

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-461/92016(DRP)

Docket No. 50-461

License No. NPF-62

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

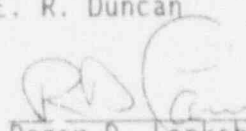
Facility Name: Clinton Power Station

Inspection At: Clinton Site, Clinton, Illinois

Inspection Conducted: July 28 - September 8, 1992

Inspectors: P. G. Brochman  
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Approved By:

  
Roger D. Lanksbury, Chief  
Reactor Projects Section 3B

9/27/92  
Date

Inspection Summary

Inspection from July 28 through September 8, 1992 (Report No. 50-461/92016(DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident and region based inspectors of licensee actions on previous inspection findings, operational safety, engineered safety features system walkdown, radiological controls, maintenance and surveillance, security, verification of plant records, self-assessment programs, licensee event reports, media contacts, and management meetings.

Results: Of the 10 areas inspected, no violations or deviations were identified in 9 areas; one violation was identified: the remaining area: (failure to identify a condition adverse to quality that would prevent a diesel generator from performing its design function - paragraph 5.e).

The following is a summary of the licensee's performance during this inspection period:

Plant Operations

- Poor work control resulted in a partial loss of main condenser vacuum. Operator response to the transient was excellent.
  
- Control room operators knowledge and communication of the status of the nonsafety-related 1F battery as well as monitoring of the related

control room instruments was poor and contributed to the damage to the IF battery.

#### Radiological Controls

- Inspector surveys of radiation areas inside the auxiliary and turbine buildings agreed closely with licensee results.

#### Maintenance and Surveillance

- The IF battery was damaged due to poor work control and communications.
- The Division I diesel generator (DG) output breaker failed to close during a surveillance test when a truck operated contact (TOC) malfunctioned.
- The maintenance staff did not exhibit a questioning attitude when a problem was identified in GGP relays, with clear generic implications. Additional problems were in the erroneous analysis of the safety impact of the relay failure performed by the maintenance staff as well as their poor understanding of the DG protective trip system and its impact on the ability of the DG to mitigate a design basis accident. (NV4 461/92016-01(DRP)).

#### Security

- No problems were identified during a review of the compensatory measures established during the modification of the security perimeter detection system.

#### Safety Assessment and Quality Verification

- No concerns were identified during a review of the licensee's program to ensure the accuracy of logs taken by plant personnel.
- Performance of the Nuclear Review and Audit Group remained superior.

## DETAILS

### 1. Persons Contacted

#### Illinois Power Company (IP)

- \*J. Peery, Senior Vice President
- \*J. Cook, Vice President and Manager of Clinton Power Station (CPS)
- \*J. Miller, Manager - Nuclear Station Engineering Department (NSED)
- \*R. Wyatt, Manager - Quality Assurance
- \*F. Spangenberg, III, Manager - Licensing and Safety
- \*R. Morgenstern, Manager - Training
- J. Palchak, Manager - Nuclear Planning and Support
- \*L. Everman, Director - Radiation Protection
- P. Yocum, Director - Plant Operations
- \*W. Clark, Director - Plant Maintenance
- \*R. Phares, Director - Licensing
- \*K. Moore, Director - Plant Technical
- \*W. Bousquet, Director - Plant Support Services
- \*C. Elsasser, Director - Planning & Scheduling
- S. Hall, Director - Nuclear Program Assessment
- \*J. Sipek, Supervisor - Regulatory Interface
- \*J. O'Brien, Supervisor - Independent Safety Engineering Group
- \*D. Korneman, Director - Systems and Reliability, NSED
- \*R. Kerestes, Director - Engineering Projects, NSED
- \*J. Langley, Director - Design and Analysis, NSED

The inspectors also contacted and interviewed other licensee and contractor personnel during the course of this inspection.

\* Denotes those present during the exit interview on September 8, 1992.

