



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

October 8, 1992

Docket No. 50-247

Mr. Stephen B. Bram  
Vice President, Nuclear Power  
Consolidated Edison Company  
of New York, Inc.  
Broadway and Bleakley Avenue  
Buchanan, New York 10511

Dear Mr. Bram:

SUBJECT: ISSUANCE OF AMENDMENT FOR INDIAN POINT NUCLEAR GENERATING  
UNIT NO. 2 (TAC NO. M82799)

The Commission has issued the enclosed Amendment No. 158 to Facility Operating License No. DPR-26 for the Indian Point Nuclear Generating Unit No. 2. The amendment consists of changes to the License Condition 2.B.(2) and to the Technical Specifications in response to your application transmitted by letter dated February 6, 1992, as supplemented on September 17, 1992.

The amendment revises Indian Point Nuclear Generating Unit No. 2 Operating License and the Technical Specification Section 5.3.A.3 to increase the enrichment of reload fuel to 5.0 w/o U-235, Section 5.4.2.A to increase the enrichment of fuel in the new fuel storage racks to 5.0 w/o U-235, and Section 5.4.2.B to redefine the limit of enrichment for fuel stored in the spent fuel racks.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

Francis J. Williams, Jr., Project Manager  
Project Directorate I-1  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 158 to DPR-26
2. Safety Evaluation

cc w/enclosures:  
See next page

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Mr. Stephen B. Bram  
Consolidated Edison Company  
of New York, Inc.

Indian Point Nuclear Generating  
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Regional Administrator, Region I  
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475 Allendale Road  
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DATED: October 8, 1992

AMENDMENT NO. 158 TO FACILITY OPERATING LICENSE NO. DPR-26-INDIAN POINT UNIT 2

Docket File

NRC & Local PDRs

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OC/LFMB

PD plant-specific file

C. Cowgill, Region I

cc: Plant Service list



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

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

DOCKET NO. 50-247

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 158  
License No. DPR-26

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Consolidated Edison Company of New York, Inc. (the licensee) dated February 6, 1992, as supplemented September 17, 1992, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. 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
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-26 is hereby amended to read as follows:

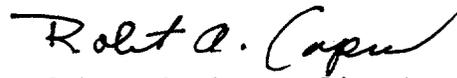
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(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 158, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert A. Capra, Director  
Project Directorate I-1  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachments:

1. Page 3 of License
2. Changes to the Technical Specifications

Date of Issuance: October 8, 1992

2. Facility Operating License No. DPR-26, as amended, issued to Consolidated Edison Company of New York, Inc., is hereby amended in its entirety to read as follows:

- A. This amended license applies to the Indian Point Nuclear Generating Unit No. 2, a pressurized water nuclear reactor and associated equipment (the facility), which is owned by Consolidated Edison Company of New York, Inc. The facility is located in Westchester County, New York, and is described in the "Final Facility Description and Safety Analysis Report" as supplemented and amended.
  
- B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses Consolidated Edison Company of New York, Inc.:
  - (1) pursuant to Section 104b of the Act and 10 CFR Part 50, "Licensing of Production and Utilization Facilities" to possess, use, and operate the facility at the designated location in Westchester County, New York, in accordance with the procedures and limitations set forth in this license;
  
  - (2) pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Facility Description and Safety Analysis Report, as supplemented and amended and as described in the Commission's authorization through Amendment No. 158 to this license.

ATTACHMENT TO LICENSE AMENDMENT NO. 158

FACILITY OPERATING LICENSE NO. DPR-26

DOCKET NO. 50-247

Revise Appendix A as follows:

Remove Pages

5.3-1

5.4-1

Insert Pages

5.3-1

5.4-1

### 5.3 REACTOR

#### Applicability

Applies to the reactor core, reactor coolant system, and emergency core cooling systems.

#### Objective

To define those design features which are essential in providing for safe system operations.

#### A. REACTOR CORE

1. The reactor core contains approximately 87 metric tons of uranium in the form of slightly enriched uranium dioxide pellets. The pellets are encapsulated in Zircaloy-4 tubing to form fuel rods. The reactor core is made up of 193 fuel assemblies. Each fuel assembly contains 204 fuel rods<sup>(1)</sup>.
2. Deleted
3. The enrichment of reload fuel will be no more than 5.0 weight percent U-235 and will be stored in accordance with Technical Specification 5.4.
4. Deleted
5. There are 53 control rods in the reactor core. The control rods contain 142 inch lengths of silver-indium-cadmium alloy clad with stainless steel<sup>(2)</sup>.

