John D. O'Toole
Vice President

Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, NY 10003
Telephone (212) 460-2533

February 4, 1985

Re: Indian Point Unit No. 2
Docket No. 50-247

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Dear Mr. Varga:

By letters dated August 7, 1981 and May 10, 1982 we provided our response to Generic Letter No. 81-14 "Seismic Qualification of Auxiliary Feedwater Systems" dated February 10, 1981. In a letter dated September 7, 1982 you forwarded the staff's Safety Evaluation concluding that the Indian Point Unit No. 2 Auxiliary Feedwater System (AFWS) has sufficient seismic capability to withstand a safe shutdown earthquake and accomplish its safety function, thereby resolving this issue for Indian Point Unit No. 2.

Subsequently, in a letter dated December 2, 1982 you provided a Technical Evaluation Report (TER) of the AFWS for the New York Power Authority's (NYPA) Indian Point Unit No. 3 plant, indicating that the information contained in that report appeared to conflict with information for Unit No. 2. You requested we review the Unit No. 3 TER and address each cited apparent discrepancy and the applicability of each to Unit No. 2.

Attachment 1 to this letter provides the results of our review of each of these matters based upon our understanding of the issues involved. As a result of discussions with NYPA personnel and a review of the NYPA documentation initially submitted in response to G.L. 81-14, we conclude that a number of items were evidently left unresolved pending receipt by NYPA of the necessary seismic qualification documentation or completion of an evaluation concluding that the identified condition did or did not warrant corrective action. We understand that upon receipt of the required documentation and/or completion of the necessary evaluations, NYPA was able to resolve most issues with only minor modification required.

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Should you or your staff have any additional questions, please contact us.

Very truly yours,

John D. O'Toole

John D. O'Toole
Vice President

attach.
cc:

Mr. Peter Kokolakis
Director of PWR Licensing
New York Power Authority
123 Main Street, Centroplex
White Plains, New York 10601

Senior Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 38
Buchanan, New York 10511

Attachment 1

Review for Applicability to Indian Point Unit No. 2 of the TER on the Seismic Qualification of the Indian Point Unit No. 3 AFW System

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
February, 1985

IP#3 TER - Open Item No. 1:

Piping - "The portion of the 12" piping connecting the hotwell to the AFW suction line (No. CT-1070) that is between valves LCV-1158 and LCV-1128 is seismic Class III. The licensee stated that it is not necessary to rely upon the operability of this pipe during a SSE in order to provide adequate flow from the condensate storage tank to the auxiliary feedwater pumps. They stated that, prior to the condensate storage tank level decreasing to its technical specification low limit, automatic closure of the seismically qualified valve LCV-1158 and actuation of low level alarm in the control room will occur and the available water is sufficient to remove heat generated by the reactor for 24 hours at hot shutdown conditions. However, we have concluded that, if this section of piping should fail during a seismic event and the single failure is assumed to be the isolation valve LCV-1158, a path is created that would jeopardize the capability of the condensate storage tank to provide adequate water to the AFW system. Since the licensee has not indicated plans to upgrade this pipe, we judge that the present level of the seismic capability of the AFW system piping is less than OBE."

Valves/Acutuators - "Valve LCV-1128 is seismic Class III. The licensee has stated that they are not planning any action on upgrading this valve due to the discussion made above in the piping evaluation section. However, we believe that the valve LCV-1128 is the second valve required on the AFW system boundary and therefore we judge that the present level of the seismic capability of the valves is less than OBE."

Response for IP#2:

In our August 7, 1981 response to Generic Letter No. 81-14 we indicated that the design of the Indian Point Unit No. 2 AFW System is such that there are not always two valves which are normally closed or capable of automatic closure between the Seismic Category I AFW system and the non-Seismic Category I branch piping. Specific cases where system design does not strictly agree with the boundary definition of Enclosure I to Generic Letter 81-14 are as follows:

- Air operated butterfly valve LCV-1158 isolates the suction line to the AFW pumps from the non-essential make-up line to the condenser hotwell. As discussed in Section B(3) below, this valve should be capable of operation under SSE loadings. Also, the valve is in a vertical line which is seismically supported to an elevation of about 25 feet above the pump inlet. Failure of the non-seismic Category I portion of the line will not affect the ability of LCV-1158 to close and therefore should not adversely affect the water supply to the pumps.

