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December 2, 1988

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

Deputy Director, Office of Enforcement
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

SUBJECT: Response to Inspection Report Nos. 50-247/86-11
and 50-247/87-38

This is in response to your letter of November 3, 1988 concerning inspections 50-247/86-11 and 50-247/87-38 conducted by members of your staff during the periods May 12-16, 1986 and December 14-18, 1987, respectively.

Attachment I to this letter constitutes our response to the Notice of Violation and Proposed Imposition of Civil Penalty ("Notice") transmitted with your November 3 letter. Also attached is a check in the amount of seventy-five thousand dollars (\$75,000) in payment of the proposed civil penalty. While we generally acknowledge the circumstances and events discussed in your Notice, in reviewing and responding to each of the violations we have identified certain factual errors contained in the Notice or the inspection reports upon which it is based.

We acknowledge that there were instances where the IP-2 EQ program was not fully effective. We do believe that Con Edison has moved promptly to correct any conditions contributing to the existence of a violation and implemented effective measures against future repeated events. We believe that there currently exists reasonable assurance that the Con Edison Environmental Qualification program for Indian Point Unit 2 is in full compliance with the requirements of 10 CFR 50.49.

Should you or your staff have any question concerning our response to the Notice, please contact Mr. Jude G. Del Percio, Manager Regulatory Affairs.

Very truly yours,

Stephen B. Bram

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ATTACHMENT I

REPLY TO NOTICE OF VIOLATION
DATED NOVEMBER 3, 1988

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
INDIAN POINT UNIT NO. 2
DOCKET NO. 50-247

NOTICE OF VIOLATION
AND
PROPOSED IMPOSITION OF CIVIL PENALTY

Consolidated Edison Company
Indian Point 2

Docket No. 50-247
License No. DPR-26
EA 88-142

During an NRC inspection conducted on May 12-16, 1986 and December 14-18, 1987 of the licensee's program for environmental qualification (EQ) of equipment, NRC inspectors identified violations of NRC requirements or reviewed other violations identified by the licensee. In accordance with the "Modified Enforcement Policy Relating to 10 CFR 50.49, Environmental Qualification of Electrical Equipment Important to Safety of Nuclear Power Plants," contained in NRC Generic Letter 88-07, the Nuclear Regulatory Commission proposes to impose a civil penalty pursuant to Section 234 of the Atomic Energy Act of 1954, as amended (Act), 42 U.S.C. 2282, and 10 CFR 2.205. The particular violations and associated civil penalty are set forth below:

I. VIOLATION ASSESSED A CIVIL PENALTY

10 CFR 50.49(d), (f), and (j), respectively, require that (1) a list of electric equipment important to safety be prepared, and information concerning performance specifications, electrical characteristics and postulated environmental conditions for this equipment be maintained in a qualification file; (2) each item of electric equipment important to safety shall be qualified by testing of identical or similar equipment and qualification based on similarity shall include a supporting analysis to show that the equipment to be qualified is acceptable; and (3) a record of the qualification shall be maintained in an auditable form to permit verification that each item of electrical equipment important to safety is qualified and that the equipment meets the specified performance requirements under postulated environmental conditions.

Contrary to the above, prior to November 30, 1985 until the dates specified herein, environmental qualification files for certain electrical equipment did not include the required documentation to demonstrate environmental qualification of the equipment. Examples of this violation include:

- A. As of December 18, 1987, 8 Weidmuller Terminal Blocks (used in Resistance Temperature Detectors for measuring reactor coolant temperature) were not qualified in that insulation resistance was not measured during a LOCA qualification test to assure that instruments would function properly during postulated LOCA conditions.

- B. As of May 15, 1986, three ASCO solenoid valves and two NAMCO limit switches were not qualified in that they were installed in a condition that was not similar to that in which they were tested. Specifically, one of the solenoid valves was found with a cover plate secured only by one loose screw, two solenoid valves had improperly installed RTV conduit seals in that there were gaps in the sealant rendering the seal ineffective, and the conduits connected to the two limit switches were loose rendering the conduit seals ineffective. There was no supporting analysis to establish qualification in the installed condition.
- C. As of the 1987 refueling outage, at least 52 UE&C instrument and control cable splices and other UE&C power cable splices, all located inside the reactor containment, were not qualified in that these splices were installed with less than the vendor specified seal length and were not similar to the tested conditions, and no supporting analysis established qualification as installed. The seal length problems that existed in instrument and control cable splices were assumed to also exist by the licensee for power cable splices.
- D. As of the 1987 refueling outage, Raychem cable splices used in at least 4 locations inside containment (for the Reactor Head Vent and Residual Heat Removal System) were not qualified in that the splices, installed with less than the vendor specified seal length, were not similar to the tested condition and no supporting analysis established qualification as installed.
- E. As of June 16, 1986, Westinghouse Model No. 542247 Terminal Blocks used in 7 transmitter loops inside containment, were not qualified in that the subject blocks were not in enclosures, as originally tested, and no supporting analysis established qualification as installed.
- F. As of the 1987 refueling outage, the resistance temperature detectors (RTD) used in four reactor coolant hot and cold legs were not qualified in that the RTDs did not have the specified vapor tight connections and were not similar to the tested conditions, and no supporting analysis established qualification as installed.

