U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT NO. 50-247/93-15

DOCKET NO. 50-247

LICENSE NO. DPR-26

LICENSEE: Consolidated Edison Company of New York
Broadway and Bleakley Avenue
Buchanan, New York 10511

FACILITY NAME: Indian Point 2 Nuclear Power Station

INSPECTION AT: Buchanan, New York and the Corporate Office

INSPECTION CONDUCTED: June 28 - July 2 and July 12-16, 1993

INSPECTOR: P. Patnaik — 8-16-93
P. Patnaik, Reactor Inspector — Date
Materials Section, EB, DRS

APPROVED BY: for E. H. Gray — 8/18/93
E. H. Gray, Chief, Materials Section — Date
EB, DRS

Areas Inspected: Assessment of engineering and technical support, long-term erosion/corrosion monitoring program, review of inservice inspection data, and the eddy current examination program for steam generator tubes.

Results: Consolidated Edison implements an effective engineering program, which is conducted by corporate engineering personnel in concert with plant engineering staff. The positive attributes of the program include a viable and continuous training program, in-depth preplanning, post-critique of modifications, and ample, competent engineering personnel. The long term erosion/corrosion monitoring program is effective, but needs improvement in the computer analysis of susceptible components to meet the current industry standards. A review of sample inservice inspection data and the eddy current examination program indicated that the requirements of the applicable ASME Section XI code and the technical specification were met.

DETAILS

1.0 SCOPE

The scope of this inspection was to assess the effectiveness of the Consolidated Edison Company's (Con Edison) engineering organization to carry out design changes and modification at the Indian Point 2 station to ensure reliable and safe generation of power. In this context, Consolidated Edison's staffing of engineers in the field and the corporate engineering department, the training of engineers and sample design change, and modification packages were reviewed. The inspection included visits to the station and to the corporate headquarters.

2.0 FINDINGS

2.1 Organization

The Plant Engineering is comprised of approximately twenty-five system engineers who work in concert with Central Engineering personnel in the corporate headquarters. The Central Engineering is comprised of project engineering, mechanical engineering, electrical engineering, civil and design engineering.

The Project Engineering - Nuclear, is the responsible organization for planning and engineering support to Indian Point 2. This department provides design for multidiscipline capital projects, prepares plant modification packages, maintains engineering liaison, and coordinates engineering work activities during outages. The organization is subdivided into four disciplines with functions as follows:

- Facilities Engineering with a staff of eighteen engineers and three designers, provides engineering services for modifications to plant systems.

- Field Engineering with a staff of six engineers, provides engineering services in the field and acts as discipline or project engineers for small projects.

- Planning and Scheduling with a staff of five engineers, develops long-range plans and five-year capital budgets.

- Project Engineering with a staff of five senior engineers, establishes project teams through negotiations with Central Engineering managers and prepares project scopes.

The Project Engineering - Nuclear, has a staff of approximately 37 engineers in comparison to a total Central Engineering staff of 220 engineers. The Plant Engineering is staffed with 30 engineers.

During the inspection, the level of staffing was assessed on the basis of the number of ongoing programs and their status. The annual progress of each program, coupled with engineering backlogs on modifications, assured that the staffing level is adequate at the Central Engineering and at the plant site.

2.2 Modification Process

Modifications are generally initiated through a process known as Engineering Support Request (ESR) process. ESRs can be generated by plant or engineering personnel. The ESR format includes statements of concerns and solutions. All ESRs are prioritized by assigning values against a set of selected attributes. The attributes are intended to validate the relative importance and urgency within the ESR population. This assures that the highest priority (i.e., safety-related) ESRs get the quickest response and the most attention. In the design phase, a proposed modification gets multiple reviews and field walkdowns.

2.3 Completed Modifications

The inspector reviewed a listing of modifications undertaken during the last outage and selected the following for review.

