

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-461/92010(DRP)

Docket No. 50-461

License No. NPF-62

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

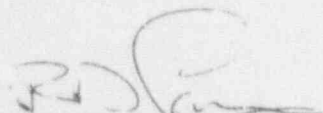
Facility Name: Clinton Power Station

Inspection At: Clinton Site, Clinton, Illinois

Inspection Conducted: May 1 - June 15, 1992

Inspectors: P. G. Brochman
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Approved By:


Roger D. Liskbury, Chief
Reactor Projects Section 3B

7/2/92
Date

Inspection Summary

Inspection from May 1 through June 15, 1992 (Report No. 50-461/92010(DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident, region, and headquarter inspectors of licensee actions on previous inspection findings, event followup, operational safety, maintenance and surveillance, emergency preparedness, engineering and technical support, licensee event reports, and management meetings.

Results: Of the eight areas inspected, no violations or deviations were identified.

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

Plant Operations

- The response by all personnel to an offgas charcoal adsorber fire was excellent.
- A personnel error by a reactor operator resulted in the injection of approximately 500 gallons (1892 L) of water into the reactor vessel via the "B" low pressure coolant injection (LPCI) line.
- Questions on the performance of system valve lineups were given to the licensee for further evaluation under Inspection Followup Item (IFI) 461/92010-01.

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- No problems were encountered during the reactor startup after the refueling outage.

Maintenance and Surveillance

- A personnel error in identifying the correct component to be worked on resulted in the spill of 3000 gallons (11,356 L) of component cooling water and the fall of a worker.
- The licensee identified several problems with the actuating linkage of the "B" turbine driven reactor feedwater pump (TDRFP) that resulted in a reactor scram on February 27, 1992. After repairing these problems, the "B" TDRFP linkage again failed on June 13, 1992. Further evaluation will be tracked under IFI 461/92010-02.

Emergency Preparedness

- The licensee declared an Unusual Event due to a fire in the offgas charcoal adsorber bed. State and federal agencies were notified in a timely manner.

Engineering and Technical Support

- The inspectors identified a concern with the Updated Safety Analysis Report (USAR) in defining the upper design temperatures for the offgas charcoal adsorber vessels and connecting piping. Also, the USAR did not include a malfunction analysis for a fire in the charcoal adsorbers. Further evaluation of these issues will be tracked under IFI 461/92010-03.

Safety Assessment and Quality Verification

- The quality of licensee event reports remained good.

DETAILS

1. Persons Contacted

Illinois Power Company (IP)

- *J. Perry, Senior Vice President
- J. Cook, Vice President and Manager, 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, NSF0
- J. Langley, Director, Design and Analysis, NSF0

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 June 15, 1992.

2. Action on Previous Inspection Findings (92701)

(Closed) Unresolved Item (461/92002-01(DRP)): Inadequate separation between electrical cables in local power panels. The inspectors reviewed condition report (CR) 1-92-02-028 which detailed the licensee's inspection, safety analysis, and rework efforts of cable separation problems in various power panels. The inspectors also met with the responsible NSED engineer to discuss the use-as-is resolutions and the impact of the separation problems on the operability of the affected equipment.

The licensee's analysis determined the equipment would have been able to perform its required function. This was based on a thorough review of construction documentation, walkdown of various panels, analysis of the maximum current the cables would be required to conduct in a fault condition, and the impact of the faults on other cables in the panels. A modification was made to one power panel to add a separation plate. The licensee's analysis subsequently determined the plate was not necessary. The licensee decided to add the plate before the analysis was completed to preclude this work impacting the refueling outage schedule. Based on the inspectors' review of the licensee's actions, the inspectors have no further concerns and this item is closed.

No violations or deviations were identified.