These violations constitute an EQ category B problem.

Reply to Violation

IA. We acknowledge the facts as stated in the Notice of Violation.

Nevertheless, we believe that we undertook timely and reasonable measures to assure qualification of the Weidmuller Terminal Blocks prior to November 30, 1985. Our Environmental Qualification file for these blocks included tests conducted by Franklin Research for simulated LOCA conditions characterized by a peak temperature of 492°F and pressure of 50 psi. Insulation resistance (IR) data was taken at the beginning and conclusion of the test but not during the test. These tests indicated that the time at peak temperature was brief - less than one hour. To compensate for the absence of IR values during the test, a second test was conducted by Wylie Laboratories to obtain additional IR data for qualification. The test was conducted over a period of forty days at a constant temperature of 230°F and pressure of 20 psi in a steam environment and intermittent spray. IR values were continuously monitored and found to be acceptable.

At the time of file preparation we believed that the test conditions more than enveloped the LOCA profile. In particular the forty day test represented an extensive test duration in comparison with the LOCA profile and was the approach recommended by our Environmental Qualification consultant.

We agree that the peak temperature for the projected IP-2 LOCA profile is 287°F and that there is no IR test data for the temperature range between 230°F and 287°F. Thus, although we continue to maintain that the test parameters resulted in a more severe test than required by 10 CFR 50.49, literal compliance with 10 CFR 50.49 was not achieved.

The blocks in question were immediately replaced with qualified Buchanan Terminal Blocks. The likelihood of prospective violations in connection with Weidmuller Terminal Blocks has been eliminated since there are no other Weidmuller Terminal Blocks in instrumentation circuits which are used inside Containment where the LOCA profile prevails. This has been confirmed by record searches and an equipment walkdown. Full compliance with 10 CFR 50.49 requirements was achieved as of December 18, 1987, when the eight Weidmuller Terminal Blocks were replaced.

Reply to Violation

IB. We acknowledge the facts as stated in the Notice of Violation.

The deficiencies identified in the Inspection Report regarding ASCO Solenoid valves and limit switches were the result of inadequate compliance with environmental qualification requirements by craft personnel. In reviewing the factors contributing to the deficiencies, we concluded that many personnel were not fully cognizant of the basis for their activities or the consequences if procedures were not strictly followed. This is particularly true with the use of RTV sealant. The loose mechanical seals are attributed to repairs implemented before training methods and procedures were enhanced to emphasize environmental qualification requirements.

Environmental qualification requirements were satisfied by an inspection of all equipment requiring a seal to maintain environmental qualification in May of 1986. This inspection was completed within 48 hours from the discovered deficiencies. No similar deficiencies were identified.

Additional corrective measures have been taken. EQ equipment is now distinctively tagged to convey to craft personnel the importance of equipment. Training programs for craft personnel have been revised to emphasize the underlying bases for an environmental qualification program and the potential consequence if the program is not properly followed. Training of craft personnel has been tailored to the various requirements of each craft. Thus, the training for I&C personnel places greater emphasis on instrumentation maintenance while training for mechanical personnel emphasizes splices, amongst other items. These procedures have been reviewed to eliminate ambiguity. Additionally, Quality Control efforts have also been enhanced to identify deficiencies before a piece of equipment is placed back in service after maintenance. These revised procedures help to ensure that activities which could affect the environmental qualification of a piece of equipment are now highlighted to station craft personnel.

We believe these procedural and training method revisions will effectively eliminate the likely recurrence of deficiencies. Con Edison is in full compliance with 10 CFR 50.49 specific to this item.

Reply to Violation

IC. We acknowledge the facts as stated in the Notice of Violation.

All questionable UE&C splices were replaced with qualified splices during the 1987 refueling outage when a comprehensive splice inspection was performed. Currently, in place maintenance procedures mandate the use of splices that are environmentally qualified. Prior to resuming power operation from this refueling outage required splices were in full compliance with the requirements of 10 CFR 50.49.