2.3.1 Residual Heat Removal (RHR) System Upgrade

The purpose of this modification is to accomplish an outage-related installation of branch connections from the discharge line of each RHR pump to a valve and a welded cap. These lines will be connected at a later date to a common recirculation line, which will connect to the Refueling Water Storage Tank (RWST). This will enable each RHR pump to increase its recirculated flow and prevent the RHR pumps from interacting with each other, causing a potential dead head condition.

The inspector reviewed the licensee's design criteria, 10 CFR 50.59 Safety Evaluation, and the engineering specification for the work. The review of the package was satisfactory.

2.3.2 Condensate Storage Tank (CST) Bladder Removal and Tank Sealing

The purpose of this modification is to remove the bladder from the CST, seal the tank, and install valves and other equipment to supply nitrogen to the tank. The bladder was beyond its service life, and the feedwater had high dissolved oxygen due to a breach of bladder. The inspector reviewed the system description, the Set Point Device Data Forms, the safety evaluation, and witnessed operation of the system. The inspector was satisfied with the review and the operation of the system.

2.3.3 Installation of Bypass around LCV-1158 (Control valve between the CST and the Condenser)

The purpose of this modification is to alleviate the water hammer condition during the opening of the valve. This modification also incorporated a solenoid valve (SOV 1258) to be manually reset to open LCV-1158 after the line downstream of this valve has been filled through the 2" bypass. All piping, valves, conduit, and electrical boxes are seismically supported. The valve and the associated piping are classified as seismic class 1. A review of the licensee's analysis and the safety evaluation was satisfactory.

3.0 ONGOING PROGRAM AND STUDIES

3.1 Cable Separation Program

In 1989, a formal program was initiated to validate and reconstitute the design basis for cable separation and to perform a field verification of the as-installed cable and raceway configuration. For this program, cables are traced for the entire run, from the source to the end device and the results documented in a data base listing of cables and train information. The program is expected to be completed during the 1995 outage.

3.2 SQUG Program

Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46," was issued to implement the USI A-46 resolution, which concluded that the seismic adequacy of certain equipment in operating nuclear power plants should be reviewed against seismic criteria not in use when these plants were licensed. Indian Point 2 is one of these plants for which USI A-46 is applicable. The program will be conducted to coincide with the 1993 and 1995 refueling outages for accessibility to equipment. The schedule for completion of the USI A-46 program is November 1995.

3.3 IPEEE Program

Generic Letter 88-20, Supplement 4, "Individual Plant Examination for External Events (IPEEE)," was issued to require each licensee to evaluate the risk to their plant from external events. These events include seismic, internal and external fires, hurricanes and tornadoes, flooding, transportation accidents, incidents at nearby facilities, and any other plant specific external events that the licensee is aware. The licensee, with NRC approval, has integrated the USI A-46 and the IPEEE programs. The integration of these activities was started during the 1993 refueling outage and will continue through the 1995 refueling outage with completion of the effort in November 1995.

3.4 Motor-Operated Valve (MOV) Program

The licensee has embarked on an extensive program to develop the design basis for each safety-related motor-operated valve and to develop calculations to confirm that each MOV is capable of meeting its design basis requirement. Further, they will test each MOV in a manner that confirms the calculational method and MOV operability. The program is intended to conform to the requirements of Generic Letter 89-10. The program is scheduled to continue through the 1995 refueling outage.

3.5 Decontamination of Reactor Coolant System (RCS)

Consolidated Edison is planning to chemically decontaminate the reactor coolant system during the 1995 outage using a process known as CAN-DEREM. This process has been successfully used on chemical and volume control systems during the 1993 outage.