### 2. Action on Previous Inspection Findings (92702)

- a. (Closed) Unresolved Item (461/90007-02(DRS)): Loose covers and a broken neck seal on Rosemount transmitters. The licensee evaluated the safety significance of the failure of the transmitters. Their failure alone would not have prevented any safety function from being performed. The licensee initiated a preventative maintenance task to check the cover torque and neck seal integrity on the environmentally qualified transmitters. The inspectors reviewed the licensee's actions, and based on this review, this item is considered closed.
- b. (Closed) Open Item (461/91009-01(DRS)): The lack of a plan to conduct static fire damper tests was considered a weakness. The licensee issued CFS Procedure 9601.13, "Fire Damper Drop Test," to resolve the issue. The inspectors have reviewed the licensee's actions and consider them adequate. Based on this review, this item is considered closed.
- c. (Closed) Inspection Follow-up Item (461/91026-01(DRSS)): Inaccurate meteorological tower data may affect protective action recommendations (PARs). The licensee had identified a problem with the 10 meter temperature monitor reading inaccurately. This

inaccurate reading was used to determine air stability class, which was then used to determine the PAR. The licensee determined that the cause of the problem was a missing ducting tube downstream of the aspirator fan. The aspirator draws air across the sensors to achieve high heat transfer rates and instrument accuracy. The licensee fabricated a ducting tube and installed it. The licensee monitored the performance of the instrument over varying conditions and compared it to other sensors. No problems were observed. Based on the actions taken, the inspectors had no further concerns. This issue is considered closed.

- d. (Closed) Inspection Follow-up Item (461/92012-01(DRP): Questions with the design of instrument sensing lines for drywell and containment pressure and differential pressure transmitters. The licensee walked down the affected transmitters. The physical arrangement of the piping did create the possibility that moisture could collect in low points. The licensee determined that comparisons between channels would identify any problems of this nature and that any water would not have an impact on pressure transmitters due to their wide range. Differential pressure transmitters were much more sensitive and a modification had been completed on one transmitter which was susceptible to moisture collecting in low points. Maintenance personnel have been trained to be sensitive to the presence of water. Based on the low potential for impacting a safety-related function the licensee had decided not to implement any preventive maintenance tasks. Based on this information, the inspectors had no further concerns with this issue. This item is considered closed.

No violations or deviations were identified.

### 3. Plant Operations

The unit operated at power levels up to 100% for the entire report period.

#### a. Operational Safety (71707)

The inspectors observed control room operation, reviewed applicable logs, and conducted discussions with control room operators during July, August, and September 1992. During these discussions and observations, the inspectors ascertained that the operators were alert, cognizant of plant conditions, attentive to changes in those conditions, and that they took prompt action when appropriate. The inspectors verified the operability of selected emergency systems, reviewed tagout records, and verified the proper return to service of affected components. Tours of the circulating water screen house and auxiliary, containment, control, diesel, fuel handling, rad-waste, and turbine buildings were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, excessive vibrations, and to verify that maintenance requests had been initiated for equipment in need of maintenance.

The inspectors observed plant housekeeping and cleanliness conditions and verified implementation of radiation protection controls. The inspectors also witnessed portions of the radioactive waste system control associated with rad-waste shipments.

The inspectors verified by observation and direct interviews that the physical security plan and all other activities were being implemented in accordance with the requirements established under Technical Specifications, Title 10 of the *Code of Federal Regulations*, and administrative procedures.

(1) Poor Work Control Resulted in a Partial Loss of Condenser Vacuum

At approximately 7:00 p.m. on August 7, 1992, a partial loss of vacuum occurred when air was inadvertently admitted to the main condenser. The "H" condensate polisher effluent to condenser valve, 1CP018H, failed open when its instrument air supply was isolated. Approximately 300 ft<sup>3</sup> [8.5 kL] of air went to the condenser from the condensate polisher vessel. Condenser vacuum decreased to 25 inches Hg [16.7 kPa], main generator output dropped 40 MW, and the condenser hotwell normal and emergency overflow valves went full open. The operators immediately decreased reactor power by reducing recirculation flow and inserting control rods. At 7:05 p.m. instrument air was restored to the valve. At 8:03 p.m., control rod insertion was terminated when reactor power reached 45 percent. Plant conditions were stabilized a short time later.

