



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SUPPORTING AMENDMENT NO. 24 TO FACILITY OPERATING LICENSE NO. DPR-51

ARKANSAS POWER & LIGHT COMPANY

ARKANSAS NUCLEAR ONE - UNIT 1

DOCKET NO. 50-313

Introduction

By letter dated January 10, 1975, Arkansas Power & Light Company (AP&L) responded to our October 29, 1974 initial request for technical specifications governing steam generator tube surveillance at Arkansas Nuclear One - Unit No. 1 (ANO-1). By letter dated September 9, 1976, we forwarded recommended revised technical specifications based upon revised Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes". AP&L answered this request by letter dated November 22, 1976, which forwarded revised technical specifications. The proposed change would add technical specification provisions for steam generator tube inspection to be consistent with the guidance contained in Regulatory Guide 1.83, Revision 1, dated July 1975.

Modifications to the proposed amendment were necessary to assure compliance with our regulatory position. These modifications were discussed with and agreed to by the AP&L staff.

Evaluation

Structures, systems, and components important to safety of a nuclear power plant are designed, fabricated, constructed, and tested so as to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. To continuously maintain such assurance, General Design Criterion 32 requires that components which are part of the reactor coolant pressure boundary be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity. The steam generator tubing is part of the reactor coolant system pressure boundary and is an important part of a major barrier against fission product release to the environment. It also acts as a barrier against

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steam release to the containment in the event of a loss-of-coolant accident (LOCA). To act as an effective barrier, this tubing must be free of cracks, perforations, and general deterioration. For this reason, a program of periodic inservice inspection is being established to assure the continued integrity of the steam generator tubes over the service life of the plant.

Generally, the major elements of the proposed steam generator tube inservice inspection program for ANO-1 consist of specified: (a) sample selection, (b) examination methods, (c) inspection intervals, (d) acceptance criteria, and (e) reporting requirements. Each of these major elements of the program is separately evaluated below.

(a) Sample Selection

The proposed sampling scheme is generally patterned after Regulatory Guide 1.83, Revision 1, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes". However, there are some deviations from Regulatory Guide 1.83 that we require to improve the program and/or reduce the potential radiation exposure of personnel that must perform the inspections. The principal deviations from Regulatory Guide 1.83 supplementary sampling requirements are evaluated below:

- (i) Regulatory Position C.5.a, "Supplementary Sampling Requirements" recommends that if the eddy current inspection results during an inservice inspection indicate any tubes with previously undetected imperfections of 20% or greater depth, additional steam generators, if any, should be inspected. In other words, because of a single tube in one steam generator with previously undetected imperfection of 20% or greater depth but still well below the plugging limit, all steam generators in the plant should be inspected. Although the detection of any defect warrants further inspection to determine the extent of degradation in the steam generators, we believe that this inspection should be expanded initially to determine the extent of any further degradation in the steam generator under inspection. If the expanded inspection indicates more extensive defect conditions, the expansion to the other steam generator is required. This approach will provide careful stepwise expansion of inspection based on the results of successive steps, while tending to minimize the exposure of inspection personnel resulting from initial positioning of inspection equipment in a steam generator. This inspection approach is appropriate for this facility in which system characteristics are such that all steam generators are expected to perform in a similar manner.

- (ii) Regulatory Guide 1.83, Revision 1 requires additional inspections if the initial inspection results indicate that more than 10% of the inspected tubes have detectable wall penetration of greater than 20% or that one or more tubes inspected have an indication in excess of the plugging limit. The additional inspections require a complete tube inspection of an additional 3% and if required a third inspection of 6% of the tubes. The programs set forth in the ANO-1 Technical Specifications require a second inspection doubling the number of tubes inspected in the first sample. Again if more than 10% of the tubes show a detectable penetration greater than 20% or 1% are defective tubes, a third sample is required again doubling the number of tubes inspected in the second sample. In the first sample, sampling is to concentrate on areas of the tube array where prior inspections or experience have indicated potential problems, and full length traverse of each inspected tube is required. For a second or third sample, if required, the inspection may concentrate on areas of the tube array and portions of the tube in which the first sample or the second sample indicated potential problems.

Based on the considerations discussed above, we have concluded that the sample selection scheme is acceptable.

(b) Examination Method

The proposed examination methods include nondestructive examination by eddy current testing. The specified methods are capable of locating and identifying stress corrosion cracks and tube wall thinning from chemical wastage, mechanical damage or other causes. Based on our review of these methods, and experience gained using these methods by the industry, we have concluded that the examination methods are acceptable.

(c) Inspection Intervals

The proposed inspection intervals are compatible with those recommended in Regulatory Guide 1.83, with the exception that AP&L has proposed a minimum of 10 months between inspections instead of the 12 months recommended by the Regulatory Guide. We consider this proposal acceptable because it more accurately reflects the refueling shutdown interval for ANO-1 and will prevent unnecessary shutdown solely for steam generator tube inspection.

(d) Acceptance Criteria

The principal parameter used to determine whether any one steam generator tube is acceptable for continued service is the measured imperfection depth. In order to specify what level of imperfection is acceptable, a tube "plugging limit" is established. The "plugging limit" is defined in the Technical Specifications as the imperfection depth beyond which the tube must be removed from service, because the tube may become defective prior to the next scheduled inspection. For ANO-1 the "plugging limit" is 40% of the nominal tube wall thickness.

AP&L and the NRC staff have mutually agreed upon this 40% plugging limit in the definitions section of the Technical Specification. Although no B&W steam generator tube has to the present time exhibited any wastage corrosion, this plugging limit will provide, in the staff's opinion, conservative protection against wastage corrosion tube degradation. The licensee will be required in the future to recalculate the plugging limit using the recommendations of Regulatory Guide 1.121.<sup>1/</sup>

Based on our review, the acceptance criteria are satisfactory.

(e) Reporting Requirements

Regulatory Guide 1.83, Revision 1, requires a licensee to report to the Commission and to await resolution and approval of the proposed remedial action when the inspection results exceed the limits specified in the Guide. It also states that additional sampling and more frequent inspection may be required. In the proposed Technical Specifications, it is clearly stated what additional inspection AP&L must perform without reporting to the NRC and requires (1) a prompt report on the number of tubes plugged in each steam generator following the steam generator tube inspection, (2) a complete report on the inspection in the next annual operating report, and (3) in the most severe cases described in the Technical Specifications, prompt notification of the NRC must be made together with a written followup.

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<sup>1/</sup> Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes," August, 1976.

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It is our position that the reporting requirements are reasonable and will facilitate reporting of pertinent information without unnecessarily increasing plant downtime. Therefore, they are acceptable.

In summary, we have concluded that the proposed steam generator tube inservice inspection program will provide added assurance of the continued integrity of the steam generator tubes, and thus is acceptable.

#### Environmental Considerations

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: May 27, 1977