U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-461/89006(DRS)

Docket No. 50-461 License No. NPF-62

Licensee: Illinois Power Company
500 South 27th Street
Decatur, IL 62525

Facility Name: Clinton Power Station

Inspection At: Clinton, IL 61727
Glen Ellyn, IL 60137

Inspection Conducted: February 6 through March 3, 1989 (Clinton)

Inspector: A. S. Gautam Anil S. Gautam 3/16/89
Date

Also contributing to this report is:

R. Larson, Idaho National
Engineering Laboratories

Approved By: R. N. Gardner, Chief
Plant Systems Section R. N. Gardner 3/16/89
Date

Inspection Summary

Inspection on February 6 through March 3, 1989 (Report No. 50-461/39006(DRS))
Areas Inspected: Routine, announced safety inspection of licensee actions on previously identified findings, Licensee Event Reports (LERs), Regulatory Guide 1.97 commitments, and torque switches (Modules 92701 and 92702).
Results: Of the areas inspected, one apparent violation was identified (failure to perform adequate corrective actions - Paragraph 3).

DETAILS

1. Persons Contacted

   a. Illinois Power Company (IPCo)

   *D. P. Hall, Vice President
   J. S. Perry, Assistant Vice President
   *R. D. Freeman, Manager, NSED
   J. G. Cook, Manager, Nuclear Planning and Support
   *J. Greenwood, Manager, Power Supply
   R. E. Campbell, Manager, QA
   *J. W. Wilson, Manager, CPS
   R. E. Wyatt, Manager, Nuclear Training
   D. L. Holtzcher, Acting Manager, Licensing and Safety
   J. D. Weaver, Director, Licensing
   *E. R. Bush, Director, Nuclear Program Scheduling
   *E. P. Vaughan, Director, Operations and Maintenance
   *M. C. Hallon, Acting Director, Nuclear Programs
   M. E. D'Haem, Supervisor, Engineering
   W. S. Iliff, Supervisor, Licensing Administration
   *K. A. Baker, Supervisor, I&E Interface
   *S. L. Clary, Supervisor, Procurement
   *K. Graff, Director, Operations Monitoring
   *F. C. Edler, Director, Training
   P. Thompson, Supervisor, Electrical Systems
   T. Butera, QC Engineer

   b. U.S. Nuclear Regulatory Commission (USNRC)

   P. L. Hiland, Senior Resident Inspector
   *S. P. Ray, Resident Inspector

   *Denotes those attending the site exit interview on February 10, 1989.

2. Licensee Action on Previously Identified Findings

   a. (Closed) Violation (50-461/87026-03a(DRS)): This item addressed the incorrect qualified life of ASCO solenoid valve ORA027. The calculated qualified life was originally based on the valve being energized for less than one hour a month while actual plant conditions required the valve to be continuously energized. Subsequent to the inspection, the licensee revised their EQ binder (EQ-CL024) to reflect the correct qualified life of 9.13 years. The licensee has also completed further actions to prevent recurrence of this finding by reviewing all appropriate solenoid valves in regard to their qualified life, and have reported full compliance. No further concerns were identified.

b. (Closed) Violation (50-461/87026-03b(DRS)): This item addressed a junction box containing terminal blocks but having no weep hole for removal of accumulated water and condensed moisture during an accident. Corrective action for this item is discussed under Section 2.f of this report.

c. (Closed) Violation (50-461/87026-03c(DRS)): This item addressed an oil leak found on the motor case under the upper motor bearing drain plug of the Low Pressure Core Spray Motor 1E21-C001. The licensee performed an inspection on August 26, 1987, and reported that oil had not leaked from the drain plug. The inspector determined that the oil previously found on the floor was in fact a housekeeping deficiency that has since been corrected. No further concerns were identified.

d. (Closed) Violation (50-461/87026-03d(DRS)): This item addressed deficiencies found on the Fuel Pool Cooling Pump 1FC02PA. Deficiencies included a missing bolt on the motor connection box, rust on the motor connection box sealing surface, a broken thermocouple connection box cover with no gasket, indeterminate oil in the pump inboard bearing, and a pool of oil under the pump outboard bearing. Subsequent to the inspection the licensee took immediate corrective action and completed repairs.