The plant transient was caused by poor work control during maintenance and troubleshooting on polisher valve 1CP95JH. The maintenance work request (MWR) was written to perform troubleshooting activities on that valve's circuits and limit switches. However, maintenance, radwaste, and operations personnel decided to isolate the air supply to the "H" condensate polisher valves to perform additional troubleshooting of the 1CP95JH valve. The MWR did not address the impact and method of isolating the air supply to the valves and plant personnel did not adequately evaluate the need for a tagout to perform the additional work. Additionally, the operations and radwaste departments were responsible for different parts of the condensate polisher equipment. Neither group was knowledgeable of the entire system and flowpaths, contributing to the event. Consequently, when the air to 1CP95JH was isolated, valve 1CP018H failed open and created an air leakage path to the main condenser.

This event was of low safety significance. The inspectors discussed the problems that led up to the event with the licensee. The inspectors will continue to evaluate the licensee's work control and communication processes in subsequent reports.



(2) Problems With The 1F Battery

Paragraph 5.b discusses the maintenance aspects which led to the damage of the nonsafety-related 1F battery. However, some aspects of poor operations department performance contributed to the event. These included poor communications between operating shifts on the status of maintenance and plant equipment and poor attention to battery current instruments by reactor operators. After the plant computer tripped and operators received permission to restore the battery charger to the bus, 5 hours elapsed before this was accomplished. The inspectors discussed these items with the licensee.

b. Engineered Safety Feature Walkdown 71710

The inspectors performed a walkdown of the high pressure core spray (HPCS) system to verify its status. The inspectors verified that valves, circuit breakers, and switches were in their correct position for existing plant conditions; hangers and supports were properly made up; valves were operable and did not have excessive packing leakage; instruments were installed, functioning, and calibration dates were current; and local and remote position indicators agreed. No discrepancies were identified regarding component position or material condition.

No violations or deviations were identified.

4. Radiological Controls (71707)

As part of routine monitoring of radiological postings, the inspectors performed a gamma radiation survey of various areas of the auxiliary and turbine buildings. The results of this survey were compared to the licensee's most recent records and were found to be in close agreement.

No violations or deviations were identified.

5. Maintenance and Surveillance (61726 & 62703)

a. Observations Of Work Activities

Station maintenance and surveillance activities of both safety-related and nonsafety-related systems and components listed below were observed or reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, industry codes or standards, and in conformance with Technical Specifications.

<u>Document</u>	<u>Activity</u>
9031.12	APRM Channel Functional
9080.01	DG 1A Operability Test
D16546	Replacement of Valve 1DG173
D27612	Repair Relief Valve 1SX154C
D36965	Inspect TOC Switch 1E22S004103

PEMHPA370  
PMMHPS002

Clean and Inspect Valve 1E22F012  
Change Oil in Pump 1E22C003

The following items were considered during this review: the limiting conditions for operation were met while affected components or systems were removed from and restored to service; approvals were obtained prior to initiating work or testing; quality control records were maintained; parts and materials used were properly certified; radiological and fire prevention controls were accomplished in accordance with approved procedures; maintenance and testing were accomplished by qualified personnel; test instrumentation was within its calibration interval; functional testing and/or calibrations were performed prior to returning components or systems to service; test results conformed with Technical Specifications and procedural requirements and were reviewed by personnel other than the individual directing the test; any deficiencies identified during the testing were properly documented, reviewed, and resolved by appropriate management personnel; work requests were reviewed to determine the status of outstanding jobs and to assure that priority was assigned to safety-related equipment maintenance which may affect system performance.