#### B. REACTOR COOLANT SYSTEM

1. The design of the reactor coolant system complies with the code requirements<sup>(3)</sup>. Design values for system temperature and pressure are 650°F and 2485 psig, respectively.

## 5.4 FUEL STORAGE

### Applicability

Applies to the capacity and storage arrays of new and spent fuel.

### Objective

To define those aspects of fuel storage relating to prevention of criticality in fuel storage areas.

### Specifications

1. The spent fuel pit structure is designed to withstand the anticipated earthquake loadings as a Class I structure. The spent fuel pit has a stainless steel liner to ensure against loss of water.
  
- 2.A. The new fuel storage rack is designed so that it is impossible to insert assemblies in other than an array of vertical fuel assemblies with a sufficient center-to-center distance between assemblies to assure  $K_{eff} \leq 0.95$ , even if unborated water were used to fill the pit and with fuel assemblies containing a maximum enrichment of 5.0 weight percent U-235, and poisons, if necessary to meet the  $K_{eff}$  limit.
  
- 2.B. The spent fuel storage racks are designed and their loading maintained within the limits of Technical Specification 3.8.D.1, such that  $K_{eff} \leq 0.95$ , even if unborated water were used to fill the pit and with the fuel assemblies containing a maximum enrichment of 5.0 weight percent U-235.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 158 TO FACILITY OPERATING LICENSE NO. DPR-26

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2

DOCKET NO. 50-247

1.0 INTRODUCTION

By letter dated February 6, 1992, as supplemented September 17, 1992, the Consolidated Edison Company of New York (the licensee) submitted a request for changes to the Indian Point Nuclear Generating Unit No. 2 Facility Operating License No. DPR-26 and Technical Specifications (TS). The requested changes would permit core reload with fuel assemblies enriched to 5.0 w/o U-235 (TS Section 5.3.A.3), permit reload fuel assemblies enriched to 5.0 w/o U-235 to be stored in the new fuel storage racks (TS Section 5.4.2.A), and redefine the limit on fuel assembly enrichment permitted in the spent fuel storage racks from grams U-235 per axial centimeter to w/o U-235 (TS Section 5.4.2.B). The storage of 5.0 w/o U-235 spent fuel in the spent fuel racks at Indian Point Unit 2 (IP2) was approved by the NRC in Amendment No. 150, issued April 19, 1990. The September 17, 1992, letter requested that License Condition 2.B.(2) be updated. It did not change the initial proposed no significant hazards consideration determination and was not outside the scope of the original notice.

2.0 EVALUATION

2.1 New Fuel Racks

The new fuel storage facility at IP2 has a total storage capacity sufficient for 72 new fuel assemblies. The storage locations are arranged in four parallel rows with a pitch of 20.5 inches between boxes within a row. The rows of boxes are grouped in pairs. The rows in each pair are spaced 20.5 inches apart and the distance between the pair of rows is 46.0 inches. The new storage racks, under the regular dry conditions, have sufficient safety margin to withstand the 5.0 w/o enriched fuel which, in a postulated accident could be accidentally loaded without any Integral Fuel Burnable Absorber (IFBA) rods.

2.2 Criticality Computational Methods

The IP2 new fuel storage racks were previously analyzed for the storage of Westinghouse fuel assemblies with enrichments up to 4.5 w/o U-235. The

licensee performed the current analysis to consider the storage of Westinghouse fuel containing IFBA's with enrichment up to 5.0 w/o U-235. The IFBA rods in the fuel assemblies consist of fuel pellets coated with a thin layer of boron, which is thus an integral part of the fuel assembly. The analysis showed that by taking credit for IFBAs with fuel enrichments of up to 5.0 w/o U-235, the K-eff of the rack system, including the associated uncertainties and calculational biases, is less than the criticality design criterion of K-eff < 0.95. This K-eff limit applies to the new fuel racks when flooded with potential moderators, except when optimum moderation is assumed, in which case the K-eff limit is 0.98.

The licensee performed the reactivity calculations with the KENO Va code, a three dimensional Monte Carlo theory program. The licensee used the latest cross-sectional libraries as inputs to this code, including self-shielding resonance cross-sections appropriate for each geometry considered. The analytical methods and models used in the reactivity analysis have been compared against experimental data sufficiently diverse to establish that the bias and uncertainty of the method will apply to rack conditions that include strong neutron absorbers, large water gaps, and low moderator densities. The staff finds these methods and models to be acceptable.