B.(3) Valves/Actuators

Seismic requirements for the AFW system valves were not specifically prescribed in the purchase specifications. However, valves typically possess a substantial amount of inherent seismic resistance since compliance with ANSI 16.5 limits the stresses to 7000 psi. In particular, valves that are passive and that do not have extended operators are unlikely to fail as a result of the SSE. Pressure boundaries of these valves are designed to be stronger than the attached piping.

Valves having extended operators are more vulnerable to seismic accelerations. The main concern is deformation or failure of the extended operator portion of the valve due to inertial effects on the heavy operator. Generic seismic capacities of motor operated and air operated gate and globe valves have been developed. These capacities were based upon a variety of valves ranging in size from 2" to 48" for motor operated gate and butterfly valves and from 3/4" to 8" for air operated valves. The acceleration capacity for the valves ranged from 0.84g to 23g with a median value of 7.3g.

Regarding the Indian Point Unit No. 2 AFW system valves, we have determined that the median ground acceleration capacity of the water regulator valves and the steam inlet valves is about 5g. This acceleration value is much greater than the 0.15g design ground acceleration for the plant. In light of the large seismic capacities obtained and also the wide scope of review, other air-operated valves in the AFW system should also have sufficient seismic resistance to withstand an SSE.

In your September 7, 1982 letter which forwarded the staff's Safety Evaluation of this issue for IP#2 you stated the following:

(1) "Regarding the AFW system boundary, the second valve normally closed or capable of automatic closure does not always exist between the AFW system and the non-seismic Category I branch piping. The three specific locations are:

. . . (b)Air-operated valve LCV-1158 isolates the suction line

to the AFW pump from the non-essential make-up line to the condenser hotwell. The licensee stated that this valve should be capable of operation under SSE loadings. The licensee also stated that the valve is in a vertical line seismically supported to an elevation of about 25 feet above the pump inlet and hence failure of the non-seismic Category portion of the line should not adversely affect the water supply to the pumps.

(2) Valves/Actuators - Licensee has stated that seismic requirements for the AFW system valves were not specifically prescribed in the purchase specifications. However, the Licensee has determined on a generic basis that the seismic capacities for the motor and air-operated gate and globe valves range from 0.84g to 23g in acceleration with a median value of 7.3g. Regarding Indian Point Unit 2 AFW system valves, the Licensee has determined the median ground acceleration capacity of the water regulator valves and steam inlet valve to be about 5g. Assuming a log-normal distribution for both the generic and Indian Point Unit 2 data, we have determined that the lower bound ground acceleration capacity of the water regulator valves and steam inlet valve is about 0.58g, which is much greater than the 0.15g design ground acceleration for the plant. In light of the large seismic capacities established by the licensee's consultant and the wide scope of his review, the licensee stated that other air-operated valves in the AFW system should also have sufficient seismic resistance to withstand an SSE. Based on the above information provided by the licensee, we judge that the valves possess a seismic capability that will survive an SSE."

Based upon the above justification demonstrating valve operability under seismic loading we have again reviewed the consequences of a single failure of LCV-1158 to close in conjunction with a double ended break in the non-seismically qualified portion of piping between LCV-1158 and the condenser hotwell using the following assumptions:

a. LCV-1158 remains integral under SSE loadings as previously demonstrated due to its inherent seismic resistance and the fact that the attached piping is seismically supported to an elevation of twenty five feet above the pump suction. As such, the assumed single failure could only be that of the valve control system. Subsequent operator action to reclose the valve is easily accomplished as the valve fails closed on loss of instrument air.

b. The condensate storage tank water level is at the lowest level permitted by Technical Specification at the time of the break.

Using the above assumptions, a minimum of ninety (90) minutes is available before the condensate tank completely empties due to the flow out of the break as well as the flow to the auxiliary feedwater system to meet decay heat removal requirements. Accordingly, adequate time is available to permit credit for manual operator action to close the valve. Redundant condensate tank level indication and alarming is provided to alert the operator to a low tank level condition.

The subject piping is seismically supported within the auxiliary feedwater room; thus any postulated failure of the non-seismic portion of this piping is

not expected to result in flooding within the Auxiliary Feedwater Pump Room. A review of previous flooding evaluations indicates that drainage capability in the Auxiliary Feedwater Pump Room is provided based on pipe breaks of larger diameter (e.g. main boiler feedwater pipe) than the piping considered here.