The inspector reviewed corrective actions taken to prevent the recurrence of any such maintenance deficiencies. The licensee provided records of their preventive maintenance program that periodically (about every 18 months) requires appropriate activities to be performed to preserve the qualification of the equipment. The licensee also provided details of surveillance regularly performed by plant operators and by quality assurance inspectors. However, during a brief plant walkdown, the NRC inspector noted a rusty Limitorque valve stem, a leaky valve, a corroded pipe and a housekeeping deficiency which had not yet been identified by the plant's surveillance program. The inspectors had no immediate safety concerns regarding these deficiencies and the licensee took immediate corrective action. The licensee was informed that implementation of their maintenance and surveillance programs would be further reviewed during an upcoming Region III maintenance inspection. No further concerns were identified.

e. (Closed) Violation (50-461/88010-03(DRS)) and Unresolved Item (50-461/87026-01(DRS)): These items identified the lack of environmental qualification documentation for two hundred and seventy Thomas and Betts nylon wire caps installed on the 480 V motor leads of Limitorque operators. Subsequent to this finding, the licensee performed a LOCA test at Wyle (January 29, 1988) where it was determined that these wire caps were qualified for 9.9 years. The licensee reported reworking some of the wire caps with qualified Okonite tape and scheduling replacement of others prior to the end of their qualified life.

The inspector reviewed corrective steps taken by the licensee to prevent recurrence of such a deficiency. The NRC had identified the wire caps as unqualified because there was no evidence in the licensee's EQ files that these components were tested along with Limitorque actuators. The licensee has now implemented checklist NF-208 for future EQ reviews which requires the reviewer to ensure that the tested equipment is identical to the installed equipment and that the equipment has been tested in its installed configuration. The licensee also indicated that reviews are being conducted of significant event reports submitted by the Institute of Nuclear Power Operations, and that IPCo is tracking various other industry EQ information and data so as to be aware of any potential impact on the EQ of the equipment at Clinton. No further concerns were identified.

f. (Closed) Violation (50-461/88010-02(DRS)); LER 87-066-00: This item addressed the lack of weep holes in EQ junction boxes. These weep holes are required to drain accumulated water so as to prevent shorting of electrical circuits in the junction box enclosures. Subsequent to this NRC finding, the licensee reported installing weep holes in one hundred and fifty six junction boxes. This work was reported to be complete on November 12, 1987.

The inspector reviewed corrective steps taken to prevent recurrence. The root cause of this deficiency was defined by the licensee as an unclear installation specification for the junction boxes by the architect/engineer Sargent & Lundy (S&L). Consequently, Engineering Change Notices were issued to correct drawings for this requirement and S&L specifications were reviewed to identify other discrepancies. The licensee indicated that a training program was implemented to ensure that "appropriate personnel responsible for reviewing nonconformance documents and defining corrective actions are aware of the need to look for possible generic implications of problems and take a broad view of remedial actions for hardware deficiencies."

During this review the inspector identified certain deficiencies in the licensee's corrective action and determined that full compliance has apparently not yet been achieved. Deficiencies regarding inadequate corrective action shall be tracked as a separate item and are described in Section 3.b of this report.

g. (Closed) Violation 50-461/88010-01(DRS)); Unresolved Item (50-461/87026-02(DRS)): This item addressed unqualified AMP Kynar electrical butt splices found to be installed on EQ valve actuators, solenoid valves and electrical junction boxes affecting multiple safety systems. Subsequent to this finding, these splices failed a LOCA test conducted by the licensee at Wyle Labs on October 9 through November 19, 1987. Upon learning of these test results, the licensee immediately located these installed splices in the

plant and reported to the NRC that 196 Kynar splices had been reworked with qualified tape or Raychem tubing. This work was reported to be complete on November 18, 1987.

