12/29/76

Docket No. 50-331

Iowa Electric Light & Power Company
ATTN: Mr. Duane Arnold, President
P. O. Box 351
Cedar Rapids, Iowa 52406

Gentlemen:

We have completed our review of your October 13, 1975 request for selected exemptions from the requirements of Appendix J. Our evaluation is enclosed. Please note that additional information must be provided for four of the five exemptions you have requested to assure that the requirements of Appendix J 10 CFR 50 are satisfied. The additional information should be submitted to NRC within 60 days of receipt of this letter.

Sincerely,

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:
Safety Evaluation of the
Containment Leak Testing
Program for the Duane
Arnold Energy Center

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ENCLOSURE

EVALUATION OF THE

CONTAINMENT LEAK TESTING

PROGRAM FOR THE

DUANE ARNOLD ENERGY CENTER

INTRODUCTION

By our letter dated August 7, 1975, the Iowa Electric Light and Power Company (IELPCo) was requested to review the Duane Arnold Energy Center (DAEC) in terms of the current containment leak testing program, and the associated Technical Specifications, for compliance with the requirements of Appendix J to 10 CFR Part 50. As part of this request, IELPCo was to determine the planned actions and the associated schedule for attaining conformance with the above cited regulation.

Appendix J to 10 CFR 50 was published on February 14, 1973. Since many operating nuclear plants had either received an operating license or were in advanced stages of design or construction at that time, some plants may not now be in full compliance with the requirements of this regulation. Therefore, beginning in August 1975, requests for review of the extent of compliance with the requirements of Appendix J were made of each licensee. Following the initial responses to these requests, the NRC staff developed positions which would provide assurance that the objectives of the testing programs were satisfied. These staff positions have since been applied in our review of reports filed by the Duane Arnold licensee and the results are reflected in the following evaluation.

The Iowa Electric Power and Light Company (IELPCo) submitted its response on October 13, 1975. In this submittal, IELPCo requested a number of specific

exemptions from the requirements of Appendix J. In the following evaluation, the Appendix J requirement is identified along with the exemption or modification proposed by IELPCo.

EVALUATION

1. Hydrostatic Testing of Isolation Valves (Penetrations X-9 A&B, X-12, 16 A&B, X-36)

Section III.C.2.a of Appendix J requires that valves, unless pressurized with a seal system, shall be pressurized with air or nitrogen at the calculated accident pressure, Pa. In its submittal of October 13, 1975, the Iowa Electric Power and Light Company (IELPCo) requested an exemption from this requirement of Appendix J and to allow hydrostatic leak rate testing of the isolation valves in the following systems: the feedwater, high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) injection lines (valves V-14-1, MO-4442, MO-2512, MO-2440, V-14-3, MO-4441, MO-2312), the core spray injection lines, the RHR shutdown cooling suction line (valves MO-1908, MO-1909), the control rod drive return line (valves V-17-52, V-17-53), and the RCIC and HPCI condensate return line (valves CV-2410, CV-2411, CV-2211, CV-2212).

The objective of the Appendix J requirements is to simulate the condition of the system following a postulated loss-of-coolant accident (LOCA) where the leakage barriers (e.g., valves, gaskets and seals) may be exposed to the containment atmosphere. There are a number of liquid filled systems that are designed to remain intact following a LOCA. These liquid filled systems

include the emergency core cooling system and the containment heat removal systems. For those systems that are designed to engineered safety feature criteria and for which there is assurance that they will remain filled with liquid following a LOCA, the liquid leakage rates should be distinguished from containment atmosphere leakage rates. Therefore, these systems can be hydrostatically tested to demonstrate that the fluid inventory is sufficient to maintain a water seal during and following the accident. A liquid leakage limit can then be assigned for these systems. This criterion is similar in concept to a valve seal-water system criterion and will provide equivalent isolation protection. For this type of testing, radiological analyses should be performed to demonstrate that the liquid leakage limits do not result in significant doses such that their summation would be greater than the 10 CFR Part 100 guidelines.

We find that hydrostatic testing would be acceptable provided the licensee can demonstrate that these lines will indeed be filled with water during and after a LOCA and that the liquid leakage will not result in radiological doses such that their summation would be greater than the 10 CFR Part 100 guidelines. Alternatively, the licensee will either have to provide a correlation acceptable to the staff that will permit the conversion of the measured hydrostatic leakage rates equivalent air leakage rates or provide the capability to leak test with air or nitrogen.