3. Plant Operations

The unit began the report period shutdown for its third refueling outage (RF-3). The unit was taken critical at 9:00 p.m. on May 20, 1992, and was synchronized to the grid at 9:23 a.m. on June 1, 1992. The plant operated up to 100% power for the remainder of the report period. An Unusual Event was declared on May 22, 1992, due to a fire in an offgas charcoal adsorber bed (see paragraph 3.a).

a. Onsite Event Followup (93702)

The inspectors performed onsite followup activities for an event which occurred in May 1992. This activity included reviews of operation logs, procedures, deviation reports, LERs (where available), and interviews with licensee personnel. For the event, the inspectors developed a chronology; reviewed the functioning of safety systems required by plant conditions; and reviewed licensee actions to verify consistency with procedures, license conditions, and the nature of the event. Additionally, the inspectors verified that the licensee's investigation had identified the root causes of equipment malfunctions and/or personnel error. Details of the event and the licensee's corrective actions developed through inspector followup appear below.

Fire In Offgas Charcoal Adsorber Bed 1N66D012

At approximately 7:00 a.m. on May 22, 1992, during routine panel observations, a control room operator noted that the temperature in offgas charcoal adsorber bed 1N66D012 was increasing. This was the first of two beds in the offgas system. There was no indication of a temperature increase in the second bed. The operators continued to monitor temperatures while they performed a walkdown of the charcoal adsorber bed vault. At approximately 8:00 a.m., operators determined there was a fire in the bed and declared an Unusual Event (see paragraph 5). The plant fire brigade was activated at 8:11 a.m. and by 8:52 a.m. had established a nitrogen (N₂) purge of 40 SCFM [1.1 m³/min] to the bed to extinguish the fire. The temperature recorder in the control room for the charcoal bed was pegged at its maximum value of 300 °F [149 °C] and thermography of the vessel indicated approximately 350 °F [177 °C]. The ignition temperature of the charcoal was 315 °F [157 °C]. Operators attempted to determine the charcoal bed temperature using the upper resistance temperature detector (RTD) directly by measuring its resistance. The reading they obtained led them to believe the RTD was open circuited. However, several days later, the operators were able to measure the temperature using the RTD at over 700 °F [371 °C].

The licensee developed the following criteria to determine when the fire could be considered out. First, that the carbon monoxide (CO) concentration was less than 100 ppm; second, that carbon dioxide (CO₂) levels were less than 1 percent; and third, that

bed temperatures were steady or decreasing. These criteria were met and the fire was declared out at 6:50 p.m. on May 23, 1992. The inspectors observed the licensee's fire fighting and recovery efforts and concluded that the response by all personnel was excellent.

The licensee continued to monitor CO and CO₂ levels and purge the bed with N₂ to remove residual heat and prevent reignition of the charcoal. The purge was terminated on June 2, 1992. The licensee calculated that approximately 800 pounds [363 kg] of charcoal was burned of 25,000 pounds [11,340 kg] in the beds and this would not affect the efficiency of the beds. Consequently, the licensee decided not to replace the affected charcoal.

The licensee believed the cause of the fire was the ignition of charcoal fines in the gas cooler located immediately upstream of the first charcoal bed. There was no filter or screen on the bed to prevent charcoal fines from migrating backward into the gas cooler during periods of reverse system flow. The fines were ignited when the heaters, which were used to defrost the gas cooler, remained energized too long. The ignited fines were then swept into the charcoal bed when the air flow resumed. The licensee subsequently revised its offgas startup procedure to prevent this type of event from recurring.

The inspectors identified three concerns from this event and recommended that licensee management evaluate them for their appropriateness. First, the fire brigade encountered difficulty in attempting to hook the temporary N₂ hose to the offgas system piping. This was due to the physical location of the valve in the room. Hard-piping the connection for the N₂ injection point to outside the room was recommended for evaluation. Second, the high temperature alarm for the charcoal beds were effectively useless during this event. This was due to the higher temperature setpoint of 7 °F [-14 °C], being locked in when the system was being started up. A second alarm point at a higher temperature (such as 120 °F [49 °C]), would provide clear indication that a fire was present and is recommended for evaluation. Third, fire in a charcoal bed can generate temperatures over 1500 °F [816 °C]. Temperature detectors which can withstand these temperatures and provide accurate indication are recommended for evaluation. These recommendations were discussed with licensee management.

b. Operational Safety (71707)

The inspectors observed control room operation, reviewed applicable logs, and conducted discussions with control room operators during May and June 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 drywell and the auxiliary,

containment, control, diesel, fuel handling, rad-waste, and turbine buildings were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, and 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 and barreling.

