reactor core power level of 2054 megawatts thermal (80% of fuel power). That amendment was in response to our request dated April 24, 1989 (1CANØ48915) as supplemented on May 5, 1989 (1CANØ589Ø3), addressing a newly-identified postulated small break in the High Pressure Injection (HPI) system which apparently was not bounded by existing small break loss of cooling accident (LOCA) analyses. A formal Appendix K LOCA analysis was performed using the B&W small break LOCA (SBLOCA) evaluation model, demonstrating that the ANO-1 HPI configuration would provide adequate core cooling in the event of a complete HPI line break at an operating power of 80% of full power.

To allow resumption to full power operation (2568 megawatts thermal), AP&L is implementing permanent system modifications to address the postulated small break LOCA and place the unit into conformance with the original small break LOCA assumptions. The HPI system modifications involve the installation of a cavitating venturi in each of the four HPI injection lines. These modifications will provide the necessary HPI injection flow distribution consistent with the licensed emergency core cooling system (ECCS) flow requirements demonstrated to provide acceptable core cooling for ANO-1 at 100% licensed power. Therefore, continued limitation of ANO-1 operation below the 100% power level will no longer be necessary after completion of the modifications and testing. In advance of modification

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implementation to allow for normal NRC processing prior to restart from the December, 1989 outage, AF&L requests a license amendment to resume full power operation at steady-state reactor core power levels not in excess of 2568 megawatts thermal upon completion of the HPI modifications. The amendment request and the basis for this request are attached.

In accordance with 10CFR50.91(a)(1), and using the criteria in 10CFR50.92(c), AP&L has determined that the change involves no significant hazards consideration. In accordance with 10CFR50.92(b)(1), a copy of this correspondence has been sent to Ms. Greta Dicus, Director, Division of Radiation Control and Emergency Management, Arkansas Department of Health.

Very truly yours. Emplell

T. G. Campbell

TGC:1w Attachments cc: Mr. Robert Martin U. S. Nuclear Regulatory Commission Region IV 611 Ryan Plaza Drive, Suite 1000 Arlington, Texas 76011

> Mr. C. Craig Harbuck NRR Project Manager NRR Mail Stop 13-D-18 U. S. Nuclear Regulatory Commission Document Control Desk Mail Station P1-137 Washington, DC 20555

NRC Resident Inspector Arkansas Nuclear One - ANO-1 Number 1, Nuclear Plant Road Russellville, AR 72801

Ms. Grota Dicus Arkansis Department of Health 4815 West Markham Street Little Rock, AR 72201

STATE OF ARKANSAS) COUNTY OF PULASKI)

I, T. G. Campbell, being duly sworn, subscribe to and say that I am Vice President, Nuclear for Arkansas Power & Light Company; that I have full authority to execute this oath; that I have read the document numbered ICANØ989Ø3 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

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T. G. Campbell

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 26th day of September, 1989.

Notary Public

My Commission Expires:

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LICENSE AMENDMENT REQUEST <u>IN THE MATTER OF AMENDING</u> LICENSE NO. DPR-51 ARKANSAS POWER & LIGHT COMPANY ARKANSAS NUCLEAR ONE, UNIT 1 DOCKET NO. 50-313 September 26, 1989

DESCRIPTION OF PROPOSED LICENSE CHANGE

The proposed amendment changes ANO-1 license condition 2.c.(1) to increase the authorized steady-state reactor core power level to a maximum of 2568 megawatts thermal (100% full power) from the current restriction which is 80% of full power (2054 megawatts thermal).

DISCUSSION

Arkansas Power & Light Company (AP&L) herein requests an amendment to the Arkansas Nuclear One, Unit 1 (ANO-1) Operating License to resume full power operation at steady-state reactor core power levels not in excess of 2568 megawatts thermal. This change will allow increasing the ANO-1 maximum power level from its current limit of 2054 megawatts thermal (80% of full power operation) which was imposed by Amendment No. 120 to the ANO-1 License, based upon AP&L discovery of a more limiting postulated small break LOCA of one of the HFI lines. The increase in power level is justified upon completion of modifications to the HPI system.

DESCRIPTION OF PLANT MODIFICATION

ANO plans to install a cavitating venturi in each of the four HPI injection lines, upstream of the recently installed second isolation (stop) check valves MU-66C, MU-66D, MU-66B, and MU-66A and downstream of the manual globe valves MU-1231, MU-1232, MU-1233, and MU-1234. In addition, the normal makeup line would be configured so that it joins the HPI injection line downstream of the cavitating venturi. Figure 1 shows the modified HPI system that is to be installed. The venturi design parameters were based upon the desired HPI system performance. One consideration in sizing the venturis was to limit HPI pump runout to less than the recommended 550 gpm. Venturi sizing was to be restrictive enough to sufficiently limit the flow out of a postulated broken HPI line to obtain the required flow through the intact lines, yet not be so restrictive that the cold leg break SBLOCA flow rate requirements cannot be met.

