JUN 7 1974

Docket No. 50-254

RMDiggs, L:ORB #2
CHebron, DRA
NDube, L:OPS
MJinks, DRA (4)
BScharf, DRA (15)
SKari, L:RP
SVarga, L:RP

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JSaltzman, L:OAI
FLIngram, OIS
JWagner, OC
WOMiller, DRA
PCollins, L:OLB
DLZiemann, L:ORB #2
JIReisland, L:ORB #2

Commonwealth Edison Company
ATTN: Mr. J. S. Abel
Nuclear Licensing Administrator -
Boiling Water Reactors
P. O. Box 767
Chicago, Illinois 60690

Gentlemen:

Your letter dated February 28, 1974, and prior supplements thereto dated June 15, July 11, and December 14, 1973, requested the Commission's authorization for Commonwealth Edison Company (CE) to operate the Quad-Cities Nuclear Power Station Unit 1 using 7 x 7 fuel assemblies containing mixed plutonium-uranium oxide (MO). The proposed Technical Specifications change (Figure 3.5.1) was included as part of your proposed refueling changes filed with your letter dated March 18, 1974. By letter dated March 18, 1974, the Regulatory staff advised you that a "Notice of Proposed Issuance of Authority to Operate Using Mixed Oxide Fuel" for Quad-Cities Station Unit 1 was filed with the Office of the Federal Register for publication. The notice was subsequently published in the Federal Register on March 22, 1974.

We have reviewed your application for operating Quad-Cities Unit 1 with MO fuel assemblies and your industrial security plan submitted by letter dated May 6, 1974, as it relates to storage of new MO fuel and have concluded that there is reasonable assurance that the health and safety of the public will not be endangered. This finding is supported by our enclosed Safety Evaluation.

Accordingly, Amendment No. 11 to Facility Operating License No. DPR-29 is enclosed authorizing those changes necessary to the license and the Technical Specifications to permit Commonwealth to operate Quad-Cities Unit 1 with mixed oxide fuel assemblies.

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APPI,

A copy of a notice of the license amendment which is being forwarded to the Office of the Federal Register for publication relating to the amendment issuance is enclosed for your information.

Sincerely,

Original signed by:
Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Directorate of Licensing

Enclosures:
1. Amendment No. 11 to License No. DPR-29
2. Safety Evaluation
3. Federal Register Notice

cc w/enclosures:
Mr. Charles Whitmore
President and Chairman
Iowa-Illinois Gas and
Electric Company
206 East Second Avenue
Davenport, Iowa 52801

John W. Rowe, Esquire
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza
Chicago, Illinois 60670

Anthony Z. Roisman, Esquire
Berlin, Roisman and Kessler
1712 N Street, N. W.
Washington, D. C. 20036

Mr. Robert W. Watts, Chairman
Rock Island County Board of
Supervisors
Rock Island County Courthouse
Rock Island, Illinois 61201

Moline Public Library

cc w/enclosures and cy of CECo
ltr dtd 3/18/74:
Mr. Leroy Stratton
Bureau of Radiological Health
Illinois Department of Public Health
Springfield, Illinois 62706

Mr. Gary Williams
Federal Activities Branch
Environmental Protection Agency
1 N. Wacker Drive, Room 822
Chicago, Illinois 60606

Mr. Ed Vest
Environmental Protection Agency
1735 Baltimore Avenue
Kansas City, Missouri 64108

J. Abel, CE, notified by telephone 6-7-74. JIR

OFFICE	L:ORB #2	L:ORB #2	L:ORB #2	OGC	L:OR
X7403 SURNAME	JIRiesland:sjh	RMDiggs	DLZiemann	R.Kinsey	KRGoller
DATE	5/23/74	5/30/74	5/31/74	6/7/74	6/7/74

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY
(QUAD-CITIES NUCLEAR POWER STATION UNIT 1)

DOCKET NO. 50-254

AMENDMENT TO FACILITY LICENSE

License No. DPR-29
Amendment No. 11

1. The Atomic Energy Commission (the Commission) has found that:

   A. The application for license amendment dated February 28, 1974, and prior supplements dated June 15, 1973, July 11, 1973, December 14, 1973, and March 18, 1974, comply with the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public, and

   C. There is reasonable assurance that (i) the reactor can be operated in accordance with the license, as amended, without endangering the health and safety of the public and (ii) such activities will be conducted in compliance with the rules and regulations of the Commission.