4.0 TRAINING

4.1 Station Training

The inspector reviewed the training program and facilities, (excluded in this review was the training program for control room operators). The major program, as described in detailed documents, covers the following personnel: (1) engineering support personnel, (2) chemistry technicians, (3) management staff including administrators, supervisors and managers, (4) electrical and mechanical maintenance supervisors, and (5) radiation technicians. The training section is comprised of 30 employees. Consolidated Edison provided the inspector with monthly training records for the January 1993-June 1993 that showed 594 persons participated in training in various disciplines such as engineering support, health physics, chemistry, I&C, maintenance and operation. The classrooms and on-the-job training facilities were found to be excellent in terms of space, lighting, and instructional aids.

4.2 Central Engineering

Training to support the station is based on provisions of OP-290-1, Section 5.17, which covers three types of training, such as procedural, technical, and access. In addition to the formal instructions, two-day courses are given to new employees to learn procedures. The engineering support personnel training based on INPO guidelines (91-017), includes courses on codes, standards, regulatory requirements, safety reviews, fire protection, seismic analysis and design, human factors, ALARA, IEEE standards, and plant reliability data systems. This training started on January 1, 1993, and is being offered to fifty-four engineers from the Central Engineering.

5.0 CONCLUSION

Consolidated Edison's engineering department is adequately staffed at the corporate office and at the plant site to undertake the ongoing projects and the design changes for Indian Point Unit 2. The training program for engineering support personnel meets INPO guidelines and is comprehensive. A review of design changes and modification packages indicates use of good engineering practice and conservative design.

6.0 EROSION/CORROSION MONITORING PROGRAM (IP49001)

6.1 Scope

The monitoring of erosion/corrosion in susceptible high energy piping is important to maintain structural integrity of piping and components. During this inspection, the licensee's program covering the selection of components for examination, the analysis of systems, ultrasonic thickness measurements, and the evaluation of data were reviewed.

6.2 FINDINGS

6.2.1 Program Evaluation

Consolidated Edison selected three hundred and ninety-nine locations for examination of wall thinning based on CHECMATE computer analysis, industry experience, and plant specific experience. The components were selected from the following systems:

- Feedwater
- Condensate
- Steam generator blowdown
- Moisture separator reheater (MSR) drains and vents
- Heater drains
- Extraction steam
- Auxiliary steam
- Main steam

The crossover steam pipe (MSR outlet to the LP Turbine) and the moisture preseparator drain tank, were visually inspected for erosion/corrosion. The visual inspection did not reveal any erosion of piping and the tank.

As a result of inspection of extraction steam piping, Consolidated Edison replaced the entire #26 extraction steam line with carbon steel piping clad with stainless steel. The crossunder (from HP turbine to the MSR) piping, was internally repaired by cladding with stainless steel over the entire circumference for 80 linear feet (20 feet in each of the four legs).

6.2.2 Review of Analysis

The inspector reviewed a sample analysis of the feedwater system. The licensee used the EPRI CHECMATE computer program to determine components with a high probability of erosion. These subsequently were ultrasonically checked for wall thinning. The inspector made the following observation of the licensee's CHECMATE analysis:

- The data pertaining to the thickness measurement of susceptible components were not fed back into the computer model to predict erosion/corrosion damage in areas that were not inspected.

- The main steam and the steam generator blow down lines were partially modelled for computer analysis outside the containment. It was noted that the licensee took exemption in the program manual to inspect components inside containment since a failure of a component inside containment for these systems has no risk to personnel safety. Hence, no analysis was performed for wear rate of components in these two systems inside the containment.

The licensee stated that the program document currently under revision would require reanalysis of data to predict erosion/corrosion of uninspected components and an extension of analysis of subject systems inside containment. The revision of the program is expected to be completed by December 1993.