The inspector reviewed corrective steps taken by the licensee to prevent recurrence of such a deficiency. The NRC had identified the Kynar splices as unqualified because there was no evidence in the licensee's EQ files that these components were tested in their installed configuration. The licensee has now implemented checklist NF-208 which requires the reviewer to ensure that the installed equipment is identical to the tested equipment and that the equipment has been tested in its installed configuration. The licensee also indicated that reviews are being conducted of significant event reports submitted by the Institute of Nuclear Power Operations and that IPC is tracking various other industry EQ information and data so as to be aware of any potential impact on the EQ of the equipment at Clinton.

During this current review, the NRC inspector reviewed several licensee identified deficiencies in the corrective action process. Based on details described in Section 3.a of this report, full compliance has apparently not yet been achieved. Deficiencies regarding inadequate corrective action shall be tracked as a separate item.

h. (Closed) Open Item (50-461/87026-04(DRS)): This item addressed the inappropriate location of a "T" drain in Limitorque actuator 1SX095A such that the "T" drain would not provide drainage during an accident. The licensee stated that actuators 1SX095A and B were part of the combustible gas control system room coolers and that this system is no longer required to perform any safety function during an accident; thus the actuators are being removed from the EQ list. The NRC inspector noted that the rooms associated with these coolers are now adequately ventilated by the containment and that no associated EQ equipment or operator action would be compromised. No further concerns were identified.

3. Licensee Corrective Action on Kynar Splices and Junction Boxes

During the periods of August 17 through October 12, 1987, and February 25 through March 31, 1988, Region III conducted inspections to verify the environmental qualification (EQ) of electrical equipment at the Clinton Station (Inspection Reports No. 50-461/87026(DRS) and No. 50-461/88010(DRS)). As a result of these inspections, a $75,000 civil penalty was imposed on Illinois Power Company (IPCo) on June 1, 1988. The Notice of Violation (NOV) that accompanied the civil penalty identified the following two deficiencies:

10 CFR 50.49(f) requires, in part, that each item of electric equipment important to safety be qualified by testing and/or analysis under postulated environmental conditions.

Contrary to the above, as of August 19, 1987, the following equipment important to safety was not qualified by appropriate testing and/or analysis which reflected the installed configuration:

- One hundred and ninety-six AMP Kynar electrical butt splices installed in valve actuators, solenoid valves and electrical junction boxes affecting multiple safety systems,

- One hundred and fifty-six junction boxes without drainage openings (weep holes) affecting multiple safety systems.

As a result of this violation, the licensee was required to take corrective steps and report the results achieved. On June 29, 1988, IPC submitted a response to the NOV (DPM-0621-88) stating that the following steps had been taken to correct the problem:

Kynar Splices:

"Upon learning of these test results on November 10, 1987, while CPS was in cold shutdown, IP immediately initiated a walkdown of electrical devices in areas where 100% humidity could occur. During this walkdown, 196 AMP Kynar butt splices in these areas were located. Each of these was reworked using qualified tape or Raychem tubing, resulting in a configuration that the NRC agrees is qualified. See NRC Inspection Report No. 88010, Item 88010-01. The walkdown and rework of all butt splices in high humidity areas was completed on November 18, 1987, prior to the time power ascension from the shutdown commenced."

Junction Boxes:

"This problem was identified as a generic condition on November 5, 1987, while the plant was in cold shutdown. IP ordered that the plant remain in cold shutdown until all of the junction boxes were repaired. A walkdown was conducted to identify all junction boxes lacking required weep holes. A total of 156 boxes were identified as lacking weep holes. These were reworked by drilling a drain hole in each box. This work was completed on November 12, 1987, prior to initiating power ascension from the shutdown."