Based upon the above evaluations, we believe that adequate protection against design basis seismic concerns already exists at Indian Point Unit 2 and no further action is required with respect to this issue.

IP#3 TER - Open Item No. 2:

- Power Supplies - "The licensee has stated that the seismic qualification data is not available for two motor control centers (MCC) (Nos. 34 and 39), two 480V switchgear units (Nos. 31 and 32), and three 125V DC power panels (Nos. 31, 32 and 33). Investigations are currently underway with the vendors and they are scheduled to be completed prior to startup from the cycle 4/5 refueling outage which will occur in the summer of 1984. However, the licensee did not indicate that identified deficiencies would actually be corrected. We judge that the power supplies currently possess a level of seismic capabilty less than the OBE."

Response for IP#2:

In our August 7, 1981 response to Generic Letter No. 81-14 we indicated that switchgear equipment was specified to withstand accelerations in excess of 0.15g horizontally and 0.10g vertically (i.e., in excess of the SSE ground accelerations). As described in section 7.2.1.11 of the Indian Point Unit 2 FSAR, vibration testing of switchgear components has been performed to demonstrate operability of the switchgear components under appropriate seismic loadings. In addition, seismic requalification of these switchgear components, including cabinets, breakers and bus bars has been completed and has verified design modifications that incorporated solid state tripping devices in lieu of the original electro-mechanical tripping devices.

Concerning the MCC's, the equivalent MCC's at IP#2 are MCC-24 and MCC-29. These MCC's are Westinghouse Series W, and are identical to those used in the engineered safeguards systems. The qualification of Westinghouse Series W MCC's is described in Section 7.2.1.11 of the Indian Point Unit 2 FSAR as follows:

> "The safeguards circuits for Indian Point Unit 2 employ Westinghouse Series W motor control centers, type DB, and associated metal-enclosed or metal-clad switchgear. A review of this switchgear for proof of the seismic resistant design determined that the Series W motor control centers and DB breakers, mounted in the metal enclosures, have been shock tested and proved to remain fully operable for shocks of at least 3g in any direction. Proof of resistance of the similar DH metal-clad switchgear to a seismic response spectrum established for Point Beach has been demonstrated by vibration testing of typical, equivalent metal-clad switchgear, incorporating the DHP circuit breaker. The DH circuit breakers installed in Point Beach were of an earlier design than the DHP. However, the general configuration, weight distribution, and vibration resistant design approach of the DH are essentially identical to the DHP. When subjected to a spectrum equivalent to or greater than Figure B-2 of Reference 2 there was no loss of function of the DHP metal-clad switchgear."

Reference 2 is WCAP-7397-L entitled "Seismic Testing of Electrical and Control Equipment".

MCC-24 is located on elevation 15' in a seismically reinforced portion of the

Turbine building. MCC-29 is located on el. 33' in the control building which is a Seismic Class I structure. These elevations are below the elevation at which the safeguard systems MCC's are installed.

It should be noted that the electrical systems for IP#2 and IP#3 differ in many respects. This is due to changing regulatory requirements between the time the two plants were completed, but more significantly as a result of differences in approach taken by the two operating companies in response to regulatory imposed backfits, as well as design and operating philosophy. As such MCC's 24 and 29 at IP#2 may not necessarily perform the same function as MCC's 34 and 39 at IP#3.

Similar differences are evident in the DC power systems. Where IP#3 appears to have three D.C. power panels (31, 32 and 33), IP#2 now has four D.C. power panels (21, 22, 23 and 24). The original IP#2 design employed only two DC power panels. However, in an effort to utilize the 480V electrical system to the maximum extent and provide for future capacity requirements, two additional power panels were added. The new power panels are manufactured by Square D company and were required by Con Edison specifications to meet the seismic category I design criteria for Indian Point Unit No. 2. The two original power panels were manufactured by Westinghouse and qualified as described in Section 7.2.1.11 of the Indian Point Unit 2 FSAR. All other safeguards equipment DC control power are provided from these power panels.

IP#3 TER - Open Item No. 3:

Initiation/Control Systems - "Actions for all items described are planned for completion before startup from the cycle 4/5 refueling outage which would occur in the summer of 1984. Because no commitments for upgrade/modification have been identified for items (a) and (e), we conclude that the seismic capability of the initiation/control systems is less than OBE."