2. Main Steam Line Isolation Valves (Penetrations X-7A, X-7B, X-7C, X-7D)

Section III.C.2 of Appendix J requires that containment isolation valves be locally leak tested (Type C) at the peak calculated containment

pressure (Pa). The licensee has requested an exemption to allow a continuation of a 24 psig test pressure for the main steam isolation valves (MSIVs), AO-4412, AO-4415, AO-4418, AO-4420, AO-4413, AO-4416, AO-4419, and AO-4421. The main steam system design in most operating BWR plants necessitates leak testing of the MSIVs by pressurizing between the valves. The MSIVs are angled in the main steam lines to afford better sealing in the direction of accident leakage. A test pressure of Pa acting on the inboard disc lifts the disc off the seat resulting in excessive leakage into the reactor vessel. This feature was considered when the original test pressure of 24 psig was established for the MSIVs at the design stage of the plant. Since testing of the MSIVs at a reduced pressure between the valves gives rise to greater leakage than when the pressure is applied upstream of the valves, the testing procedure results in a conservative determination of the leakage rate through the valves, so that we find the proposed exemption acceptable.

3. Type C Tests (Penetrations 210 A&B, N-211 A&B, N-224, N-225 A&B, N-226, N-227 A&B, X-13 A&B, X-17, X-39 A&B

Section II.H of Appendix J defines isolation valves as those that: (1) provide a direct connection between the inside and outside atmospheres of the primary reactor containment under normal operation; (2) are required to close automatically upon receipt of a containment isolation signal; (3) are required to operate intermittently under post-accident conditions; or (4) are in main steam lines and feedwater piping and other systems which penetrate containment.

IELPCo maintains that several lines do not include containment isolation valves corresponding to the definition of valves requiring Type C tests in Appendix J because these valves do not receive containment isolation signals, are required to remain open for the duration of the accident, or would remain pressurized for the duration of the accident. The lines containing these valves are the RHR suppression pool suction, the core spray suction, the suppression pool suction for RCIC and HPCI, the LPCI injection, the suppression pool spray, the RHR test line, the vessel head spray, and the containment spray.

We find that the licensee's proposed exemption from the requirements of Section II.H of Appendix J for the above cited valves is acceptable, provided that the licensee shows that these valves will continue to function even if a single active failure were to occur.

4. Submerged Lines

A section appears in the IELPCo request for exemption, between Items 9 and 11 in their submittal of October 13, 1975, which is not specific in identifying any particular valves. This exemption request, however, appears to refer to lines that are submerged in the suppression pool.

Because this section is incomplete, the request cannot be evaluated by the staff. However, the following general staff position may be applicable. For valves in pipes which penetrate the containment but which terminate below the surface of the suppression pool, it should be noted that in the event of a blowdown the suppression pool will serve as a sink and will, therefore, be contaminated. Thus, any valve in one of these lines which is to close automatically or operate intermittently after an accident

should be Type C tested. However, an exemption from the requirement for leak testing with air can be justified by showing that these lines will be filled with water during and after the LOCA and that the liquid leakage will not result in radiological doses such that their summation would be greater than 10 CFR Part 100 guidelines.

5. Proposed Modifications - Containment Airlock

IELPCo has indicated that they will propose modifications to the Technical Specifications for the Duane Arnold Energy Center so as to conform with the requirements of Appendix J for the Containment Airlock, until it can be demonstrated that the continuous leak rate monitoring system is effective. In its letter of October 13, 1975, IELPCo did not identify details of these modifications. Therefore, we are unable to conclude our evaluation on this point.

CONCLUSION

The Iowa Electric Light and Power Company has requested certain exemptions from the requirements of Appendix J to 10 CFR 50. The conclusion of the staff evaluations of these proposed exemptions is as follows:

1. The proposal to conduct local leak rate testing of the feedwater, HPCI, RCIC injection valves, the core spray injection valves, the RHR shutdown cooling suction valves, the control rod drive return line valves, the RCIC condensate return valves and the HPCI condensate return line valves with the piping filled with water is acceptable, provided it can be shown that these valves will indeed be filled with water during and after a LOCA and that the liquid leakage will not result in radiological

doses such that their summation would be greater than 10 CFR Part 100 guidelines.

2. Reduced pressure testing of the MSIVs is conducted in a conservative manner, and is, therefore, acceptable.

3. Isolation valves can be exempted from Type C testing in those lines which remain pressurized or for which the valves are to remain open for the duration of the accident provided the licensee can demonstrate that these conditions will prevail after assuming a single active failure.

4. The containment isolation valves in pipes which terminate below the surface of the suppression pool must be Type C tested. If they will remain filled with water during and after a LOCA they can be hydrostatically tested instead of tested with air. If this is to be done, it must be shown that the liquid leakage will not result in radiological doses such that their summation would be greater than 10 CFR Part 100 guidelines.

5. The proposed modification to the Technical Specifications for testing of the airlocks has not been adequately identified by IELPCo so that an evaluation cannot be completed by the staff.