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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 16

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

Introduction:

By letter dated September 16, 1980, the Arkansas Power and Light Company (the licensee) requested a change to the Technical Specifications for Arkansas Nuclear One, Unit 2 (ANO-2). The proposed change would allow reduced service water flow through the containment cooling units.

The containment cooling units (fan coolers) at ANO-2 are used for both normal and post-accident operations. During normal operation chilled water from the plant's chilled water system is pumped through the containment cooling units (CCU). Following an accident, the chilled water system is automatically isolated, service water valves are opened, and service water is pumped through the CCU. The CCU has two separate sets of tubing for the chilled water and the service water. The two sets of tubing do not interface.

ANO-2 Technical Sepcification 4.6.2.3.a.3 requires that a specified minimum flow of service water through the CCU be demonstrated operable every 31 days. On September 3, 1980, ANO-2 was shut down due to inadequate service water flow to the CCU. The cause of inadequate flow was determined to be due to an intrusion of Asian Clams, Corbicula sp., into the CCU.

The Asian Clam is a bivalve mollusc found abundantly in the warm fresh-waters of the United States. The Asian Clam is monoecius (bi-sexual), incubatory and precocious in reaching sexual maturity. This hardy clam reproduces prolifically when water temperatures range from 62 to 75 degrees Fahrenheit.

Larvae discharged from adult clams are about 1/50 of an inch in diameter and are passively carried by water movement. Stagnant, or low flow areas provide suitable conditions for the larvae to grow into valved clams. Valved larvae are greater than 1/32 inch in size and grow to mature adult clams (1.2 inches in size) in approximately 36 to 42 months.

At ANO-2, service water suction is taken from Lake Dardanelle and is strained before entering the plant. Differential pressure measurements are checked on the intake screens once per shift to prevent buildup of adult clams.

Apparently, during a pervious surveillance test of the CCU, Asian Clam larvae present in the service water were pumped with the water into the CCU. Upon completion of the surveillance test, some water was left stagnant in the CCU. The larvae present matured into valved clams inside the heat exchanger tubes, affixing themselves to the tube walls, and thus causing flow blockage in the CCU.

Significant effort has been expended in cleaning the CCU. Flow rates have been increased significantly, but not yet to the 2500 gallons per minute (gpm) limit required by lechnical Specification 4.6.2.3.a.3. Some flow blockage still exists as a result of remaining clams. Accordingly, in its letter of September 16, 1980, the licensee proposed a Technical Specification change to allow for reduced service water flow through the CCU.

Discussion

There are four CCU at the ANO-2 facility. The CCU are arranged in two groups with two CCU per group. Each group is powered by a different safety grade electrical power source. ANO-2 Technical Specifications 3.6.2.3 currently requires, as a minimum, "two independent containment cooling groups shall be Operable with two cooling units in one group and at least one cooling unit in the second group." Surveillance requirements of Specification 4.6.2.3 currently requires a minimum service water flow rate of 2500 gpm for each group containing two cooling units and 1250 gpm for each group containing one cooling unit.

The licensee's letter of September 16, 1980, stated that due to the remaining clams and their associated flow blockage, the minimum flow of 2500 gpm cannot be obtained in either group. However, if a single containment cooling unit in each group is isolated, a flow of 1250 gpm can be obtained through a single containment cooling unit. Therefore, the licensee proposed to modify the ANO-2 Technical Specification so that only one CCU would be required in each group. Information was submitted by the licensee in a letter dated September 11, 1980 stating that a flow of 1250 gpm for a single CCU would provide sufficient cooling to meet design basis requirements.

The licensee has stated, and we concur, that changing the ANO-2 Technical Specifications to permit only two CCUs (one per group) will not affect the plant's safety analysis. The previous worst case design basis accident (DBA) assumed the failure of the diesel generator that served the train that had two CCUs. This would leave only one CCU and a single containment spray train for containment cooling. Transient response analyses by the licensee using the COPATTA computer code showed that the peak containment pressure and temperature limits were not exceeded by the worst case DBA. We have verified the licensee's results by confirmatory analysis.

The worst case DBA with the proposed Technial Specifications again assumes the failure of a diesel generator. Again this results in the case with only a single CCU and a single containment spray train available to provide containment cooling. Obviously the containment transient response would be identical to the previous case.

Although the licensee has stated that a single CCU per group will provide adequate cooling capability, the licensee can only obtain this flow rate by isolating the adjacent CCU in each group. We concur with the licensee that it would not be sound engineering judgement to isolate one CCU in order to increase the flow through the other unit to a value greater than 1250 gpm. If both CCUs are left open, the combined service water flow and heat removal capability would be expected to increase. Therefore, the proposed Technical Specifications will only require a minimum service water flow of 1250 gpm through each group rather than for each CCU on a group. The proposed Technical Specification change will also increase the frequency of verifying the service water flow rate from once every 31 days to once every 14 days. This will provide additional assurance that the minimum service water flow rate will be available if needed.