b. 1F Battery Damaged Due To Poor Work Control And Communications

The nonsafety-related 1F battery was damaged due to poor work control and communication. At 6:30 a.m. on July 29, 1992, loads on the 1F direct current (dc) bus were transferred to the 1E dc bus to support preventative maintenance (PM) work on the 1F battery charger. The only remaining load powered from the 1F bus was the plant process computer's (PPC) uninterruptible power supply (UPS). The 1E and 1F batteries supply 125 Vdc power to various balance-of-plant (BOP) loads. The battery charger was then tagged out for the PM, which was expected to require 4 hours to perform. At 6:35 p.m. the UPS Trouble Inverter Annunciator alarm was received in the main control room. The 1F battery voltage was observed to be at 85 Vdc. At 6:40 p.m., the UPS inverter automatically shifted to its alternate source of power. The unloaded battery voltage then increased to 107 Vdc. The PPCs shut down as a result of the voltage transient caused by the inverter transfer. The PPCs were restarted from their alternate power supply.

At 7:15 p.m. the operations shift supervisor discussed the status of the battery charger PM with electrical maintenance (EM) supervision. It was determined that the PM had not been performed as scheduled. Operations personnel did not understand that the battery should be placed back on the charger. Consequently, by 11:10 p.m., the 1F battery output had decreased to approximately 90 Vdc. The battery charger tagout was cleared and the 1F bus was energized with the charger. The initial charging current drawn by the battery was approximately 500 amperes. The licensee subsequently concluded that cell 37 had gone into "cell reversal" and had become a load rather than a source of electricity.

On July 30, 1992, the 1F battery was inspected prior to placing the battery on an equalizing charge. It was discovered that cell 37 had a crack in its casing. The damage was attributed to the initial high charging current drawn by the battery. The cell was jumpered out until a new one was installed.

The inspectors discussed the failure of the EM personnel to perform the work as scheduled or contact the operations department when the work could not be performed with maintenance department management. This event was not safety significant; however, the breakdown in work control and the failure to recognize a degrading condition were significant. The inspectors reviewed the licensee's response to this event and considered it adequate. The inspectors will perform further evaluations of work control practices in subsequent reports.

c. Failure of the Division 1 Diesel Generator Output Breaker

At 9:30 a.m. on July 17, 1992, the Division 1 diesel generator (DG) was started for a routine surveillance. The DG reached required voltage and frequency within the specified time; however, when the operator attempted to synchronize the generator, the output breaker failed to close. The breaker also failed on a second attempt. It was then racked out and back in. The breaker was successfully closed on the next attempt. The DG was fully loaded and the surveillance test was completed without further problems.

Maintenance work request (MWR) D25003 was initiated to troubleshoot and identify the cause of the breaker failure. Electrical maintenance personnel recorded resistance readings across the switch contacts, while functionally testing the breaker control switch and synchronization switch. Inspections at the remote shutdown panel, as well as inspection of the undervoltage relay and control circuitry contacts, revealed no abnormalities. Further troubleshooting was suspended while a more in-depth action plan was developed, which was finalized on August 6, 1992. The intent of the action plan was to functionally test all active components in the breaker closing circuit and record pertinent information in order to determine the root cause of the failure.

The DG was being tested on a weekly test frequency as a result of the July 17, 1992 failure. The surveillance tests on July 24 and 31 were successful. A Division 1 DG outage was scheduled for August 13, 1992, to troubleshoot the breaker according to the action plan. However, at 3:05 a.m. on August 7, 1992, the output breaker again failed to close during the weekly surveillance test. The synchronization switch was cycled, and the breaker failed to close on several attempts. The breaker was then racked out and back in. It closed on the next attempt. The DG was fully loaded and the surveillance was completed without further problems. However, because of the previous failure and the undetermined root cause, the DG was declared inoperable.



Investigation continued under the action plan. Performance of point-to-point and contact resistance readings in the breaker cubicle revealed problems with the 1-2 contact pair of truck-operated contacts (TOC) Switch H1. This contact was a permissive in the breaker closing circuit that ensured the breaker was fully racked in. The TOC switches contain a number of contacts, some of which provide input to the breaker permissive logic. Others provide input for breaker status indication circuits. Inspection of the TOC switch revealed the 1-2 contacts were pitted and tarnished. In addition, EM personnel noted the 1-2 contacts would close last and open first, relative to the other contacts in Switch H1. Because other contacts provide input to breaker status indication, the 1-2 contact pair could be open without any indication of the problem. Experimentation with different breaker racking positions while jarring the cubicle demonstrated that jarring (such as occurs during breaker closure) could cause contact pair 1-2 to open while the remaining contacts in this switch remained closed.