The cause of the deficiency was our reliance upon documentation supplied at the time of plant construction which was purported to support qualification of the UE&C splices. This would have been correct if the splices were fabricated in accordance with procedure. As the inspection revealed this was not always the case. In addition, inspection of the splices was not always feasible. Many of the splices could not be inspected without destruction of the splice. The UE&C power cable splices fall into this category. These power cable splices were replaced with qualified Raychem splices since they were not amenable to inspection.

Due to the conservative approach taken, which meant splice replacement with a known and accepted splice (Raychem) even though the existing splice could have been qualified, or was qualifiable by on-going industry test effort, provides added assurance that required splices were environmentally qualified prior to resumption of power operation at the conclusion of the 1987 refueling outage.

Recurrence of the deficiency is not expected. It arose during the time of plant construction at which time the requirements for environmental qualification were being formulated. Lastly, due to the efforts exerted in the 1987 outage there is confidence that the existing required plant splices are in compliance with environmental qualification requirements of 10 CFR 50.49.

Reply to Violation

ID. We acknowledge the facts as stated in the Notice of Violation.

We identified these deficiencies as a result of the splice inspection program conducted in 1987 in response to Information Notice 86-53. The splices, which were apparently fabricated in early 1980, did not conform to Raychem requirements and this non-conformance is attributable to poor procedures and lack of training of craft personnel which existed at that time. At the time of discovery the splices were repaired with qualified Raychem splices and conformance with environmental qualification requirements was achieved.

In the years since the splices were originally fabricated there have been extensive revisions in the training programs. Due to the extensive use of Raychem splices throughout the plant, seminars were conducted by Raychem personnel for the benefit of engineering and craft personnel explaining the background, basis and function of the Raychem splice. Other training courses have focused on providing the skills necessary to perform an acceptable Raychem splice. These courses have also included Quality Control personnel to enhance their inspection skills. Maintenance procedures have been reviewed and revised where necessary to ensure that the critical parameters of a Raychem splice (overlap, no braid, etc.) are achieved in application. Thus, there is heightened awareness, procedures and controls currently in effect. These same standards were not in place when the splice was originally fabricated.

Due to the Raychem Splice Inspection conducted during the 1987 refueling outage, and the resulting splice replacements, full compliance with 10 CFR 50.49 was achieved prior to resumption of power operation.

Reply to Violation

- IE. We believe Inspection Report 87-38 is in error in citing June 16, 1986 as the date of discovery of this EQ deficiency. In fact, the uncovered terminal blocks were found by us on January 16, 1986 and replaced the same day.

The facts related to this event are contained in NRC Inspection Report 50-247/86-05. On January 16, 1986, while performing Environmental Qualification (EQ) inspections, we discovered four terminal blocks installed on Rack 19 inside the containment building which were not enclosed in terminal boxes. As a precautionary measure, the blocks were replaced with other environmentally qualified blocks and enclosed in terminal boxes. Full compliance with the requirements of 10 CFR 50.49 was immediately achieved. An operability review was performed and the blocks were determined to be operable even without them being enclosed in terminal boxes.

The cause of the event was the removal of the original enclosure due to the hindrance it represented to maintenance functions. Considering the time frame when this occurred it is doubtful whether the technicians were aware that, by removing the enclosure, they had defeated a measure important to environmental qualification. The original installation occurred in the 1980-81 time frame and it is believed that the enclosure was removed sometime afterward. The technicians were using electrical schematics whereas the enclosure is only shown on physical drawings.

Measures described in our responses to other subparts of this violation have been implemented to prevent a reoccurrence. These include the unique EQ tagging of all devices on the EQ Master List. This enables rapid visual identification that a device is subject to environmental qualification requirements. Training programs have instilled in all personnel a heightened awareness of environmental qualification requirements and measures that must be taken to maintain the qualification status of equipment. These programmatic steps provide reasonable assurance that the deviation will not be repeated.

The error in the date of the correction of the violations has impacted mitigation for a violation whose duration is significantly below 100 days. This mitigative factor is set forth in Generic Letter 88-07. As indicated above, our corrective actions with respect to this deficiency were implemented 47 days after November 30, 1985.

Reply to Violation

IF. We acknowledge the facts as stated in the Notice of Violation.