In the course of our review of the proposed Technical Specification change it became apparent that some of the information in Section 6.2 of the ANO-2 FSAR was inconsistent with information in Section 9. In particular, Section 6.2 of the FSAR states that the design flow for each containment cooling unit is 2600 gpm while Section 9 and the Technical Specifications are based on 1250 gpm per containment cooling unit. We discussed this inconsistency with the licensee, who stated that the 1250 gpm design value, which is used as the basis for the proposed Technical Specification change, is the correct value. The licensee received confirmation of the 1250 gpm design value in a letter from its system designer (Bechtel Corporation). In addition, the specifications for the ANO-1 containment cooling units were checked. These units are essentially identical to the ANO-2 containment cooling units. The design flow for the ANO-1 containment cooling units is 1200 gpm. This also confirms that the 1250 gpm value, rather than the FSAR value of 2600 gpm, is correct. We asked for and received a commitment from the licensee, to provide a letter in the near future documenting and verifying the correct design information for the containment cooling system.

Based on the licensee's September 16, 1980 submittal, and in our subsequent discussions with the licensee, a program for eradication of the Asian Clams (molluscs) includes heat treatment and flushing operations of the CCU. Piping upstream of the ten-inch header to the isolation valve has been flushed and visual inspection indicates there are few clams remaining in the headers. The licensee will heat treat the system from the isolation valve in the 10 inch header, downstream to and including the coolers. Water at a temperature of 130 degrees Fahrenheit will be used to heat the system. Flushing of the system subsequent to heat treatment will be performed prior to restart.

Based on available information, the heat treatment will result in 100 percent mortality of the molluscs. Further flow restrictions due to continued growth of the existing mollusc population will not occur. Flow reduction may occur due to possible sloughing off of individual valves from molluscs killed by heat treatment from areas not presently restricting flow, and movement of these valves to the CCU heat exchanger tubes. The licensee's proposed flushing sequence subsequent to the heat treatment but prior to station startup should remove most of the detached dead molluscs and lessen the possibility of blockage due to

valve movement. It is reasonable to assume that decay of the molluscs will be a gradual process over a number of days resulting in the gradual sloughing off of valves from any molluscs remaining in the system. At our request, the licensee by letter dated September 22, 1980, committed to perform a flow verification test at an increased frequency of once per two days for the first 14 days of station operation to assess whether flow through the CCU is decreasing due to the movement of valves from dead molluscs. If these valves restrict flow, this reduction should be gradual and readily observed during the augmented monitoring program.

The licensee has stated that effective control procedures resulting in complete mortality to both valved and non-valved larvae will commence prior to restart after the next scheduled refueling outage. In the interim, continuous chlorination to control non-valved larvae will be performed during surveillance testing. Valved larvae introduced during surveillance testing between now and the next scheduled fuel load may become established in the CCU. However, it takes approximately one year to mature to a size sufficient to block CCU heat exchanger tubes. Therefore, no significant reduction in flow across the CCU is expected due to maturation of the valved larvae between now and when complete cleaning of the CCU is performed during the next scheduled refueling operation (March 1981).

The licensee has proposed a program of continuous chlorination during the augmented 14 day surveillance testing to eliminate the possibility of future infestations of Asiatic clams in the CCUs. The continuous chlorination procedure will substantially reduce the introduction of live mollusc larvae but will not eliminate it entirely. Chlorination will kill non-valved larvae but will not result in mortality to valved larvae.

The licensee is presently evaluating long term effective control procedures for complete mortality to both valved and non-valved larvae. The long term control procedures will be effective after the next scheduled refueling operation.

Evaluation

As stated above, the proposed Technical Specification will not jeopardize containment integrity by exceeding the containment design pressure nor will it increase the calculated post DBA Peak Containment Pressure in the most limiting case. Off-site dose consequences as a result of containment leakage post DBA will not exceed the dose projections of the original design basis calculations for ANO-2 and will be identical to projected doses using the existing Technical Specification in the most limiting case.

In addition, augmented surveillance testing with chlorination will assure mortality for non-valved larvae and the introduction of any additional valved larvae will not cause any signficant reduction in flow across the CCU's between now and the March, 1981 refueling operations.

Thus, the proposed Technical Specification change does not constitute a significant hazard to the health and safety of the public, in the most limiting case, the margin of safety is not reduced; and, therefore, we find it acceptable.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date of Issuance: October 9, 1980