6.2.3 Ultrasonic Thickness Measurement

The inspector reviewed the licensee's procedure, "Ultrasonic Examination - Thickness Measurements for Erosion/Corrosion," and found this document to comply with industry guidelines. The thickness measurement is tabulated with coordinates from a grid map. The data logger is compatible with EPRI CHEC NDE software. The thickness plot was reviewed for the following components in the feedwater system:

- BFD-6 — 20" elbow
  - Nominal wall — 1.031 inch
  - Measured wall — 1.018 inch
  - Code minimum — 0.797 inch

- BFD-101 — 18" elbow
  - Nominal — 0.750 inch
  - Measured — 0.679 inch
  - Code minimum — 0.544 inch

- BFD-105 18" elbow
  Nominal 0.75 inch
  Measured 0.679 inch
  Code minimum 0.544 inch

6.2.4 Data Evaluation

During the inspection, the licensee's design minimum wall for various systems identified in the program was verified on a sampling basis using the applicable ANSI B.31.1 Code. The data reviewed on the above mentioned components indicated that the measured wall was greater than the 0.875 nominal wall, requiring no further evaluation of data. The erosion rates for the feedwater system were found to be insignificant. The licensee stated that the data evaluation for the feedwater did not lead to a situation requiring sample expansion, repair, or replacement of the component.

6.2.5 Conclusion

The licensee conducted an extensive examination of components for wall thinning and repaired or replaced components as needed. However, the licensee's analysis needs upgrading to current industry practice recommended by EPRI. In light of this, the licensee planned to revise the program document, which is expected to be completed by the end of 1993.

7.0 INSERVICE INSPECTION DATA REVIEW AND EVALUATION (IP 73755)

The purpose of this inspection was to review and evaluate the licensee's nondestructive examinations (NDE) performed during the 1993 refueling outage, which was the third period of the second interval, to ascertain that NDE data covered the scope of examinations and were in compliance with ASME Code Section XI, 1980 Edition through Winter 1981 Addenda. The licensee's Inservice Inspection (ISI) program was approved by the NRC in a letter dated March 16, 1989.

The inspector selected seven items as shown in Table 1, and reviewed the test procedures, test records, qualifications of personnel performing NDE, calibration blocks and other materials used for NDE of these items.

TABLE 1

EXAMINATION AREA	IWB-2500-1	REF. SKETCH
CIRCUMFERENTIAL WELDS		
4" Pressure relief line, weld 70-12	B 9.11	B206712-3
10" Acc. Disc. line, weld 352-10, 11, 12	B 9.11	B206904-3
6" RHR Return line weld 356-30	B 9.11	B206907-3
6" RHR Return line weld 358-10&11	B 9.11	B206908-3
NOZZLE WELDS		
Nozzle to safe end welds, PZRS-3	B 5.40	A206918-1
Nozzle to safe end welds, SGS-24-4	B 5.70	A206917-1
CODE REPAIR		
14" Pressure Surge line 63A & 63B	B 10.1	B206710-4

The licensee contracted with a qualified contractor to perform NDE during this outage. The inspector determined that the qualifications of these personnel were reviewed and approved by the licensee's level III examiner and met the requirement of SNT-TC-IA, 1980 Edition.

The inspector reviewed the ultrasonic testing procedure, IPP-ISI-206, Revision 3, the penetrant test procedure, IPP-ISI-11, Revision 4, and the magnetic particle testing procedure, IPP-ISI-70. These procedures were found to be in compliance with the requirement of ASME Code, Section XI. These procedures were reviewed and approved by the licensee's Level III examiner.

The NDE records were found to contain pertinent data properly recorded and reviewed by licensee's Level III examiner and the ANI inspector. The inspector also verified that the calibration blocks IPP-1, IPP-38, IPP-56, IPP-48, and IPP-61 used for ultrasonic examination

were manufactured per approved drawings and were in compliance with ASME Code requirements. The calibration blocks were maintained properly, with traceable identification on each block. The inspector also verified the manufacturer's certificates for the batch number of the penetrant and magnetic particle material used for NDE of the selected items.

The licensee had a computerized tracking system to maintain ISI status and NDE results. The inspector witnessed the retrieving process of the NDE data pertaining to selected items stored in the computer memory. This computer tracking system was programmed to track NDE data for future reference.