During the 1987 refueling outage, in replacing a failed wide range resistance temperature detector (RTD), station personnel could not complete the connection to a terminal block due to insufficient lead length supplied with the new RTD. A subsequent evaluation revealed that the manufacturers requirement for a vapor tight enclosure was not met by the use of a terminal block and box. A modification was immediately implemented wherein the existing RTD lead wires were spliced to qualified cable. The splice was enclosed in a condolet and sealed with RTV. This modification was completed for all eight wide range RTDs, four hot leg and four cold leg RTDs. By December 31, 1987 full compliance with the requirements of 10 CFR 50.49 had been achieved.

The cause of the occurrence was an inadequate assessment that termination of the RTD leads at a terminal block within an enclosure would be sufficient to satisfy environmental qualification requirements. The manufacturer's requirement for a vapor tight seal at the lead junction was not met. Since the initial installation of the RTDs, additional EQ documentation requirements have been implemented. Engineering procedures have been revised to require a detail review of design requirements. Specifically, the EQ file for the RTDs has been revised to clearly identify the manufacturer's requirement for vapor tight leads. These changes are to ensure that the deficiency will not be repeated.

II. Violations Not Assessed a Civil Penalty

- A. 10 CFR 50.49(d), (f), and (j), respectively, require, that (1) a list of electric equipment important to safety be prepared, and information concerning performance specifications, electrical characteristics and postulated environmental conditions for this equipment be maintained in a qualification file; (2) each item of electric equipment important to safety shall be qualified by testing of identical or similar equipment and qualification based on similarity shall include a supporting analysis to show that the equipment to be maintained in an auditable form to permit verification that each item of electrical equipment important to safety is qualified and that the equipment meets the specified performance requirements under postulated environmental conditions.

Contrary to above,

1. at the time of the inspection on May 16, 1986, the qualification of RHR pump motor 21 RHRPM (File #2) was not adequately established for the radiation dose expected in the area in that the Westinghouse letter, upon which the qualification was based, did not reference a particular test report, nor was there any licensee evaluation or audit of the test.
 2. prior to May 1986, qualifications for Anaconda cable (new file #31F), Okonite cable (new file #31G) and Brand Rex cable (new file #31H) were not established in that no EQ file existed for the cables until May 1986. In addition, the cables were not on the EQ master list until May 12, 1986.
 3. before June 4, 1986, qualification for AIW Amerlink type SIS cable was not established in that no EQ files and qualification data existed for this cable and this cable was not in the EQ master list.
- B. 10 CFR 50.49(d)(1) requires performance specifications to be established for the electrical equipment to be qualified.

Contrary to the above, as of May 16, 1986, appropriate functional performance requirements (insulation resistance) for the instrumentation cables, which require qualification, had not been established.

These are Severity Level IV violations. (Supplement I)

Reply to Violation

IIA1 We disagree with the facts as stated in the Notice of Violation (NOV).

The RHR pump motors 21 and 22 were procured from Westinghouse (W) as part of the original purchase order and were qualified to WCAP 8754. WCAP 8754 addressed qualification of large pump motors located outside containment. The only harsh environmental parameter for the RHR pump area is radiation. A value of 3.6×10^6 rads total dose is assigned to this area for qualification purposes. The WCAP described testing the pump motor coils to a qualification level of 2×10^8 rads after preaging equivalent to 40 years at 105°C. The auditable link document (W letter, IPP 136 dated 10/25/81) which identified the motors by the manufacturers shop order numbers provided a detailed comparison of the insulation systems of these pump motors to the insulation systems used in the tests documented in WCAP 8754. This W letter was also provided in the EQ file. This document stated that the insulation systems met IEEE 323-74 criteria except for a teflon glass lead cable in the RHR pump motor no. 22. The teflon glass lead cable was not included in WCAP 8754 testing. W later provided another document (IPP-84-628 dated 7/6/84) which stated that the teflon glass lead cable was successfully tested to a radiation level in excess of 10^7 rads. This document was judged adequate providing the analysis required to support qualification to the DOR guideline. Accordingly a copy of the detailed test report was not included in the EQ file. Procurement of the original pump motors predated the effective date of 10 CFR 50.49. Therefore qualification to a DOR guideline was properly achieved.

The inaccuracies in the NOV are likely the result of errors made in formulating the SCEW sheets, DEF and the master list revision for 21 and 22 RHR pump motors. These documents incorrectly identified 21 RHR pump motor having been changed to a VSWI 5008-P20 model during the 1986 IP-2 refueling outage, when in actuality it was the 22 RHR pump motor which was replaced with an equivalent model (i.e., VSWI 5008-P20). Both 21 and 22 RHR pump motors were qualified in accordance with the DOR guideline. The SCEW sheets and DEF were corrected to reflect motor qualification to the DOR guideline in May 1986.

