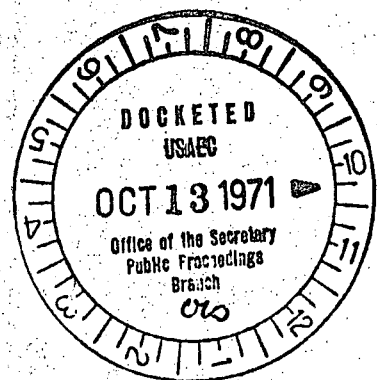


DISCUSSION AND CONCLUSIONS BY THE
DIVISION OF REACTOR LICENSING
U. S. ATOMIC ENERGY COMMISSION
PURSUANT TO APPENDIX D OF 10 CFR PART 50
SUPPORTING THE ISSUANCE OF A LICENSE TO CONSOLIDATED
EDISON COMPANY OF NEW YORK, INC.
AUTHORIZING THE
LOADING OF FUEL AND SUBCRITICAL TESTING
OF INDIAN POINT UNIT NO. 2
DOCKET NO. 50-247

October 6, 1971



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Table of Contents

Introduction -----	1
Background -----	1
Staff Conclusions and Recommendation +-----	3
Summary of Environmental Considerations -----	3
A. Radiological Safety Considerations -----	4
B. Thermal Effects -----	5
C. Mechanical Effects -----	5
D. Chemical Effects -----	6

Introduction

The application of Consolidated Edison Company ("applicant") for a license to operate the Indian Point Unit No. 2 nuclear facility is presently pending before an Atomic Safety and Licensing Board (Board) established by the Atomic Energy Commission ("Commission") pursuant to a Notice of Hearing in this matter dated November 15, 1970. Appendix D of 10 CFR 50 of the Commission's regulations, which implements the National Environmental Policy Act of 1969 (NEPA) establishes procedures for environmental review of such applications. Appendix D also provides a procedure (Section D.2) for the issuance of a license authorizing the loading of fuel in the reactor core and limited operation within the scope of 10 CFR 50.57(c) in a proceeding where, such as this one, the requirements of paragraphs 1-9 of section A of Appendix D have not as yet been met and the matter is pending before a Board. In such a proceeding, the applicant may make, pursuant to 50.57(c), a motion in writing for the issuance of a license authorizing the loading of fuel in the reactor core and limited operation within the scope of 50.57(c). In this proceeding, a motion for authorization of limited activities for which an operating license is required, i.e., the loading of fuel and subcritical testing, but not for power operation, has been made by the applicant. The presiding Board may grant the applicant's motion and authorize the Director of Regulation to issue the license pending the completion of an ongoing NEPA environmental review of the activities to be licensed, upon a showing on the record that the proposed licensing action will not have a significant, adverse impact on the quality of the environment, and upon satisfaction of the requirements of 50.57(c). In this proceeding, the requirements of 50.57(c) have been previously considered in the Board's order of July 20, 1971, which authorized the Director of Regulation to issue the requested license on specified conditions. No such license has been issued by the Director of Regulation, however. This discussion is submitted in connection with the Board's reconsideration of that order with respect to the subsequently adopted Appendix D procedure for a showing on the record as to no significant adverse impact on the quality of the environment.

Background

The June 21, 1971, motion by the applicant for an order to permit fuel loading and subcritical testing of Indian Point Unit No. 2 (the design power level of which is 2758 megawatts thermal [MWt]) was filed before the presiding Atomic Safety and Licensing Board in accordance with the Notice of Hearing in this proceeding, dated November 15, 1970. A description of the activities and the extent to which the facility will be completed prior to their commencement is found in the affidavit of the applicant's Vice President, William J. Cahill, Jr., which accompanies the applicant's motion,

and in the testimony of Mr. Cahill which was accepted into evidence by the Board at a session of the public hearing in this matter on October 5, 1971. Said activities will consist of the following:

- a. Loading fuel into the reactor vessel.
- b. Closing the reactor vessel and establishing temperature and pressure in the reactor coolant system by operating the reactor coolant pumps.
- c. Testing and calibrating some of the instrumentation in the core and the reactor coolant system, and
- d. Performing various tests on the control rods and control rod drives.

