

August 16, 1991

Docket No. 50-331

Mr. Lee Liu
Chairman of the Board and
Chief Executive Officer
Iowa Electric Light and Power Company
P. O. Box 351
Cedar Rapids, Iowa 52406

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Dear Mr. Liu:

SUBJECT: EXEMPTION TO 10 CFR PART 50, APPENDIX R, SECTION III.G.2
(TAC NO. 66186)

The Commission has issued the enclosed Exemption from certain requirements of Appendix R to 10 CFR Part 50 for the Duane Arnold Energy Center, in response to your letter dated August 25, 1987. The subject regulation is related to the requirement for a 3-hour barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage.

The Exemption is enclosed. A copy of the Exemption is being filed with the Office of the Federal Register for publication.

Sincerely,

~~original~~ signed by

Clyde Y. Shiraki, Sr. Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

PD33:LA:DRPW
~~PKreutzer~~
7/26/91

PD33:PM:DRPW
CShiraki/bj
7/27/91

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Mr. Lee Liu
Iowa Electric Light and Power Company

Duane Arnold Energy Center

cc:

Jack Newman, Esquire
Kathleen H. Shea, Esquire
Newman and Holtzinger
1615 L Street, N.W.
Washington, D.C. 20036

Chairman, Linn County
Board of Supervisors
Cedar Rapids, Iowa 52406

Iowa Electric Light and Power Company
ATTN: David L. Wilson
Post Office Box 351
Cedar Rapids, Iowa 52406

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Rural Route #1
Palo, Iowa 52324

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Mr. John A. Eure
Assistant to the Division Director
for Environmental Health
Iowa Department of Public Health
Lucas State Office Building
Des Moines, Iowa 50319

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
IOWA ELECTRIC LIGHT AND POWER
COMPANY
CENTRAL IOWA POWER
COOPERATIVE, AND
CORN BELT POWER COOPERATIVE
(Duane Arnold Energy Center)

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Docket No. 50-331

EXEMPTION

I.

The Iowa Electric Light and Power Company, et al., (the licensee), is the holder of Facility Operating License No. DPR-49 which authorizes operation of the Duane Arnold Energy Center at power levels not in excess of 1658 megawatts thermal. The license provides, among other things, that it is subject to all rules, regulations and Orders of the Nuclear Regulatory Commission (the Commission) now and hereafter in effect.

The facility consists of a boiling water reactor located at the licensee's site in Linn County, Iowa.

II.

On November 19, 1980, the Commission published a revised Section 50.48 and a new Appendix R to 10 CFR Part 50 regarding fire protection features of nuclear power plants. The revised Section 50.48 and Appendix R became effective on February 17, 1981. Section III of Appendix R contains 15

subsections lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant.

One of the subsections, III.G, is the subject of the licensee's exemption request. Specifically, Subsection III.G, Part 2 requires a 3-hour fire barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage.

By letter dated August 25, 1987, the Iowa Electric Light and Power Company (the licensee) responded to an unresolved item (50-331/86005-01) from an NRC fire protection program inspection conducted at the Duane Arnold Energy Center (DAEC) on February 24-28, March 12, April 22-23, and May 15, 1986. The unresolved item was concerned with the potential for fire damage to redundant safe shutdown cables in penetrations passing through the expansion gap due to burning combustible foam material located in the expansion gap.

Boiling Water Reactor (BWR) Containments expand and contract with both the thermal and pressure changes which occur over the course of a normal operating cycle. In order to accommodate these dimensional changes, an "Expansion Gap" of about 2½ to 3 inches is provided between the steel containment vessel (the drywell) and the reinforced concrete biological shield that surrounds the drywell. This Expansion Gap is built in by means of installing compressible plastic foam sheets around the outside of the steel drywell before pouring the concrete.

At Dresden Units 2 and 3, the plastic foam was covered with a glass-fiber mat which in turn was sealed with an epoxy resin and left permanently in place after the concrete pours.