7.1 Conclusions

The licensee's NDE procedures and recorded data were found to be in compliance with ASME Code, Section XI. The ISI program was well organized and implemented properly.

8.0 EDDY CURRENT EXAMINATION OF STEAM GENERATOR TUBES (IP 73052)

The purpose of this inspection was to review and evaluate the licensee's procedures for the eddy current inspection of steam generator tubes to ascertain that the testing performed during this outage was in compliance with ASME Code, Section XI and the plant technical specification.

Consolidated Edison's pressurized water reactor at Indian Point 2 has four steam generators (SG) identified as SG 21, SG 22, SG 23, and SG 24. Each steam generator contains 3,260 U-bend, mill annealed, Inconel 600 tubes.

The licensee contracted with a qualified eddy current inspection vendor to perform eddy current testing of steam generator tubes per procedures MRS 2.42 GEN-35, Revision 1, DAT-GYD-001, Revision 6, and DAT-MGT-001, Revision 0. The personnel performing the data collection and analysis of the eddy current inspection of the steam generator were qualified to the requirement of SNT-TC-1A, 1980 Edition. The qualifications of these personnel were reviewed and approved by the licensee's Level III examiner.

The inspector reviewed the above eddy current procedures. The procedures were found to be in compliance with the requirement of ASME Code, Section XI, and the plant technical specification.

One hundred percent of the tubes (both hot and cold legs) were examined from the tubesheet through the first support with a standard 700/720 mil bobbin coil probe. The bobbin coil examination was also performed over the full length on 707 tubes in SG 21, 568 tubes in SG 22, 680 tubes in SG 23, and 705 tubes in SG 24. All bobbin coil indications were also

examined by a rotating pan cake (RPC) probe to clarify defects. During this outage, the tubes with indications evaluated at 40% or larger, of wall thickness were plugged. The summary of the plugged tubes is shown in the Table I.

TABLE 1

SG	Plugged in 1993	Previously Plugged	Total Plugged
21	13	257	270
22	14	324	338
23	16	239	255
24	16	252	268
Total	59	1072	1131

8.1 Conclusions

The eddy current inspection program for steam generator tubes at Indian Point 2 was found to be well organized and capable of determining the integrity of steam generator tubes. The testing procedures were in compliance with ASME Code, Section XI, and the plant technical specification.

9.0 ENTRANCE AND EXIT MEETINGS

Members of the licensee's management and engineering and technical staff were informed of the scope and the purpose of the inspection at the entrance meeting, which took place on June 28, 1993. The findings of the inspection were presented to and discussed with members of the licensee's management at the conclusion of the inspection on July 16, 1993. The licensee concurred with the inspector's findings. A list of attendees at the exit meeting is appended to this report as Attachment 1.

ATTACHMENT 1

EXIT MEETING

Con Edison of New York

C. Jackson, Manager, Nuclear Safety & Licensing
T. Schmeiser, General Manager, Nuclear Power Generation
J. McAvoy, Manager, Operations
J. Curry, Department Manager, Nuclear Quality Assurance
V. Perry, Manager, Modification Planning - Maintenance
G. Wasilenko, Technical Specialist, Nuclear Quality Assurance
S. Nadipuram, Principal Engineer, Field Engineering - Nuclear
M. Whitney, Sr. Engineer, Nuclear Safety & Licensing
J. Lamb, System Engineer - Erosion/Corrosion, Plant Engineering
B. Canonigo, System Engineer -Service Water, Plant Engineering
W. O'Toole, Supervising Engineer, Plant Engineering
J. Keller, Engineer, Field Engineering - Nuclear
J. Schwartz, Sr. Quality Assurance Examiner, Test and Performance

United States Nuclear Regulatory Commission

G. Hunegs, NRC Resident Inspector, IP2
P. Patnaik, NRC Region I Inspector
A. Ray, NRC Region I Inspector