2. Facility License No. DPR-29, as amended, issued to Commonwealth Edison Company and the Iowa-Illinois Gas and Electric Company for operation of its Quad-Cities Unit 1, located in Rock Island County, Illinois, is hereby amended by replacing subparagraphs 2.B and 3.B with the following subparagraphs:

2.B Pursuant to the Act and 10 CFR Part 70, "Special Nuclear Material", to receive, possess, and use up to (1) 5,000 kilograms of contained uranium 235, and (2) 8 kilograms of contained plutonium in connection with operation of the facility.

3.B Technical Specifications

The Technical Specifications contained in Appendices A and B attached to Facility Operating License No. DPR-29 are revised as indicated in the attachment to this license amendment. The Technical Specifications, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised.

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by:
Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Directorate of Licensing

Attachment:
Change No. 20 to Appendix A
Technical Specifications

Date of Issuance: JUN 7 1974

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ATTACHMENT TO LICENSE AMENDMENT NO. 11

CHANGE NO. 20 TO APPENDIX A TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NO. DPR-29

Replace Figure 3.5.1 (page No. 105A) with the attached Revised Figure 3.5.1.

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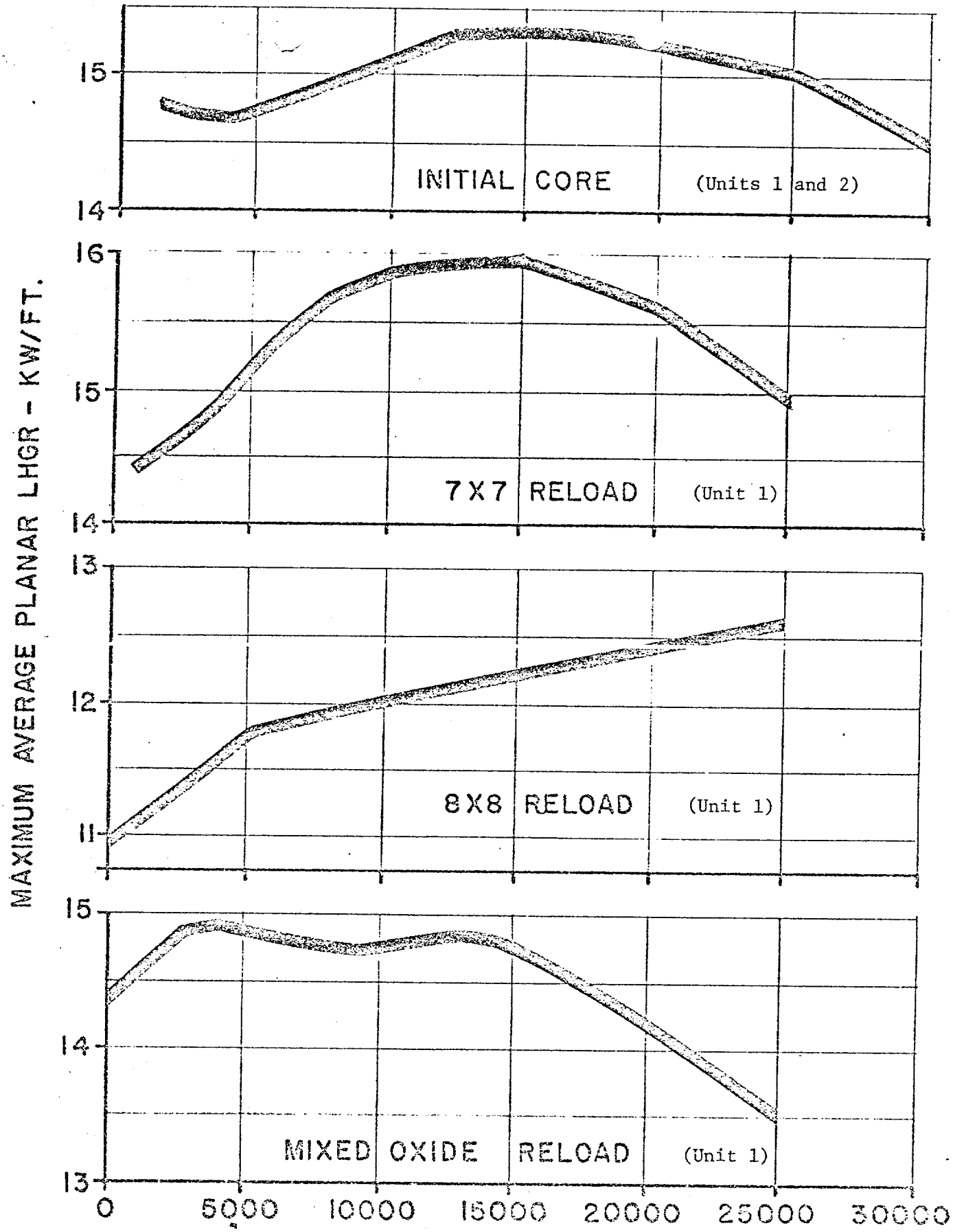

