

October 21, 1968

U. S. ATOMIC ENERGY COMMISSION
DIVISION OF REACTOR LICENSING
REPORT TO ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
REQUEST FOR EXEMPTION

Note by the Director of the Division of Reactor Licensing

The attached report has been prepared by the Division of Reactor Licensing for the use of the ACRS.

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ABSTRACT

The Consolidated Edison Company of New York, Inc. requested an exemption from the provisions of 10 CFR 50.10(b) which would permit the following operations to be conducted prior to issuance of a construction permit for Indian Point Nuclear Generating Unit No. 3:

1. Pouring of the base mat concrete of the containment building up to the bottom liner plate. This includes the walls of the reactor vessel cavity and the sumps required for recirculation following a loss of coolant accident.
2. Installation of the bottom liner plates and transition knuckle plates.
3. Installation of the rebar for the base concrete over the bottom liner plates.

We have reviewed the structural design of the base mat, and the influence the base mat design has on the proper operation of the engineered safety features. We have concluded that the exemption requested may be granted.

INTRODUCTION

By letter dated July 23, 1968, the Consolidated Edison Company of New York, Inc. requested an exemption from the provisions of 10 CFR 50.10(b) which would permit the following operations to be conducted prior to issuance of a construction permit for Indian Point Nuclear Generating Unit No. 3:

1. Pouring of the base mat concrete of the containment building up to the bottom liner plate. This includes the walls of the reactor vessel cavity and the sumps required for recirculation following a loss of coolant accident.
2. Installation of the bottom liner plates and transition knuckle plates.
3. Installation of the rebar for the base concrete over the bottom liner plates.

The applicant requested that this exemption be granted by September 15, 1968.

As discussed with the Committee at the September 1968 meeting, we deferred action on this matter until the pertinent portions of the responses to our questions on containment structural design of July 16, 1968 had been received and evaluated. These responses were submitted as the Second Supplement to the Preliminary Safety Analysis Report on September 16, 1968. Additional information responding to oral questions from the staff concerning the adequacy of the shear reinforcing in the mat and the elasticity of the rock foundation was received on October 18, 1968. In addition, the First Supplement to the PSAR which contains the responses to our general questions of February 19, 1968, was received on August 30, 1968.

The reason for the Consolidated Edison Company request is the need to have Indian Point Nuclear Generating Unit No. 3 ready for commercial operation prior to June 1, 1972 in order to meet the anticipated summer 1972 electric power requirements

of Consolidated Edison's system and those of the state and region in which the system is located. In order to accomplish this, the applicant indicated construction of the proposed work should start by September 15, 1968. The applicant's projections of system and regional capacity and of system peak load in 1972 indicate that there is a public need for the energy to be produced by the proposed power reactor on the schedule projected by the applicant.

Based upon our current schedule, the construction permit for Indian Point Unit No. 3 would not be issued earlier than February 1969. Since the proposed work will require six months to complete, the beginning of the work in the near future, rather than after issuance of the construction permit, would be of substantial benefit to the Consolidated Edison Company in meeting their construction schedule and commercial operating date.

STRUCTURAL DESIGN

The only areas of concern to us from a structural viewpoint involved the adequacy of the shear reinforcing in the mat, between the mat and the wall, and in the lower part of the wall, and the elasticity of the rock foundation. The applicant provided the following additional information on these matters.

(1) Shear Reinforcing

The shear reinforcing is provided for the most unfavorable load combination in accordance with the design criteria as set forth in the PSAR and in accordance with the ACI 318-63 Code. The bars are anchored either in the compression zone or mechanically anchored, by hooks or by bending around main bars. Radial shear reinforcing in the walls is provided to a height of approximately 20 feet above base.

(2) Elasticity of the Rock Foundation

The base mat was designed assuming a rigid non-yielding rock foundation. At our request the applicant performed additional calculations, assuming three different values for the elasticity of the rock. The results indicated that the stresses in the mat were only moderately increased when an elastic rock foundation was considered. A sufficient amount of reinforcing is provided to adequately cover these increased stresses.

This additional information has been discussed with our consultants. We have concluded and our consultants concur that the structural design is adequate.

OTHER SAFETY IMPLICATIONS

We have examined the proposed construction work to determine if the design of the base mat would adversely affect the normal operation of plant or interfere with the proper operation of the engineered safety features. The following areas were considered:

1. Emergency Core Cooling System - The proposed construction includes the sumps required for recirculation following a loss of coolant accident. We have examined the elevation of the sumps and believe that it is feasible to choose both internal and external pumps for their sumps which will have adequate NPSH. We have also evaluated the adequacy of the recirculation system piping which will be embedded in the bottom mat. The piping is designed to presently accepted standards. This portion of the recirculation system is provided with sufficient valve redundancy to prevent any single failure, either active or passive, from negating the ability of the emergency core cooling system to provide long term core cooling.

2. Post Loss of Coolant Accident Protection (PLOCAP) - The base and walls of the reactor cavity are included in the proposed construction. While the dimensions of the cavity must be considered in designing a system which would provide continued core cooling in the event pressure vessel integrity is lost, we can identify no feature of the base mat design which would preclude the ability to design a system to provide such protection.
3. Evolved Hydrogen - Hydrogen generation by metal-water reaction, coolant radiolysis, and reaction of the spray solution with material in the containment vessel can lead to flammable mixtures of hydrogen and oxygen in the containment at some time after the initiation of the loss of coolant accident. This time increment is a function of the containment free volume and thus relates to the design of the base mat. Although we recognize the problem associated with hydrogen evolution, we do not consider altering the containment volume a solution since this would only postpone the time when a flammable mixture exists, rather than eliminate this possibility.

CONCLUSION

Based on the evaluation discussed above, we have concluded that

- (1) There is a public need for the energy to be produced by the proposed power reactor on the schedule projected by the applicant;
- (2) Characteristics of the reactor site and design criteria for the construction to be performed under the exemption have been adequately described in the application to construct and operate the facility; and
- (3) Resolution of known safety problems would not require modification of the requested construction.

Accordingly, we believe the exemption requested may be granted.