The replacement motor for 22 RHR pump was procured from the New York Power Authority/Con Edison spare parts pool. Since the replacement pump motor meets the requirements of the DOR guidelines, a documentation of the "sound reasons to the contrary", as provided for in 10 CFR 50.49, was prepared and incorporated in the EQ file.

Reply to Violation

IIA2 We acknowledge the facts as stated in the Notice of Violation.

Anaconda, Brand Rex and Okonite cables were purchased under Con Edison Specification EO-13, "Power Control and Instrumentation Cables, XPL or EPR Insulated 0-600V" as safety grade cable for nuclear plant application. Before procurement they were identified as cables that require environmental qualification. Appropriate review of the qualification documentation was performed to address the qualification requirements and to ensure their qualification under IEEE-323 and 383. Appropriate qualification documentation was maintained in engineering files. Installation and maintenance of these cables for safety related applications were controlled under our QA requirements for Class A items. Anaconda Cable type FREP and Brand Rex cable were purchased in April 1981 and March 1982 respectively.

An internal QA review of the EQ master list and warehouse EQ material during January 1986 identified the omission of some cable manufacturers from the EQ master list. At that time a decision was made to incorporate the EQ information in reformed files and Revision 2 of the EQ master list. The relevant material had previously existed in Engineering files but had not been assembled into auditable EQ files. The omission from the EQ master list was the basic cause of the violation.

Upgraded EQ procedures placed into effect as of May 1986 provide reasonable assurance that a recurrence of this type will not be repeated. As stated in the Inspection Report, the corrected EQ master list and appropriate files were in place as of May 1986 and full compliance with 10 CFR 50.49 was therefore achieved.

Reply to Violation

IIA3 We acknowledge the facts as stated in the Notice of Violation with the following clarification.

The Amerlink wiring was used in an annunciator circuit for monitoring valve position and not considered to be safety-related. It appears that this wire had been in place since original plant construction. The original basis for acceptability considered that the circuit was to be non-safety related as it provided a control room annunciator alarm for "Safeguard Valves Off Normal Position". This alarm contact and wiring was not connected to the valve power and control circuitry. The alarm was powered from an independent D.C. power supply. The alarm circuit did not pass through the same conduit as the motor operated valve control cabling, contrary to the statements in the inspection report. It was installed in a separate conduit. As such, the original plant design basis would not have required the use of plant cable which was environmentally qualified. The original installation in no way impaired, degraded or interfered with the required safeguard functions of valve HCV-640.

It is our position that this wire need not have been environmentally qualified. Nevertheless, all wiring involved with Limitorque operators which could not be identified in accordance with a listing of "environmentally qualified" wires were replaced with qualified wiring. This occurred during a Limitorque inspection in response to the I-E notice on Limitorques and was completed by March 15, 1986. It is our contention that, notwithstanding the replacements, the requirements of 10 CFR 50.49 were met both prior and subsequent to wire replacement.

Reply to Violation

IIB We acknowledge the facts stated in the Notice of Violation with the following clarification.

Certain cable files contained no evaluation of functional performance requirements. The cable Document Evaluation forms (DEFs) did not address the minimum acceptable insulation resistance. Rather, this aspect had been evaluated by us in July 1984 in response to IE Information Notice 84-47. An EQ file contained an analysis which cited maximum leakage current obtained during Environmental Qualification testing significantly smaller than directly measured IR and nominal excitation would yield. The explanation was that the cable IR value used in the analysis corresponded to the terminal block IR values being at a minimum. The minimum IR values for cable and terminal blocks do not occur simultaneously. No correction for cable length was made as Con Edison's position has been that cable performance (IR losses) does not deteriorate with length.

In particular, the NRC took issue with Lewis cable in view of actual test results obtained with this cable. The NRC maintained that IR losses should increase with length. On advice of its Environmental Consultant, we took the opposite position, i.e. cable performance does not deteriorate with length. At the time of the technical disagreement we took the conservative approach of replacing Lewis cable in dispute with acceptable environmentally qualified cable and performed a conservative operability analysis, using a corrective factor/with cable length, of other Lewis cable applications. This was accomplished in May 1986. Subsequent testing of the Lewis cable validated our position.

Although the existence of a violation is not apparent to us we have proceeded to ensure that the leakage to signal current ratio is less than 1% by selecting a minimum acceptable IR value of 10^6 ohms. The cable qualification test reports indicate an IR value of more than 10^6 ohms.⁷ The Lewis cable test results indicate a minimum measured value of 10^7 ohms.

The cable files have been revised accordingly. Full compliance with the requirements of 10 CFR 50.49 was achieved in May 1986.