Summary of NRC Findings

a. KYNAR Butt Splices:

In December 1988, during routine maintenance activities, the licensee identified two Limitorque operators containing unqualified AMP KYNAR butt splices. These valves were included in the population of devices walked down by the licensee in 1987. Subsequently, the licensee initiated a complete walkdown of all EQ devices having KYNAR butt splices and has identified a current total of six

unqualified KYNAR butt splices in five Limitorque operators. As a result, these five 10 CFR 50.49 designated valves were inoperable during plant operation.

In determining the root cause of the inadequate inspections conducted in 1987, the licensee determined that planning that occurred prior to the first walkdown inspections in 1987 was incomplete. The NRC inspector determined that in regard to these 1987 inspections, the IPC administrative controls and measures were inadequate in the areas of planning, training of inspectors, quality controls, documentation, communication, accountability, and conformance to inspection procedures. Consequently, there was a certain degree of confusion and some errors made during the licensee's inspection process.

b. Junction Boxes:

During this current review, the NRC inspector identified missing weep holes in six boxes installed inside the Unit 1 containment and in high energy line break areas. The licensee later confirmed that fifteen 10 CFR 50.49 designated EQ junction boxes did not have weep holes for drainage of accumulated water. The licensee indicated that weep holes were only installed in boxes having terminal blocks, and the contents of the six boxes were qualified for submergence.

All fifteen boxes are inside the containment or high energy line break areas (HELB) and are exposed to spray during an accident. Since the box is not sealed, water is postulated to pour into the box from top and side conduit entries and from unsealed covers. Moisture is also introduced during the accident through the box cover to condense and accumulate in the box. The inspector requested the licensee to verify whether the contents of the boxes without weep holes were qualified for submergence. The following items in the boxes were identified as requiring qualification for submergence:

- Raychem splices.
- Okonite Wire, Single Conductor No. 16 19X with 0.015" Okozel (Tetzel 280) insulation (Instrumentation Cable; Okonite Report No. SL-IP-1081 dated October 29, 1981).
- Conax Electrical Conductor Seal Assembly (ECSA) with Kapton insulated leads (Conax Report IPS-1079, Revision D, May 21, 1984).
- Okonite T-95 and T-35 splicing tapes (Okonite Report No. NQRN-3).

The Raychem splices were found adequately tested for submergence, however, the inspector noted that based on the documentation in the licensee's EQ files, the Okonite wire, Kapton leads and Okonite tapes were not qualified for submergence. The inspector also noted that

the summary sheets in the EQ files for Okonite cable and tapes stated "Submergence - N/A" and that there was no apparent evaluation for submergence in these files.

Subsequent to the NRC concerns identified in Paragraphs 3a and 3b of this report, the licensee provided additional documentation in an attempt to establish qualification of the Kapton leads, the Okonite cable, and the Okonite tape for post LOCA submergence. In regard to the ECSA Kapton leads, the licensee submitted Conax Report IPS-1079, Revision D, May 21, 1984 and Conax Installation Manual IPS-725, Revision G, February 15, 1985 to address submergence. The inspector noted that in the Conax test, Kapton leads were encased in a tight polyolefin tube and then inserted in a flex conduit before being immersed in water. It was not clear whether the pigtails were wet in such a configuration. This is significant because the Kapton leads installed in the plant have no polyolefin tube or flex conduit in the postulated submerged condition in the field. Further, one of two samples failed the test requiring modification of the test circuit for the second sample. It was not clear how the measurements were taken and whether they were taken while the leads were submerged. Based on a lack of adequate test documentation, the NRC inspector concluded that the Kapton leads were unqualified for submergence and that their appropriate junction box enclosures required weep holes.