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 (TS), Title 10 of the *Code of Federal Regulations*, and administrative procedures.

(1) Improper Valve Operation

On May 18, 1992, with the plant in cold shutdown, a reactor operator inadvertently opened the "B" residual heat removal (RHR) low pressure coolant injection (LPCI) valve 1E12F042B and injected water into the reactor vessel. The operator had intended to open valve 1E12F053B and align RHR pump "B" to the shutdown cooling mode. Less than 500 gallons (1892 L) of water were injected into the reactor vessel. General Electric performed an analysis and determined that there was no safety impact to the fuel or core structures.

The cause of the event was operator error. The reactor operator initially performed self-checking when he placed his hands on the pump and valve switches. However, after he started the pump with his right hand, he looked up to check motor amperes. He unintentionally took his hand off the F053B switch and placed it on valve F042B and then opened it without performing further self-checking. Contributing to this event was perceived pressure to open valve F053B immediately, as there was no minimum flow protection for the RHR pump, in this mode of operation.

One of the licensee's corrective actions was to place caution tags on the control switches. The inspectors did not believe this was an appropriate permanent fix and discussed this concern with operations management. Operations management also reiterated to all operators the importance of performing self-checking.

(2) Conduct of Valve Lineups

Concerns with the performance of system valve lineups (AMS RIII-A-92-0055) have been raised. This issue was given to licensee management for information only. Further review of this question will be tracked under IFI 461/92010-01.

(3) Startup From Refueling

The inspectors reviewed the licensee's preparations for starting up the reactor following RF-3. The inspectors reviewed the mode change checklists and performed walkdowns on portions of the primary coolant system prior to startup. The inspectors also observed portions of the reactor startup. No problems were identified.

No violations or deviations were identified.

4. Maintenance and Surveillance (61726 & 62702)

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 TS.

<u>Document</u>	<u>Activity</u>
D09913	1B21F022D (Inboard MSIV)
D30667	1FWC:KA (TORFP "A" Turbine)
D31477	1CY119 Packing Leak
9479.01	Steam Bypass Response Time

The following items were considered during this review: the limiting conditions for operation (LCOs) 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 was accomplished by qualified personnel; test instrumentation was within its calibration interval; functional testing and/or calibrations were performed prior to returning components or systems back to service; test results conformed with TS 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; and 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. Spill In The Control Building

At 4:00 a.m. on May 12, 1992, a personnel error by a contract maintenance worker resulted in approximately 3000 gallons (11,356 L) of water being spilled into the control building (CB) 762' (232 m) elevation. The worker, who was on top of the "A" component cooling (CC) system heat exchanger (ICC01AA) fell 10

feet (3.05 m) to the floor. The service water (SW) system, which provided cooling water for the heat exchanger, had been depressurized for removal of its high point vent cap. The job foreman mistakenly directed the worker to remove the high point vent cap on the CC side of the heat exchanger, which was still pressurized. The response by operations personnel was prompt and the leak was quickly isolated.

The inspectors concerns resulting from this incident were the lack of supervisory oversight that contributed to the wrong vent cap being removed and the failure of the worker to wear fall prevention equipment. The inspectors discussed the concerns with licensee management and have no further concern in this area.

c. Reactor Feed Pump Repairs

On February 27, 1992, the "B" turbine driven reactor feed pump (TDRFP) locked up which resulted in a reactor scram. This event was documented in Inspection Report (IR) 461/92002. The licensee's investigation determined that the root cause of the TDRFP malfunction was inadequate maintenance procedures for the turbine steam admission valves' actuating linkage. Contributing factors were improper bearing lubricant specified by the vendor, lack of periodic maintenance on the actuating linkage, and misalignment of the bearing pedestals.