"3.(a)1 The licensee has stated that the seismic qualification data is not available for the speed control system for the turbine AFW pump, the ITT Barton flow control switches (FC-1135S and 1136S), and static "O" ring. The licensee indicated that these deficiencies would be investigated with the vendor, but did not indicate that corrective actions will be taken."

Response for IP#2:

3(a)1 The speed control system for the turbine driven AFW pump consists of a variable air controller providing a 3-15 psi signal (0-100% speed) to an air diaphragm actuator mounted on the pump. The air diaphragm actuator controls turbine speed by adjusting the position of the normal speed governor lever. With air supplied to the air diaphragm actuator the normal speed governor is overridden and the speed is

controlled by the variable air controller. It is important to note that the 100% position of the controller corresponds to the turbine design speed of 3570 rpm, the setting of the normal speed governor, thus the air controller (speed control system) serves only to reduce turbine speed. Loss of air pressure would result in returning turbine speed control to the normal speed governor which maintains turbine design speed at 3570 PPM. A handwheel is provided on the air diaphragm actuator to facilitate local manual speed control upon loss of air supply from the variable air controller. An independent overspeed protection device is provided to trip the turbine at the design overspeed of 4517 rpm, and a missile shield is provided to protect nearby equipment from any potential turbine generated missiles. Water flow control is provided by feedwater regulating valves.

Insofar as the speed control system serves only to reduce turbine speed, and in the absence of the functionability of this equipment, speed control is maintained at design speed by the normal speed governor. Failure of this equipment under seismic loadings will not adversely impact the capability of the turbine driven AFW pump to satisfy decay heat removal requirements.

In spite of the fact that the speed control system is not required to insure the turbine driven AFW pump's safety function, we believe the system is inherently seismic resistant. The air diaphragm operator is yoke mounted to the turbine pump casing which itself is a

seismically mounted component. The yoke is similar to those used throughout the plant and industry to mount air diaphragm operators to control valves. The speed control valve is rigidly attached to the pump casing and therefore subject to minimum amplification of ground acceleration. The associated instrument air tubing is well supported and frequently clamped.

IP #3 TER - Open Item No. 3 Continued

"3.(a)2 The ITT Barton flow control switches (FC-1135S - 1136S) and static "O" ring"

Response for IP2:

3.(a)2: The investigation of the ITT Barton flow control switches (FC-1135-D-1136S) and static "O" ring has been completed. Barton has provided us documentation stating that the flow switches are seismically qualified and comply with IEEE 344-1975. In response to the subject of "O" ring, there are no static "O" ring pressure switches used in the Indian Point Unit No. 2 AFW control system. There is a Dresser impacting pressure switch used for low pressure alarm on the steam supply to the turbine driven AFW pump. This switch is not safety related and therefore is not seismically qualified. Its failure will not degrade pump operations. Turbine pump parameters such as turbine speed and pump flow are indicated in the Central Control Room.

IP #3 TER- Open Item No. 3 Continued

"3.(b) Field routed instrument air piping in the AFW pump room is currently supported by rod hangers or frictional clamps which appear to lack sufficient seismic resistance."

Response for IP#2:

The use of frictional clamps or rod hangers for the support of field routed instrument piping in the AFW system is consistent with generally accepted design practices both now and at the time Indian Point Unit No. 2 was designed. The piping is light weight and also flexible. The use of frictional clamps is an acceptable design pattern when seismically supporting small lightweight piping. It should be noted that all safety related air operated valves within the AFW system are designed to fail to their safe positions upon loss of instrument air, thereby assuring no loss of safety function.

IP #3 TER - Open Item No. 3 Continued

"3.(c) Instrumentation and control rack No. 28 is free standing without any bolts. Moreover, the grout is not provided and the bottom of the rack is rusted. Corrective actions are planned."

Response for IP#2:

A visual inspection of Rack No. 28 at Indian Point Unit 2 indicates that

the rack is adequately seismically supported and installed flush with the floor using anchor bolts through the angle iron framing. The rack itself as well as the other components within the AFW pump room appear to have been recently painted. Overall housekeeping was good with no evidence of rust or corrosion.

IP #3 TER - Open Item No. 3 Continued

"3.(d) Nitrogen bottles are free standing and tied only with chains and ropes. Additional restraints have been planned."