System performance analysis has been performed based upon the assumption that the cavitating flow limit varied as the square root of the absolute inlet pressure and that the non-recoverable pressure drop in the non-cavitating mode varied as the square of the flow, consistent with previous B&W practice and experience. The analysis results for a cold leg break SBLOCA and an HPI line break SBLOCA (assuming no operator action) exceed the ECCS flow rate requirements with adequate margin to account for a 7% head degradation (consistent with ASME Section XI inservice testing "acceptable range"). Parametric studies performed with various combinations of off-nominal venturi characteristics in combination with a 7% head degradation assumption confirmed that the HPI flow into the core remained insensitive to these variations. Since this analysis demonstrated that the ANO-1 modified HPI system will satisfy the licensed ECCS flow requirements for 100% licensed power, no new ECCS Evaluation Model analysis was necessary. The venturi equipment specification requires that the venturi design be functionally tested prior to installation in order to verify that the measured cavitating flow limit as a function of inlet pressure and the measured non-recoverable pressure drop versus flow rate in the non-cavitating mode support the venturi-specific analysis assumptions. Post-installation testing will also be performed following the HPI system modification. The objective of this testing is to verify the system-level HPI performance analyses assumptions summarized above.

Two tests will be conducted. The first will test the flow distribution for the modified HPI system for RCS pressure from zero to approximately 600 psig with normal valve lineup and the most limiting conditions by utilizing only one HPI pump. The resulting flow test data, in conjunction with the laboratory test data of the venturis, will indicate the cavitating performance of each HPI line and will demonstrate that sufficient coolant can be provided to the reactor core from three out of the four lowest HPI flow lines. The venturis are designed such that the system flow is not affected by variations in back pressure below 600 psig. The second test will demonstrate HPI system performance for an RCS pressure of 1200 psig. assuming one broken HPI line downstream of the venturi. This test will be accomplished by throttling the HPI manual isolation valves located between the venturis and the RCS on three of the four HPI lines. The fourth line will not be throttled but will be subject to atmospheric pressure, thus simulating a broken line. Flow measurements will be taken during both tests and compared to projected values to verify design assumptions.

BACKGROUND

On January 20, 1989, ANO-1 experienced a reactor trip initiated by a generator lockout. Following the trip, certain conditions required the operators to manually initiate additional HPI flow to the RCS. It was later discovered that a check valve in the "B" HPI injection line had failed to reseat after HPI flow was terminated. This allowed reactor coolant to flow into the HPI line resulting in the line being overheated. This event was described in Mr. T. G. Campbell's letter to Mr. Jose A. Calvo of February 19, 1989 (1CANØ289Ø9) and LER 89-002-00, dated March 31, 1989 (1CANØ389Ø6).

As a result of the January 1989 transient, AP&L undertook a thorough review of the HPI system. This review included a revaluation of the qualification and ability of both the individual components and the HPI system as a whole to withstand all conditions that could result from transients and steady state operations. During this review, it was discovered that a postulated break of an HPI injection line, just upstream of the RCS cold leg connection and downstream of the first check valve, could constitute a small break LOCA not currently enveloped by the approved 10CFR50.46 and Appendix K analyses. AP&L requested that Babcock & Wilcox (B&W), the nuclear steam supply system vendor for ANO-1, evaluate the impact of this postulated break on current ECCS evaluations. B&W analyzed the break and informed AP&L that the postulated break did not appear to be enveloped by previously postulated breaks and that the ANO-1 HPI system might not be able to provide adequate core cooling (using conservative Appendix K assumptions) should the break occur at high power operation. AP&L promptly reported this finding pursuant to 10CFR50.72 on March 18, 1989. B&W determined, based upon a comparative analysis of the ANO-1 system with a representative analysis for another similar B&W plant, that for power operation up to 74% of full power, the current ECCS response using the HPI system would provide adequate core cooling in the event the postulated break were to occur.

That analysis was the basis for AP&L submittal of March 23, 1989 (1CANØ38914). Upon review of that submittal the NRC issued Amendment No. 119 to the ANO-1 License (1CNAØ389Ø5). This amendment limited maximum power to 50% since an actual LOCA evaluation model analysis was not performed for the ANO-1 core (Midland Unit 1 & 2 was used as the base case).

AP&L subsequently performed an ANO-1 specific 10CFK50 Appendix K analysis of the postulated HPI LOCA to justify an increase in power operation until permanent modifications could be designed and installed to place the unit back into conformance with the original small break LOCA assumptions. Upon review of that analysis, the NRC issued Amendment No. 120 to the ANO-1 License (1CNAØ589Ø4) to permit operation up to 80% of full power operation. AP&L has prepared a design change to the HPI system to be installed during the ANO-1 December, 1989 outage to permit operation of ANO-1 at 100% full power.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

In accordance with 10CFR50.91(a)(1), AP&L has assessed whether the proposed change involves a significant hazards consideration, using the criteria in 10CFR50.92(c), as follows:

- (1) The proposed change does not increase the probability or consequences of any accident previously evaluated since any effect on previously analyzed accidents will remain unchanged as the reactor will still trip from the established setpoint for 100% full power. In addition, the modified HPI system will satisfy ECCS flow requirements for 100% power, bounded by previously evaluated accident assumptions.
- (2) The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated since the HPI system performance is not adversely affected but, instead, improved to provide enhanced HPI injection flow distribution during postulated events at full power operation. The HPI modifications will be installed and post-installation testing will be performed in accordance with applicable ASME Code requirements. The testing is to verify the system-level HPI performance analyses assumptions.
- (3) The proposed change does not involve a significant reduction in a margin of safety since the margins of safety associated with the proposed increased power level remain consistent with those applicable to the original licensing of ANO-1.

Therefore, based on the above, AP&L has determined that the requested change does not involve a significant hazards consideration.



ANO-1 Modified HPI System-With Cavitating Venturis



PROPOSED LICENSE CHANGE

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