Maintenance was subsequently performed to correct these problems on both the "A" and "B" TDRFP actuators during RF-3. The periodicity for preventative maintenance on the actuators was decreased from 6 to 3 years. A subsequent identical failure is discussed below.

d. Repeat Reactor Feed Pump Failure

On June 13, 1992, the "B" TDRFP again locked up. However, the operators were successful in removing it from service without causing a reactor scram and the unit was stabilized at 70 percent power. The licensee's corrective actions were ongoing at the end of the inspection period and the inspectors will track this event under IFI 461/92010-02.

No violations or deviations were identified.

5. Emergency Preparedness

The licensee declared an Unusual Event at 8:02 a.m. on May 22, 1992, when it was determined that a fire in a charcoal adsorber bed had been in progress for more than 10 minutes. The licensee notified the State of Illinois and the NRC Operations Center within the required time frames. Periodic updates of the status of the equipment was provided to the NRC. The Unusual Event was terminated at 6:50 p.m. on May 23, 1992. This event is discussed further in paragraph 3.a.

No violations or deviations were identified.

6. Engineering and Technical Support

During the review of the offgas charcoal adsorber fire, the inspectors identified several concerns in the Clinton Updated Safety Analysis Report (USAR) section related to the offgas system. The concerns are listed below and relate to the omission of a malfunction analysis for a fire in the charcoal adsorbers and the upper design temperatures for the charcoal adsorber vessels, downstream high efficiency particulate air (HEPA) filter vessel, and connecting piping.

- Clinton USAR, Table 11.3-5, "Equipment Malfunction Analysis," does not discuss the possibility of a fire in the charcoal adsorbers nor does it discuss the possibility of high temperature gases from a fire entering the HEPA filter downstream of the charcoal adsorbers.
- Clinton USAR, Table 11.3-2, "Major Equipment," specified design values for the charcoal adsorber and HEPA filter vessels of -20 to +250 °F [-29 to +121 °C]. This was inconsistent with the design numbers on General Electric drawing 10505095 and the vessel manufacture's U-1 code data sheet. The piping that connects the vessels (10G05A6, 10G06A6, and 10G07A6) also had low design temperatures. The piping equipment list specified design temperatures of 00+3 °F (sic) for pipes 10G05A6 and 10G06A6 and 300 °F [149 °C] for pipe 10G07A6. These design temperatures did not appear to take into account the possibility of over 1500 °F [816 °C] combustion gases being present.
- Clinton USAR Section 11.3.2.1.6.1 specified an ignition temperature of 374 °F [190 °C] for the charcoal. This appeared to be inconsistent with the information contained in the charcoal's material safety data sheet of 350 °F [177 °C] and information provided by General Electric of 315 °F [157 °C].

The inspectors requested that the licensee evaluate these questions to ensure that the offgas system was designed in accordance with the licensee's commitment to Regulatory Guide 1.143, Revision 0, July 1979. This issue will be tracked under IPI 461/92010-03.

No violations or deviations were identified.

7. Safety Assessment and Quality Verification

Licensee Event Report (LER) Followup (90712 & 92700)

Through direct observation, discussions with licensee personnel, and review of records, the following LERs 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 TS.

<u>LER</u>	<u>TITLE</u>
461/90003	Loose Covers on Rosemount Transmitters
461/90005	Motor Operated Valves Operated Outside Their Design Capabilities

No violations or deviations were identified.

8. Management Meetings

A routine management meeting was held on June 4, 1992, in the NRC Region III office in Glen Ellyn, Illinois, between Mr. J. S. Perry, Senior Vice President and members of his staff and Mr. A. B. Davis, Regional Administrator. Items discussed included RF-3 performance, raw water treatment system problems, and the motor operated valve program.

9. Inspection Followup Items (IFIs)

IFIs are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. IFIs disclosed during this inspection are discussed in paragraphs 3.b.(2), 4.d, and 6.

10. Exit Interview

The inspectors met with the licensee representatives denoted in paragraph 1 at the conclusion of the inspection on June 15, 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.