Throughout the conduct of said activities the reactor will be maintained in a subcritical condition by a large margin. Since the reactor can produce no power in the subcritical condition, fission products or other radioactivity will not be produced.

Prior to commencement of conducting the above tests, (a) all systems and all work inside the containment, (b) all systems outside the containment but connected directly to the reactor coolant system, and (c) all engineered safety systems including the diesels, with the exception of minor "punch list items" none of which affects system safety in connection with the activities for which authorization is sought, will have been completed.

All of these activities are to be conducted within the parameters set forth in the Technical Specifications which would be issued with the license requested. Further details concerning the tests listed above can be found in the applicant's Final Safety Analysis Report (FSAR).

In its order of July 20, 1971 the Board specified and directed for this authorization in this proceeding that the Director of Regulation expressly condition his appropriate findings regarding the application herein for fuel loading and subcritical testing to the effect that at no time shall the reactor be made critical following fuel loading, and if there is such criticality following fuel loading (or if this direction for a condition were not acceptable to the Director of Regulation) then the authorization is no longer valid nor effective and the matter should then be reconsidered by the Atomic Safety and Licensing Board.

On November 16, 1970, the AEC regulatory staff (staff) had completed its review of the application for license and issued its Safety Evaluation in which it concluded that there was reasonable assurance that Unit 2 of the Station could be operated at full power of 2758 MWt without endangering

the health and safety of the public. The regulatory staff also submitted Supplement No. 1 to the Safety Evaluation dated November 30, 1970, (the testimony of the Division of Compliance) and Supplement No. 2 thereto (updating Supplement No. 1) dated July 1971, Supplement No. 3 to the Safety Evaluation dated September 3, 1971 (concerning emergency core cooling system effectiveness, and other testimony and exhibits as reflected in the record. The NEPA environmental review of the operation of Unit 2 has not yet been completed in accordance with the requirements of Appendix D of 10 CFR 50 as revised September 9, 1971. Pending completion of that review, the Commission's regulations do not contemplate the issuance of the full power license.

Staff Conclusions and Recommendation

The staff has concluded that the activities for which authorization has been requested by the applicant will not have a significant, adverse impact on the quality of the environment. In accordance with section D.2 of Appendix D of 10 CFR 50, we recommend that the Board authorize issuance by the Director of Regulation of the license requested by the applicant upon a finding that such licensing action will not have a significant adverse impact on the quality of the environment and upon noting satisfaction of the requirements of 10 CFR 50.57(c) per its previous order. The bases for the staff's conclusions are set forth below.

Summary of Environmental Considerations

The following principal documents contain information to form the basis for the evaluation of environmental factors pertinent to the requested fuel loading and subcritical testing.

Safety Evaluation	(November 16, 1970)
Supplement No. 1 and Appendix A	(November 20, 1970)
Supplement No. 2	(July 1971)
Final Detailed Statement of Environmental Considerations	(November 20, 1970)
The Applicant's Environmental Report - Operating License Stage	(August 6, 1970)
Supplement to Environmental Report and Appendices, Volume Nos. I and II	(September 9, 1971)

Final Facility Description and
Safety Analysis Report (FFDSAR)
Technical Specifications
Amendment No. 25 and Supplement
No. 15

(November 12, 1970)

Letter from Mr. W.J. Cahill, Jr.
to Dr. Peter Morris, Director
USAEC Division of Reactor
Licensing and presented in
Testimony submitted by
W. J. Cahill on October 5,
1971 at the Hearings

(September 30, 1971)

While a wide range of such environmental factors is being included in the full NEPA review, the following factors warrant discussion here.