FIGURE 3.5.1 MAXIMUM ALLOWABLE PLANAR LHGR APPLICABLE TO QUAD-CITIES INITIAL AND RELOAD FUEL

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING

SUPPORTING AMENDMENT NO. 11 TO LICENSE NO. DPR-29

(CHANGE NO. 20 TO APPENDIX A TECHNICAL SPECIFICATIONS)

COMMONWEALTH EDISON COMPANY

QUAD-CITIES NUCLEAR POWER STATION UNIT 1

DOCKET NO. 50-254

INTRODUCTION

In a letter dated February 28, 1974, and prior supplements thereto dated June 15, 1973, July 11, 1973, and December 14, 1973, Commonwealth Edison Company (CE) requested authorization to operate Quad-Cities Station Unit 1 utilizing 7 x 7 fuel assemblies containing plutonium-uranium oxide (MO). The proposed change to the Technical Specifications (Figure 3.5.1) was included as part of CE's proposed refueling changes filed with letter dated March 18, 1974. The Commission's "Notice of Proposed Issuance of Authority to Operate Using Mixed Oxide Fuel" for Quad-Cities Station Unit 1 was published in the Federal Register on March 22, 1974. No request for hearings or petitions for leave to intervene were filed.

EVALUATION

CE proposes to load five MO fuel assemblies in the Quad-Cities Unit 1 core during its first refueling outage in the spring of 1974. These assemblies are designed to operate within the same constraints as uranium fuel including, for example, interim ECCS acceptance criteria temperature and metal-water reaction limits and minimum critical heat flux ratio (MCHFR) limits. Additional cold shutdown margin has been introduced by use of more Gd_2O_3 pins than are incorporated in the uranium reload fuel assemblies. The other mechanical, nuclear, thermal, and hydraulic design features; transient response characteristics; and safety criteria and margins are essentially the same as for uranium fuel assemblies. The basic fuel assembly hardware is the same as for the uranium fuel.

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CE states that five assemblies, containing 48 MO fuel rods, are part of a program directed to a step wise approach to full-scale MO fuel reloads. Addition of 48 MO fuel rods to the 35,330 Quad-Cities 1 UO_2 rods results in a negligible perturbation on operating characteristics. The fundamental approach, small-scale irradiation, is the same as that used in design verification by most prudent designers and contributes to safety by verifying the design prior to full scale use of the design in reloads.

The approximate plutonium balance on the Quad-Cities Unit 1 reactor is as follows:

Pu in Core Before Refueling	436.5 Kgs
Pu Discharged in 50 Assemblies (6560 MWd/t)	34.2 Kgs
Pu Added in 48 EEI-GE Rods	7.3 Kgs
Net Pu in Core After Refueling	409.6 Kgs

Thus it can be seen that the quantity of plutonium introduced in the 48 MO fuel rods is small compared to that which will be produced in several months of operation. Because the total inventory of plutonium in the core is essentially unchanged, as reflected above, the net overall effect of the 48 MO fuel rods on reactor transient response is negligible and in the unlikely event that all 48 Rods should fail, there would be no significant effect on the fission product or heavy element release or on the health and safety of the public. Because of the small amount of mixed oxide fuel introduced (0.14 percent of the core), design basis accidents which can be local in nature are the only accidents affected by the mixed oxide fuel. These are the refueling accident and the control rod drop accident. The results of the refueling accident analysis have been shown by the applicant to be no more severe than the previously reviewed results for UO_2 fuel because the fission product inventory remains essentially unchanged. The methods used by the applicant to analyze the control rod drop accident were based on test data identified in the application. Because local vaporization can occur in PuO_2 particles greater than 1000 u in size and result in penetration of the clad, fabrication control procedures were used to limit the maximum PuO_2 particle size to 500 u in diameter. By limiting the size of particle, the major difference in the results of the rod drop accident between MO and UO_2 fuel has been removed. The Doppler coefficients of the assemblies containing MO rods will be approximately 10 percent more negative than that of the UO_2 reload fuel, due to Pu-240 in the MO rods. This contributes a slightly greater margin of safety in the control rod drop analysis with MO fuel.

The MO fuel assemblies are designed to operate within the same operating limits as the initial fuel in the same environment. That is, MCHFRs will be greater than 1.9 and MLHGRs will not be greater than 17.5 kW/ft.