Response for IP#2:

Unlike Indian Point Unit No. 3 which uses four nitrogen bottles chained against the AFW building south wall, the Indian Point Unit No. 2 design employs three such bottles secured within a 3 sided steel angle iron frame structure. The fourth side is enclosed by a safety chain to permit ease of access. This design is considerably different from our understanding of the IP#3 design which uses only a chain to keep these bottles in their installed position.

IP #3 TER - Open Item No. 3 Continued

"3.(e) The AFW pumps local control panel appears to lack adequate seismic resistance in the lateral direction. The licensee plans to check with the vendor for additional lateral support of X-bracing. However, corrective actions are not committed to."

Response for IP#2:

A seismic stress analysis was performed on the AFW pumps local control panel. The panel hold down bolts and structural supports were determined to be adequate to seismically restrain the panel in the lateral direction.

IP#3 TER - Open Item No. 4:

- Structures - "The turbine building is seismic Class III, and it supports and/or houses the 12' pipe (CT-1070), valve LCV-1128, and possibly some other essential AFW system components. The licensee has no plans to upgrade/modify this building. We therefore conclude that the present level of seismic capability of the structures is less than OBE."

Response for IP#2:

As stated earlier in response to IP#3 TER - Open Item #1, valve LCV-1158 at IP#2 is seismically supported to an elevation twenty-five feet above the pump suction. As such the downstream piping leading to the condenser hotwell, valve LCV-1128 or the turbine building need not be seismically qualified for Indian Point Unit No. 2.

IP#3 TER - Open Item No. 5:

"Additionally, the licensee provided the results of a seismic interaction study of the components outside and in the vicinity of the AFW system, to assess their effect on the AFW system. The components in the following list are considered by the licensee to be the major contributors to unacceptable interaction affecting AFW system functionality. The licensee did not indicate any plans to investigate or correct the above mentioned deficiencies."

"5.(a) Crane/monorail structure located directly above the two motor driven and the turbine driven AFW pumps."

Response for IP#2:

We have reviewed the design installation details for the crane/monorail structure installed in the Indian Point Unit No. 2 AFW building. The monorail support system was evaluated for a safe shutdown ground acceleration of 0.15g. The system was analyzed using AISC-1981 specifications and determined to be capable of supporting seismically induced loads with ample margin.

IP #3 TER - Open Item No. 5 Continued

"5.(b) 4" non-seismic floor drain pipe directly above the electrical cable trays containing essential safety related equipment."

Response for IP#2:

At IP#2 the floor drain pipe is all welded steel and is rigidly anchored to the concrete at elevations 32'-6" and 18'-6". The pipe has been determined to be seismically acceptable and no further action is necessary.

IP #3 TER - Open Item No. 5 Continued

"5.(c) Space heaters and electrical lighting fixtures located directly above essential safety related equipment and structures."

Response for IP#2:

The chain supports for the electrical lighting system were technically evaluated. They were found to adequately support the loading on the lighting fixtures during a Safe Shutdown Earthquake (SSE).

The supports for the space heaters were also evaluated. The supports will be modified and reinforced by the end of March, 1985; therefore the space heaters will be seismically restrained independent of any other system in the Pump Room.

IP #3 TER - Open Item No. 5 Continued

"5.(d) Non-seismic electrical cable trays and conduit routed directly above essential safety related equipment and structures."

Response for IP#2:

The electrical cable trays and conduit were technically evaluated and were found to be adequately supported for seismic loadings. The supports are spaced as required by the seismic span charts.

"5.(e) Large non-seismic instrument racks located within close proximity to essential safety related equipment and structures."

Response for IP#2:

A visual inspection was performed of the instrument racks. All the instrument racks in the Auxiliary Feedwater Building were found bolted to the floor and laterally supported by either bracing or conduit bolted to the walls. The racks are seismically restrained as constructed.

IP#3 TER - Open Item No. 5 Continued

5.(f) Large roll-up door located in the shieldwall whose structural failure could affect the flow control stations of the turbine driven AFW pumps.

Response for IP#2:

An evaluation was performed on the roll-up door. The door is securely fastened to a seismic Category I structure and therefore inherently assumes the same seismic resistance as the structure. The roll-up door is capable of withstanding a Safe Shutdown Earthquake for Indian Point 2.