Radiological Safety Considerations

The activities authorized under the license would be limited to conducting tests and verifying plant performance during fuel loading and subcritical testing. Fuel loading and the conduct of these tests will take about 4-8 weeks and no power will be generated. The aforementioned tests will be conducted in which the reactor will be maintained in a subcritical condition, by means of neutron absorber using boric acid dissolved in the primary coolant. As such, no power and no fission products nor other radioactivity will be produced since neutrons interacting with the uranium-235 atoms in the uranium dioxide fuel will not involve a self-sustaining chain reaction. Therefore, no fission products will be produced nor will fission neutrons be available to activate materials in the reactor core to produce radioactive activation products. No radioactive waste will be generated and, therefore, no radioactivity will be released to the environment and no resultant exposures to the public will occur during the subcritical testing program.

The consequences of postulated accidents during activities conducted under this license were also investigated. Since there will be no fission product source to consider, and thus no fission product decay heating of the primary coolant, the usual design basis accidents considered for a plant of this type, i.e., loss of coolant, control rod drop, and a steamline break, are not pertinent. Since there will be no radioactive waste generated, postulated accident situations that might be considered in evaluating plant operations are not meaningful for the fuel loading and limited plant testing proposed.

From the above considerations, we find that loading fuel and subcritical testing of Unit No. 2 will not result in a significant adverse impact on the quality of the environment.

Thermal Effects

Under the activities authorized under this license, Unit No. 2 will generate no power. The small amount of mechanical heat generated by the reactor coolant pumps producing a maximum temperature rise of 0.4° Fahrenheit will not result in a significant temperature increase in the river water flowing through the system and no adverse thermal effects on the environment are anticipated during the duration of this license.

Mechanical Effects

The intake structure for the condenser cooling system is provided with trash racks, stop log gates, and traveling screens. A mobile trash rake is used to remove material that collects on the racks. Back-spraying the screens with high pressure water serves to remove any material picked up on the up-pass of the traveling screens as they rotate. Provisions are also made for placing fine mesh stationary screens in front of the traveling screens.

In the applicant's Environmental Report of August 6, 1970, its Supplement of September 9, 1971, letter to the Commission dated September 30, 1971, and the Commission's Final Detailed Statement of November 20, 1970, there is a discussion of the problem of fish kills occurring on the Hudson River from Unit No. 1 and the action being taken to reduce the fish kills prior to operation of Unit No. 2. On Unit No. 2 protection screens have been installed at the outer face of the intake structure in guides already provided in the walls; and throttling operation of the circulating pumps will occur during the coldest parts of the year which will reduce the intake velocity from 0.85 feet per second to about 0.6 feet per second. This will result in a reduction of flow through the condensers from 840,000 gallons per minute (gpm) to 600,000 gpm. The applicant plans to operate the circulating water pumps only one to two weeks in connection with the authorized activities.

The applicant also has been conducting continuing ecological and engineering studies on the topic of fish protection. During intermittent pump operations of Unit No. 2, any fish impingement problem will be evaluated and designs developed to minimize it. The applicant has been in contact with the Indian Point Fish Advisory Board and a number of other Federal, State and local organizations to discuss the overall program in order to provide for fish protection in connection with operation of the Indian Point plants. A complete assessment of the problem is being conducted

during the NEPA review for full power operation. Information gained during this operation will aid the full NEPA review.

Smaller organisms that pass through the screen system will pass through the condensers and be discharged to the river. Some damage from mechanical shock to these organisms may be caused by passage through the pumps and condensers. No thermal shock will occur. The effects of this passage on these organisms are presently being evaluated in the full NEPA review. During the full NEPA review, October and November have been identified as a period of least likelihood of damages, since fish eggs and larvae and juvenile fishes are generally not present and any food chain losses would not be important over a 1-2 week testing period.

The increase in any damage to aquatic life during the period of fuel loading and subcritical testing of Unit No. 1 is not considered to be sufficient to cause a significant adverse impact on the quality of the aquatic life and the environment in the Hudson River.

Chemical Effects

The condenser cooling water system will be intermittently operated during the fuel loading and the subcritical testing program authorized by the license. Flow rates may range from 140,000 gpm to 840,000 gpm during the one to two week testing period and the water will serve to dilute liquid chemical wastes prior to discharge into the river.