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The core safety analysis for Quad-Cities Unit 1 is not significantly altered by the presence of the five mixed oxide bundles in the core. Peak cladding temperature following a LOCA, for example, is predicted to be 2025°F well below the ECCS interim acceptance criteria. Calculation of densification effects involved measured thermal-simulation parameters for the MO pellet and the use of fuel densification models accepted by the Regulatory staff. The MO fuel assemblies are not the peak power assemblies in the Quad-Cities Unit 1 core and none of the MO fuel rods are expected to limit heat generation.

Our recent generic review(1) of the large-scale utilization of plutonium in light-water reactors has indicated that core performance is not degraded with the use of plutonium recycle fuels.

Seven BWRs(2) are now operating with some Pu recycle fuel and this experience has covered a span of more than six years. Results of the program have shown the performance of the MO fuel to be very good, reaching peak burnups of 35,000 MWd/t in the Big Rock Point core. The Quad-Cities mixed oxide fuels are part of an Edison Electrical Institute (EEI) plutonium utilization program and as such are well characterized. Documentation of the EEI/General Electric (EEI/GE) program is presented in a series of topical reports and a detailed description of the planning, design, fabrication, and related performance analysis of the Quad-Cities mixed oxide fuels appears in several of these reports(3). It can be expected that irradiation data obtained in this program will be reported extensively, as have results shown in the application, from similar EEI/GE mixed oxide fuel irradiations in the Big Rock Point reactor.

In the May 6, 1974 supplement to the application, CE submitted an Industrial Security Plan (proprietary) which satisfies the basic requirements of 10 CFR 73, Parts 73.50 and 73.60 for storage of plutonium fuels.

(1) WASH-1303, "Technical Report on Effects of Plutonium Utilization on the Performance of Light Water Reactors", Regulatory staff, U. S. Atomic Energy Commission, April 1974.

(2) KAHL (Germany), LINGEN (Germany), Garigliano (Italy), Big Rock Point (Michigan), Dresden 1 (Illinois), JPDR (Japan), and Dodewaard (Netherlands).

(3) NEDC-12152, NEDC-12198, NEDC-10586, and NEDC-10747.

CONCLUSIONS

Based on the above evaluation, we conclude that the storage and use of mixed oxide fuel for operation of Quad-Cities Unit 1 in the manner proposed by CE provides reasonable assurance that the health and safety of the public will not be endangered by this action.

/s/

John I. Riesland
Operating Reactors Branch #2
Directorate of Licensing

Original signed by
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Date: JUN 7 1974

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DATE ➤						

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-254

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY
(QUAD-CITIES NUCLEAR POWER STATION UNIT 1)

NOTICE OF ISSUANCE OF AUTHORITY TO OPERATE USING MIXED OXIDE FUEL

No request for a hearing or petition for leave to intervene having been filed following publication of the notice of proposed action in the Federal Register on March 22, 1974 (39 F.R. 10927), the Atomic Energy Commission (the Commission) has issued Amendment No. 11 to Facility Operating License No. DPR-29 to the Commonwealth Edison Company and the Iowa-Illinois Gas and Electric Company (jointly referred to as the licensee). This amendment, effective immediately, authorizes the licensee to operate the Quad-Cities Nuclear Power Station Unit 1 (the facility) using a partial loading of five 7 x 7 fuel assemblies containing mixed plutonium and uranium oxide. The related changes to the Technical Specifications are incorporated in Amendment No. 11 as Change No. 20. The licensee is presently licensed to possess and operate the facility located in Rock Island County, Illinois, at power levels up to 2511 MWt using a full core of 7 x 7 fuel (containing U-235).

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The Commission has found that (a) the application for the above action dated February 28, 1974, including supplements filed prior to the application dated June 15, 1973, July 11, 1973, December 14, 1973, and March 18, 1974, complies with the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's rules and regulations published in 10 CFR Chapter I, (b) there is reasonable assurance that the reactor can be operated in accordance with the license, as amended, without endangering the health and safety of the public and that such activities will be conducted in compliance with the rules and regulations of the Commission, and (c) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public. The Commission's Directorate of Licensing has completed its evaluation of the action and issued a favorable Safety Evaluation.

A copy of Amendment No. 11 with Change No. 20 to the Technical Specifications of Facility Operating License No. DPR-29 and the Directorate of Licensing's Safety Evaluation issued concurrently with the amendment are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., and at the Moline Public Library at 504 - 17th Street in Moline, Illinois 61265.

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Single copies of these items may be obtained upon request sent to the U. S. Atomic Energy Commission, Washington, D. C. 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Dated at Bethesda, Maryland
this JUN 7 1974

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