The H1 TOC switch was replaced. As a precaution, TOC Switch H2 was also replaced. Following replacement of the TOC switches, continuity measurements were taken with the breaker racked in and out of the "test position" three times to verify proper operation. At 12:38 p.m. on August 8, 1992, the DG was started and the breaker was closed three times to synchronize the DG with offsite power. No problems were experienced. The DG was then loaded to rated conditions following the third breaker closure. After the DG was shutdown, continuity checks across the 1-2 contacts were again performed and no changes were noted. Based on these corrective actions and post-maintenance testing, the DG was declared operable at 2:10 p.m. on August 8, 1992.

The licensee determined the root cause of the DG 1A output breaker failure to close on July 17 and August 7, 1992, to be failure of the H1 TOC switch. The root cause of the TOC switch failure was under investigation by the licensee.

As corrective actions, the licensee intended to inspect the TOC switches in the Division II DG breaker and similar switches in the Division III output breaker cubicle by October 1, 1992. Any degraded TOC switches would be replaced. The licensee also planned to inspect TOC switches in breaker cubicles in other safety-related switchgear by the end of the fourth refueling outage (scheduled to begin in September 1993). Additionally, the licensee planned to review the vendor manual for the 4.16 kV switchgear to identify any additional recommendations for preventive maintenance of the TOC switches. Procedure or preventative maintenance program changes would be made, as required, prior to inspecting or replacing those TOC switches in non-diesel generator safety-related applications. The inspectors reviewed the licensee's actions and had no further concerns in this area.

d. Maintenance Work Request (MWR) Backlog

The inspectors reviewed the backlog of MWRs. The backlog of extremely old items (greater than 2 years) was reasonable, management was aware of the issues, and no significant maintenance had been affected.

e. Electrical Relay Failure Affecting Safety-Related Equipment

On June 23, 1992, operations personnel identified a problem when the main generator breaker tripped sooner than expected. Maintenance personnel identified the problem as closed reverse power contacts on a Type GGP relay (see Inspection Report 461/92012, paragraph 3.b(2)). In response to questions raised at the exit meeting for Inspection Report 461/92012, electrical maintenance management informed the inspectors on July 29, 1992, that the cause of the problem with the closed contacts was incorrect adjustment. This was caused by guidance from the vendor manual for the relay not being completely incorporated into the licensee's calibration procedure. The inspectors questioned if any other relays were affected by this problem due to the generic potential of the error.

Licensee personnel stated they did not know if other relays were affected. Ten days later, the inspectors were informed that there were five GGP relays in the plant; two on the main generator, and one on each of the three emergency DGs. The licensee performed a walkdown of the three safety-related relays. The reverse power contacts of the Division III DG relay appeared to be closed. The licensee declared the DG inoperable and recalibrated the relay. The inspectors requested the licensee evaluate the safety significance of the closed relay contacts on the Division III DG. The inspectors were subsequently informed by maintenance management that these contacts were bypassed on a loss-of-coolant accident (LOCA). Consequently, the failure of the relay would have no effect on the DG. The inspectors agreed with that analysis, but asked what was the effect during a loss of offsite power (LOOP) accident. Licensee personnel stated they had not evaluated the LOOP accident and did not know what the effect would be.