The licensee used the concept of reactivity equivalence to establish the poison material loading required to meet the criticality limits. The concept of reactivity equivalence includes the assumption that adding the IFBAs rods will cause the reactivity to decrease. In using this concept the licensee performed a series of reactivity calculations to generate a set of IFBA rod numbers for each enrichment ordered. Each of these rod numbers yields the same value for K-eff when the fuel is stored in the new fuel racks. The licensee used the PHOENIX depletable, two-dimensional, transport theory code to calculate the burnup dependence and reactivity sensitivity of the rods. The licensee validated the PHOENIX code by comparing the results it yielded with those obtained from (1) experiments in which the isotopic fuel composition was examined after the fuel was discharged from a reactor and (2) an extensive set of criticality experiments.

The licensee conducted numerous studies of the effects of the fuel storage configuration on the nuclear characteristics of the fuel and the new fuel racks. The licensee found that introducing water into the new fuel racks produced the worst case scenario. Consequently, the licensee used as the bounding accident the fully flooded and low density optimum moderation cases that it analyzed. This resulted in the most conservative value of K-eff for the fuel storage rack.

Other postulated events could lead to an increase in the reactivity of the storage racks, such as (1) misloading an assembly with a combination of enriched rods and IFBA rods that is outside of the acceptable limits or (2) dropping an assembly into a cell that is already loaded. However, any of these other postulated events would have to increase the reactivity by more

than 20 percent delta K to approach the Technical Specification criteria, since the licensee normally maintains the new fresh fuel racks in a dry environment.

The licensee analyzed the case of misloading an assembly having a combination of enriched rods and IFBA rods that is outside the acceptable limits, with every cell in the rack misloaded with fresh 5.0 w/o fuel assemblies without IFBAs. The licensee found that this accident would increase the reactivity of the fresh fuel racks by approximately 5 percent delta K. Misloading with a single assembly would increase reactivity by significantly less of an amount. Generic studies have shown that accidentally dropping an assembly into an already loaded rack would increase reactivity a maximum of less than 10 percent delta K. Therefore, the cases of introducing full density and low density (optimum moderation) are the bounding reactivity events. The value of K-eff in these cases remains below the acceptance limits of 0.95 and 0.98, respectively.

The licensee assumed the worst case reference configuration in calculating K-eff. This configuration consisted of symmetrically placed fuel assemblies of 4.55 w/o enrichment, extended infinitely in the lateral and vertical directions to prevent any neutron leakage. The licensee found the maximum value for K-eff to be 0.9491 at full water density conditions and 0.9475 at low density optimum moderation conditions. These values for K-eff included all uncertainties and biases and meet the NRC design criteria in the Standard Review Plan NUREG-0800. The K-eff values for the 5.0 w/o enriched fuel with IFBA, under fully flooded and low density optimum moderation conditions, also met the NRC Standard Review Plan acceptance criteria of being less than 0.95 and 0.98, respectively.

### 3.0 SUMMARY

Based on the above evaluation, the staff concludes that the fresh and spent fuel storage racks at IP2 can accommodate Westinghouse fuel assemblies with a maximum nominal enrichment of 5.0 w/o U-235. The acceptability of this fuel in the actual IP2 core, of course, will be evaluated during each reload analysis by verifying that none of the Technical Specifications limits affected by fuel enrichment is violated.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact was published in the Federal Register on

(57 FR 46200). Based upon the environmental assessment, the Commission has determined that issuance of the amendment will not have a significant effect on the quality of the human environment.

#### 6.0 CONCLUSION

The Commission published a Notice of Consideration of Issuance of Amendment to Facility Operating License and Opportunity for Hearing in the Federal Register on April 17, 1992 (57 FR 9441). No requests for hearing were received.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor:  
Anthony Attard

Date: October 8, 1992

October 8, 1992

Mr. Stephen B. Bram  
Vice President, Nuclear Power  
Consolidated Edison Company  
of New York, Inc.  
Broadway and Bleakley Avenue  
Buchanan, New York 10511

Dear Mr. Bram:

SUBJECT: ISSUANCE OF AMENDMENT FOR INDIAN POINT NUCLEAR GENERATING  
UNIT NO. 2 (TAC NO. M82799)

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A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,  
Original Signed By:  
Francis J. Williams, Jr., Project Manager  
Project Directorate I-1  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

- 1. Amendment No.158 to DPR-26
- 2. Safety Evaluation

cc w/enclosures:

See next page

\*See previous concurrence

OFC	LA:PDI-1	PM:PDI-1	*OGC	PD:PDI-1	
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DATE	10/8/92	10/8/92	08/10/92	10/8/92	

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