ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

January 13, 1983

2CAN018306

Director of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
TMI Item II.K.3.25, Power to
Pump Seals

Gentlemen:

Your letter of November 4, 1982, (2CNA118201) requested information regarding ANO-2 conformance or deviation from the staff's position on TMI Item II.K.3.2.5, Power to Pump Seals. Our response is contained in Attachment 1.

Very truly yours,

John R. Marshall

John R. Marshall
Manager, Licensing

JRM:JK:rd

Attachment

A046

ATTACHMENT 1

Item 1. The cooling water supply should be adequate to provide seal cooling and prevent seal failure for a period of two hours during a loss of offsite power event.

Response

The effect of loss of cooling water to pump seals has been addressed in the ANO-2 FSAR, Section 5.5.1.3. It states:

> "Four reactor coolant pump seals of similar design have been operated for up to 40 minutes with no component cooling water flow. While there was some increase in controlled seal leakage (to the closed system), the mechanical seals were subsequently dismantled and refurbished without finding major damage such as broken pieces in the seals."

Therefore, we feel that the seals would maintain their integrity for a substantial time after a loss of offsite power event when the pumps would not be running.

It has also come to our attention that in August, 1980, the Byron Jackson Pump Division of Borg-Warner Corporation, Los Angeles conducted a Reactor Coolant Pump Seal Hot Standby test specifically for St. Lucie Unit 2. Since the Reactor Coolant Pumps for both St. Lucie-2 and ANO-2 were both supplied by Byron Jackson and have seals manufactured of the same materials, we feel that the results of the St. lucie test may be applicable to ANO-2 as well. Some of the following discussion of this test was extracted from the September 19, 1980, memorandum from J. Zudans to Z. Rosztoczy of the NRC.

This test simulated a loss of off-site power and monitored the reactor coolant pump conditions following the loss of cooling water. Under static conditions associated with the loss of all AC, the fluid in the seal cartridge will attain a level above the normal seal cartridge operating temperature due to the interuption of cooling water. The temperature would rise from about 180° to about 550°F. If the postulated loss of all AC occurs, there are two modes of seal operation that may be utilized, namely secure bleedoff flow or maintain bleedoff flow. If the bleedoff flow is secured, the maximum outleakage would not exceed the normal 1 gpm if the fourth seal failed. If the third seal also failed, the outleakage would increase to 1.2 gpm as only two pressure breakdown devices were effective. If the second seal also is assumed to malfunction, the first seal takes over and the leakage would increase to 1.7 gpm. If the bleed-off line is not secured, the seals will continue to operate as under normal conditions until failure, when they would leak as discussed above.

Even though there are four independent seals per RCP to ensure the maintenance of the sealing function, and each one is designed to seal against full system pressure, there is no reason why any one of these seals would fail in the static condition. The only components effected by the elevated temperature, are the elastomeric gaskets of the seals, namely the "U" cup in the normally rotating part of the seal, and the "O" rings in the stationary seal segment. The "U" cups are totally captured and the "O" rings are backed up by lapped seats which would maintain low leak rates. All other components are metallic or carbon, which are not affected by the elevated temperatures of the system. The elastomeric components are made of ethylene propylene or nitrile, materials which are suitable for long operation at temperatures up to 250°F without a change of characteristics. Temperature above 250° will affect the physical characteristics of the material, the extent of the effect being a function of temperature, pressure and time. The accepted operating life at 300° is in excess of 1000 hours. At the system temperature of 550° the elastomeric material would be subject to extrusion and hardening leading to a gradual loss of flexibility and permanent setting in a deflected position.

The St. Lucie test measured controlled leakage as well as temperature and pressure within the Reactor Coolant Pump after the cooling water was secured. Data was taken for four hours with the seal leakage remaining steady and low. The test continued for 56 hours and leakage did not increase appreciably, (maximum of 16 gph with water maintained at 550° and 2300 psig).

The above test assumed no cooling water was available for 56 hours and the seals performed without failure. ANO-2 procedures require the reinitiation of cooling water.

In summary, we feel the analysis provided above is sufficient to assure adequate RCP seal performance with a loss of cooling water.

Item 2. RCP seals should be designed such that they are cooled by means of two independent supplies, e.g. seal injection (charging pumps) and thermal barrier heat exchangers (Reactor Building Closed Cooling Water (RBCCW) System). If plant design consists of only one cooling method, provide detailed design information to demonstrate that seal integrity is still maintained in the event of a loss-of-offsite power event.

Response

The component cooling water system (CCWS) is a closed loop system which provides cooling water to the Reactor Cooling Pump seals. The system gives up heat to the service water system in the CCWS heat exchanger. The CCWS pumps are normally supplied from offsite power.

In the event of a loss of offsite power, the component cooling water pumps would stop and the Reactor Coolant Pumps would be deenergized. One of the CCWS pumps would be transferred to the emergency diesel generators. Existing procedures address reinitiating component cooling water and controlled bleedoff in such a manner as to preclude seal damage due to a thermal transient. The time to manually transfer the component cooling water pump and reinitiate cooling flow would be as quick as possible in accordance with the procedures. The service water system would also be available to remove heat from the component cooling water system as it is powered by the diesel generators.

After the initial time required to transfer one of the CCWS pumps to the diesel generator bus, the component cooling water system, in conjunction with the service water system, would be able to provide normal cooling to the reactor coolant pump seals. Surge tanks in the closed-loop CCWS would ensure an adequate supply of cooling water.

We feel that with the demonstrated successful operation of Reactor Coolant Pumps for 40 minutes without seal cooling and the results of the Byron Jackson test discussed in Item 1 there will be sufficient time to complete manual transfer to its emergency power source per procedures without loss of seal integrity.

Item 3. It is currently our position that automatic loading of the cooling water pumps onto the emergency buses is desirable and should be incorporated. The cooling water pumps should be automatically (requiring no operator action) and sequentially loaded onto the diesel generators and automatically started.

Response

Based on our response to Items 1 and 2 above, we do not feel that automatic loading of the CCWS pump is necessary. Sufficient time exists for operators to manually transfer the CCWS pump to its emergency source in accordance with existing procedures.

Further, it is felt that placing the CCWS pumps automatically on the emergency buses may violate the guidance of Regulatory Guide 1.75 since the CCWS is not a safety related system and automatic loading may conflict with Regulatory Position C.1. In accordance with this and the above responses to Items 1 and 2 we do not feel that automatic loading of the CCWS pumps is appropriate or necessary for ANO-2.