Licensee personnel subsequently informed the inspectors that the contacts were also bypassed on a LOOP accident. The inspector questioned the licensee, as this was inconsistent with his previous experience with DG protective trip systems. The licensee reviewed the schematics and informed the inspectors that the contacts were not blocked. With the reverse power contact closed the DG breaker would trip open approximately 4 seconds after it closed. However, the licensee concluded that while the contacts may have appeared to have been closed during the walkdown, they were not actually closed. The licensee could not prove that directly, as they had not taken continuity measurements before the relay was removed for recalibration. However, through a review of records the licensee determined that the relay was last calibrated in October 1991. In the intervening period, the DG had

been tested several times. These surveillance tests included starts on simulated LOCAs and LOOPs as well as routine surveillance tests. The breaker had not tripped open during any of these tests. Based on this information the licensee concluded that the contacts had not been closed when the diesel was tested. The inspectors agreed with this conclusion.

However, the failure of the licensee to evaluate the potential impact of the relay problem on other plant equipment, given the generic potential due to the inadequate procedure, was poor performance. The licensee's evaluation of this problem indicated a poor understanding of the design of the DG trip circuitry. Based on the inadequate analysis and incorrect information provided to the NRC, the inspectors concluded that the licensee's performance in this event was inadequate and that absent the inspectors' questions, the licensee would not have identified this potential problem.

Part 50 of Title 10 of the *Code of Federal Regulations*, Appendix B, Criterion XVI, required that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. The failure of the licensee to identify that the generic error in calibrating the GGP relays had the potential to affect safety-related equipment resulted in the failure to identify a condition adverse to quality. This failure constituted a violation of Criterion XVI (461/92016-01(DRP)).

No deviations were identified. One violation was identified.

6. Security (71707)

The inspectors reviewed the compensatory measures taken during the ongoing perimeter detection system modification and had no concerns.

No violations or deviations were identified.

7. Safety Assessment and Quality Verification

a. Verification of Plant Records (2515/115)

Using the guidance contained in Temporary Instruction (TI) 2515/115 the inspectors reviewed the licensee's program for ensuring that logs recorded by licensed and non-licensed operators were accurate and complete. The licensee's quality assurance (QA) organization had accompanied the non-licensed operators on their rounds to determine if the logs were appropriate. However, there was no formal program to cross check room entry times against log times. The arrangement of security card readers in the plant would make this very difficult.

The licensee subsequently developed a formal program in response to industry information concerning falsification of logs and the issuance of TI 2515/115. The areas covered were operations,

radiological waste, and radiation protection. The contractor responsible for the security and fire watch activities also developed a review program. This program was audited by the QA organization and was found to be adequate.

Based on the review of the licensee's program, the inspectors had no further concerns. This TI is considered closed.

b. Licensee Self Assessment Programs (40500)

The inspectors attended a Nuclear Review and Audit Group (NRAG) [Offsite Review Committee] meeting on August 13, 1992, to observe its interaction with licensee management. The group discussed the SALP 11 scores, Thermo-lag, and reactor water level issues, and efforts to improve inter and intra-departmental communications. They also reviewed the source term reduction program and the status of various NRAG action items. The NRAG committee members were well qualified individuals and very effective in their review of licensee activities. The committee appeared to be independent and not subject to undue influence by licensee management. This was evident in the content of the subcommittee reports and in the discussions between licensee personnel and committee members.

c. Licensee Event Report Follow-up (90712 & 92700)

Through direct observation, discussions with licensee personnel, and review of records, the following licensee event reports (LER) were reviewed to determine that the reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with Technical Specifications.

<u>LER</u>	<u>Title</u>
90013	Main Generator Trip Due To Out-Of-Calibration Volts/Hz relay.
91005	Inoperable Fission Product Monitor
92009	DG Fuel Oil Incorrectly Tested

No violations or deviations were identified.

8. Media Contacts

On July 30, 1992, the inspector received a question from a reporter at a local television station on what impact the industry problems with non-condensable gasses in the reference legs of reactor water level transmitters could have at Clinton (further information contained in NRC Bulletin 92-01). The inspector provided information to the reporter on the impact of this issue on Clinton Power Station.

9. Exit Interview

The inspectors met with the licensee representatives denoted in paragraph 1 at the conclusion of the inspection on September 8, 1992. The inspectors summarized the purpose and scope of the inspection and

the findings. The inspectors also discussed the likely informational content of the inspection report, with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents or processes as proprietary.