On pages 2.3.4-8 through 2.3.4-10 of the applicant's Supplement to its Environmental Report, the chemical releases during construction and testing of Unit No. 2 are outlined. There will be several sources of chemical wastes as a result of activities authorized under this license: river water treatment for various plant systems and regeneration of the demineralizers.

The subject of chlorination of the cooling water in the condenser tubes is being given a full NEPA review. During the one to two week testing period, chlorination of the condenser cooling water may be necessary. The activities authorized under the license will be conditioned that chlorination will be limited to having residual chlorine concentration in the discharge canal no greater than 0.5 ppm for the 1 hour period of chlorination three times a week.

Prior to use in various plant systems, river water is treated by means of a flash evaporator to which is added sulfuric acid to control the pH. The concentrates from the flash evaporator are blowdown to the discharge canal, which has a pH between 7.0 and 8.5. No measurable releases of sulfate ion are anticipated from Unit No. 2. Sodium hydroxide is used for pH control in the waste evaporator in the waste disposal system. The wasted distillate would be discharged at a concentration of 10 ppm of sodium ion at the rate of 2.5 gpm into the discharge canal.

Sodium hydroxide is also used and consumed during regeneration of spent demineralizers. The projected frequency of demineralizer regeneration is once every 4 to 7 days for a period of two hours. Regeneration of the demineralizers will result in the release of sodium, calcium, magnesium, and sulfate ions, which are the major constituents present in the city water supply used for most plant water requirements and are concentrated on the resins. The anticipated total concentrations are unlikely to exceed an added 2 ppm in the discharge water. Regeneration will be more frequent during the preliminary filling and flushing of the internal systems. For short periods of time plant water use will exceed the normal rate such that the total concentrations of these chemicals could occasionally reach concentrations as large as 6 ppm.

In addition to thermal discharge standards established by New York State, the State Department of Conservation has established water quality standards depending on water use. A set of applicable criteria for the Hudson River at Indian Point is classified "Class SB" as shown in Table 2.3-2 of the applicant's Supplement. Since the regulation is phrased in terms of general criteria rather than specific numbers, the applicant is proposing to meet certain discharge limits with respect to concentrations of various chemicals at the confluence with the Hudson River which it believes satisfy the criteria. The basis for these limits was obtained in part from bioassay work performed by the Raytheon Company and New York University as consultants for the applicant. These concentrations are shown in Table 2.3.3 in the applicant's Supplement.

In Table I, the chemical concentration of the discharges from the condenser cooling water during the testing period is shown below.

Table 1
Chemical Content of Water (Parts Per Million)

	Indian Point No. 2 Condenser Discharged (1)	Recommended limits of concentration in Drinking Water	Drinking Water in 100 largest cities (4)	
			Median	Maximum
SO ₄	≤10	250 ⁽²⁾ TDS	26	572
Na	≤10	250 ⁽²⁾ TDS	12	198
Mg	≤ 2	50 ⁽³⁾	6	120
Ca	≤ 2	75 ⁽³⁾	26	145

- (1) These concentrations of the listed chemicals are discharged for short fractions of the day and are further diluted by the river.
- (2) Public Health Service PHY-956, U.S. Department of Health, Education and Welfare, also proposed Illinois standards.
- (3) World Health Organization data from the Water Encyclopedia⁽⁴⁾.
- (4) The Water Encyclopedia, Water Information Center, Water Research Building, Manhasset Isle, Port Washington, N.Y. 1970.

Table I compares the above chemical releases to Public Health Service Standards for sulfate and to World Health Organization standards for magnesium and calcium (Public Health Service Standards are silent on the latter two elements). The Table also lists for comparison the median and maximum values of certain chemicals found in the drinking water of one hundred large cities in the United States.

The chemicals discharged to the Hudson River in the condenser cooling water from the Indian Point Unit No. 2 are not considered to be sufficient to cause a significant adverse impact on the quality of the environment.

* * * * *

The discussion and conclusion of the Commission's regulatory staff herein apply only with respect to loading of fuels and subcritical testing of Indian Point Unit 2 and are without prejudice to the outcome of our environmental review as to operation at any higher power level.