In regard to the Okonite cable and tapes, the licensee submitted Okonite test reports SL-IP-1081, October 29, 1981 and NQRN-3 which indicated that a voltage withstand test at 80 volts/mil was performed on post LOCA test samples immersed in tap water for five minutes. The inspector informed the licensee that to demonstrate qualification for submergence, the specimens must be submerged during the test for the duration required during and after an accident. The licensee also provided a water absorption test for both Okonite cable and tapes; however, this test did not subject the samples to thermal or radiation aging prior to submergence. Based on a lack of adequate test documentation, the NRC inspector concluded that the Okonite cable and tapes were unqualified for submergence, and that their appropriate junction box enclosures required weep holes. Subsequent to these findings, the licensee immediately installed weep holes in the boxes to mitigate any immediate safety concerns.

10 CFR 50, Appendix B, Criterion XVI, "Corrective Action" requires, in part, that measures be established to assure that conditions adverse to quality such as defective material and equipment are promptly identified and corrected. In the case of significant conditions adverse to quality the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management. Based on the NRC review, the licensee failed to perform adequate corrective action in repairing the previously identified unqualified Kynar electrical butt splices and junction

boxes without weep holes. This was evidenced by the licensee's failure to ensure that corrective actions taken included adequate design control (weep holes), document control, quality control, and conformance to inspection procedures. The licensee's failure to perform adequate corrective action is considered an apparent violation of 10 CFR 50, Appendix B, Criterion XVI (50-461/89006-01(DRS)).

4. Regulatory Guide 1.97 Commitments

The Clinton Station Regulatory Guide (RG) 1.97 SER identified two outstanding commitments in regard to the neutron flux detectors and the reactor pressure vessel water level fuel zone range indicators.

a. The licensee is committed to upgrade their neutron flux detectors to the requirements of RG 1.97, Category 1. The inspector informed the licensee that systems were currently available for such applications, and that the licensee was required by RG 1.97 to initiate reviews of these systems. The licensee stated that they were currently in the process of reviewing available systems and shall inform the NRC of their progress in this area.

b. The licensee is committed to provide Class 1E power to reactor water level fuel zone range indicator B21-R610 (Division 2) and recorder B21-R615 (Division 1). The inspector reviewed appropriate schematics for independence of power supplies and appropriate isolation.

No concerns were identified.

5. Replacement of Limitorque Melamine Torque Switches

A 10 CFR 21 report issued by Limitorque alerted the industry to potential functional failures of Melamine torque switches installed in certain actuators. According to the report, the Melamine shafts of these torque switches are very susceptible to high temperatures and may have become slightly warped during production. This could cause these shafts to break during operation. The licensee took immediate corrective action and replaced all appropriate EQ valve torque switches with qualified Fiberite torque switches.

No further concerns were identified.

6. Mixed Lubricants in Limitorque Actuators

On February 6, 1987, the licensee identified mixed lubricants in a Limitorque actuator limit switch gear box. The mixture was apparently 50% Beacon 325 and 50% Mobil 28. These lubricants are not compatible. The licensee subsequently issued Special Procedure 8451.01 (current Revision 17) to ensure mixing would not occur in the future. The licensee also checked all appropriate valves for mixing and replaced lubricants where necessary.

On September 15, 1987, the licensee issued Condition Report CR 1-87-09-053, Revision 0, regarding valves 1FP051 and 1FP054 because maintenance found Exxon Nebula in these valves while the preventive maintenance document required Sun Oil EP-50. The licensee reported, however, that there was no mixing of lubricants and that Exxon Nebula is a qualified grease. A similar concern was identified on November 18, 1988 regarding valve 1FC036; however, there was no mixing of lubricants reported.

No further concerns were identified.

7. Exit Interview

The Region III inspector met with the licensee's representatives (denoted in Paragraph 1) during a site exit on February 10, 1989. The inspector summarized the purpose and findings of the inspection and the licensee acknowledged this information. The licensee did not identify any documents/processes reviewed during the inspection as proprietary.