During flame cutting operations on January 20, 1986, and again on June 4, 1988, on certain mechanical penetrations at Dresden Unit 3, maintenance personnel allowed hot slag to drop down the annulus around the penetration. The hot slag ignited the expansion gap material which smoldered for several hours and was difficult to extinguish. Licensees with designs similar to Dresden have evaluated their particular construction designs and requested exemptions, as appropriate, from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 as they apply to the expansion gap.

In its letter dated August 25, 1987, the licensee requested an exemption from the Commission's regulations in 10 CFR Part 50, Appendix R, Section III.G.2 requiring a 3-hour barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage.

Section III.G of Appendix R to 10 CFR Part 50 provides different acceptable methods of protecting safe shutdown capability from the effects of fire. These different methods utilize various combinations of 3-hour and 1-hour fire-related barriers, automatic fire detection and fixed fire suppression capability, and spatial separation between redundant safe shutdown components. The licensee has requested an exemption from the specific requirements for 3-hour fire rated barrier separation for the redundant safe shutdown train instrumentation and power and control cables located in containment penetrations where they pass through the expansion gap between the steel drywell and the concrete biological shield.

The technical information furnished by the licensee to support this requested exemption included the following:

- A. Unlike the Dresden construction, most of the foam material was removed from the expansion gap at DAEC following each concrete pour. The only combustible material remaining in the expansion gap at DAEC is elastic polyurethane circumferential strips 3 inches thick x 5 inches wide on 2-foot centers below elevation 748 feet 9 inches and 3-foot centers above that elevation. (The equator of the spherical portion of the drywell is at elevation 766 feet.)
- B. The strips are manufactured of plastic material that is classed as "self-extinguishing" in accordance with ASTM D 1692.
- C. Because of the geometry (long narrow circumferential strips separated by 3 feet on centers from below the equator of the bulb) and the self-extinguishing characteristics of the plastic material, any fire that might occur is expected to be limited to the area of ignition and would not spread to other strips.
- D. The steel drywell itself will serve as a large heat sink to further assist in cooling and aiding the self-extinguishing characteristics of this material should it become ignited.
- E. Maintenance work on containment penetrations is administratively controlled. In addition to fire watches, precautions include filling the annulus space with noncombustible material prior to any operations which might produce hot slag or sparks.

The staff has evaluated the technical information furnished by the licensee to support its requested exemption. On the basis of that evaluation, the staff concludes that the likelihood of fire occurring in the expansion gap foam material is slight. Further, if the material should become ignited, the staff concludes that the fire would be localized and would not endanger components of redundant safe shutdown trains passing through the drywell.

On this basis, the staff finds that the licensee has demonstrated, as required by 10 CFR 50.12(a)(2)(ii), that the subject redundant safe shutdown train instrumentation and power and control cables located in containment penetrations where they pass through the expansion gap between the steel drywell and the concrete biological shield need not have a 3-hour fire barrier to achieve the underlying purpose of the rule (i.e., achieve and maintain safe shutdown) in that the geometry, construction techniques, and self-extinguishing characteristic of the foam material in the expansion gap will maintain the temperature increase in the cables below the damage threshold.

III.

In summary, the NRC staff finds that the licensee has demonstrated that there are special circumstances present as required by 10 CFR 50.12(a)(2). Further, the staff also finds that, for this exemption request, the fire protection provided by the licensee will not present an undue risk to the public health and safety.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption as described in Section II is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest and hereby grants the exemption to the requirements of 10 CFR Part 50, Appendix R, Section III.G.2.

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register (56 FR 32229, July 15, 1991).

Accordingly, based upon the environmental assessment, the Commission has determined that the granting of the exemption will not have a significant effect on the quality of the human environment.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

original signed by

Bruce A. Boger, Director
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 16th day of August 1991.

PD33:LA:DRPW
PK [signature]
7/26/91

PD33:PM:DRPW
CShiraki/bj [signature]
7/24/91

PD33:D:DRPW
JHannon [signature]
7/26/91

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8/12/91

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8/16/91

DOCUMENT NAME: 66186 EXEMPTION