

August 22, 1996

Mr. Lee Liu
Chairman of the Board, President
and Chief Executive Officer
IES Utilities Inc.
Post Office Box 351
Cedar Rapids, IA 52406-0351

SUBJECT: DUANE ARNOLD ENERGY CENTER - REQUEST FOR ADDITIONAL INFORMATION
(RAI) ON THE DUANE ARNOLD ENERGY CENTER APPENDIX R EXEMPTION
REQUEST (TAC NO. M96097)

Dear Mr. Liu:

On June 28, 1996, IES Utilities Inc., submitted a request for exemption from Section III.G.2.a of 10 CFR Part 50, Appendix R. The staff requires additional information in order to complete its review. The staff requests that you provide a response to the enclosed questions within 60 days to meet the staff's review schedule.

Sincerely,

151
Glenn B. Kelly, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-331

Enclosure: Request for Additional Information

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Sincerely,

A handwritten signature in cursive script that reads "Glenn B. Kelly".

Glenn B. Kelly, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-331

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REQUEST FOR ADDITIONAL INFORMATION

DUANE ARNOLD ENERGY CENTER

REQUEST FOR EXEMPTION FROM 10 CFR PART 50, APPENDIX R

1. Active Fire Detection and Suppression for Fire Zone 16F

- (a) Verify that the automatic smoke detection in this fire area has been designed and installed in accordance with the applicable National Fire Protection Association (NFPA) codes and standards.
- (b) Identify and justify any significant deviations from the applicable NFPA codes and standards.

2. Thermo-Lag Evaluation

The request states that the performance parameters for the Thermo-Lag fire barriers in this area were determined by a field verification process and documentation review. In a request for additional information (RAI) dated December 23, 1994, the staff stated that some of the important installation parameters cannot be verified or determined by walkdowns or installation records. The staff also stated in the RAI that some of the parameters can only be obtained and verified by detailed examination such as disassembling a representative sample of in-plant fire barrier configurations. (a) Provide a description of the detailed examinations and inspections that were performed to obtain or verify the important parameters for the Thermo-Lag fire barrier that is the subject of this request.

The request states that it has been demonstrated that Thermo-Lag will only support combustion with a constant ignition source and with temperatures above approximately 1000 °F. This conclusion is not consistent with the staff observations noted during the industry sponsored Thermo-Lag fire test programs. (b) Provide the technical basis for this conclusion including any supporting fire test data.

3. Fire Hazard Analysis

The request states that the fire duration in this area is less than 15 minutes based on the licensee's fire hazard analysis. The licensee has utilized the equivalent fire severity methodology based on the average combustible loading in the fire zone, for evaluating Thermo-Lag performance. This method is based on the assumptions that: (1) an equal area under the time-temperature fire exposure curve equates to equivalent fire performance, and

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(2) that combustible load is the only important factor that determines fire severity. Both of these assumptions are incorrect, therefore, this methodology cannot be used to evaluate the fire hazards or the performance of the Thermo-Lag barriers. The equal area concept is not valid for materials that undergo chemical decomposition such as Thermo-Lag. For these types of materials, the total energy that the material is exposed to determines the materials performance, not the temperature, as assumed by the equal area concept. The equal area concept is also invalid for fires that develop more rapidly than the standard time-temperature curve, as would be expected for a combustible or flammable liquids fire. The assumption that combustible loading is the only important factor is also incorrect. Important factors such as ventilation, fuel geometry, fuel type, compartment effects and proximity to the target barrier are not considered in the equivalent fire severity method. The application of this method is limited to light hazard occupancies, where the combustibles are evenly distributed over the floor area, the fuel is normal cellulosic materials such as wood and paper, and the combustibles are located solely at the floor level. This is not representative of the configuration of the Duane Arnold Energy Center (DAEC) pump house. (a) Provide a fire hazard analysis that considers all the important factors related to fire severity and Thermo-Lag barrier performance. Guidance on the information necessary to support a request for exemption was provided in the RAI dated September 19, 1994.

The request states that the cables at DAEC have met fire resistance and propagation tests that are similar to the methods specified in IEEE 383. (b) Describe the fire resistance and propagation tests, including the acceptance criteria, for the cables installed in this fire zone. (c) Identify and justify any deviations from the IEEE 383 standard.

The request states that Fire Zone 16F is below grade. (d) Describe the access to this zone for the plant fire brigade. Specifically address if brigade personnel will be required to enter this zone from above the floor level. (e) Specify the fire rated separation, if any, between Fire Hose Station 46 and Fire Zone 16F, and the fire rated separation, if any, between the fire hose station located north of Fire Zone 16B and Fire Zone 16F.

The request states that a time-temperature curve for this fire zone based on actual fire loading was generated using a methodology developed by the Electric Power Research Institute (EPRI) with support from the University of Maryland. (f) Please provide Reference 6 (EPRI Methods for Evaluation of Cable Wrap Fire Barrier Performance, dated July 1995). (g) Describe the detailed verification and validation of the EPRI method. (h) Provide the analysis which demonstrates that the EPRI method is applicable to the DAEC pump house in the response.

4. Evaluation of the Fire Endurance Capability for Fire Barrier 16F-1,
Calculation CAL-M96-004, Revision 1

Page 8 of the calculation states that the top panel of the cable tray has the stiffener (v-rib) oriented external and perpendicular to the maximum external span. Evaluation E1 states that the installed configuration is bounded by Nuclear Energy Institute (NEI) Test 2-10. Section D.3.6 of the NEI Application Guide for Evaluation of Thermo-Lag 330 Fire Barrier Systems, states that no testing has been performed for barriers with stiffener ribs facing away from protected commodities, and that configurations with stiffeners oriented outward would bound configurations with inward facing stiffeners. (a) Provide a technical basis for the conclusion that the internal panel rib orientation of NEI Test 2-10 bounds the external panel rib orientation of barrier 16F-1.

Evaluation E1 of the calculation states that the presence or orientation of v-ribbed panels on the side and bottom of the cable tray is unknown. In the RAI dated December 21, 1993, the staff listed the important barrier parameters identified by the Nuclear Management and Resources Council (NUMARC) during the industry Thermo-Lag fire test program. Panel rib orientation is included in the list of important barrier parameters. In the RAI dated December 23, 1994, the staff stated that licensees must have valid and verifiable information on each of the important parameters for its in-plant Thermo-Lag fire barriers if it intends to retain its Thermo-Lag fire barrier installations. (b) Verify the presence and orientation of the panel ribs for the barrier assembly that is the subject of this exemption request.

Evaluation E2 of the calculation states that the Thermo-Lag 1 hour, 2-inch air drop tested by the Tennessee Valley Authority (TVA) has the same construction techniques as the installed configuration at DAEC. Test Item 5 in TVA Test Report No. 11210-9455c, was constructed with a 304 stainless steel stress skin overlay held in place by 18 gauge tie wires. This construction upgrade technique is not typical of most existing Thermo-Lag installations. (c) Verify that this upgrade is provided for the Thermo-Lag barrier 16F-1.

Page 16 of the calculation references NEI Test 2-3. The 3/4-inch conduit tested in NEI Test 2-3 had a total enclosed mass of 0.36 lbs/ft. The total enclosed mass of the air drop in barrier 16F-1 is not provided in the calculation. (d) Provide the total enclosed mass of the subject air drop.

Mr. Lee Liu
IES Utilities Inc.

Duane Arnold Energy Center

cc:

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