U.S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-461/95Q12

FACILITY
Clinton Power Station

License No. NPF-62

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

DATES
August 8 through September 25, 1995

INSPECTORS
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APPROVED BY

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10/18/95
Date

AREAS INSPECTED

A routine, unannounced inspection of operations, engineering, maintenance, and plant support was performed. Safety assessment and quality verification activities were routinely evaluated. Follow-up inspection was performed for non-routine events and for certain previously identified items.

RESULTS

Assessment of Performance

Operations

- Poor communications and a lack of questioning attitude contributed to a personnel error, resulting in an inadvertent mode change during a forced outage. This was a violation of NRC requirements.

- Performance during operator rounds was considered good and effective communications were demonstrated when resolving a low oil pressure trip on the switchgear HVAC condensing unit.

- The operations department established a program to address and identify work around concerns. However, it was too early to evaluate the long term effectiveness of the program.

- Additional surface scum and rust were found during an inspection of the drywell floor drain sump v-notch. The licensee performed a temporary fix on the system, however continued problems were expected.

Maintenance

- Efforts to resolve long-term deficiencies on the motor driven feed pump and the fire protection jockey pump were effective and helped to improve the material condition of the plant.

- An instrumentation technician demonstrated a good questioning attitude during the performance of a scram discharge volume surveillance and averted a reactor scram.

Engineering

- The root cause evaluation in response to the Division 1 emergency diesel generator (EDG) failed fuel oil surveillance was prompt and of high quality.

- Plant engineering, operations and licensing failed to recognize the importance of performing a timely evaluation of possible past operation of the reactor core isolation cooling turbine with inadequate bearing lubrication.

- Engineering failed to communicate a change request to the procedures group regarding the Division II EDG fuel oil transfer pump surveillance procedures. As a result, test data were compared to incorrect acceptance criteria.

Plant Support

- A personnel error resulted in an inoperable radiation monitor and was a factor in the violation described above.

- Good support by the chemistry department was demonstrated during the evaluation of a failed diesel fuel oil surveillance, also addressed above.

- Additional good support was noted during the installation of a new security barrier.

Self Assessment/Quality Verification

- The licensee had taken aggressive actions to address previous personnel error concerns. However, causes of a recent inadvertent mode change were similar to some of the previous events, indicating these actions were not entirely effective. The licensee's thorough review of this latest event was a good effort and the licensee was evaluating additional corrective actions for the identified weaknesses.

- Through increased plant management focus, the licensee was effectively addressing material condition concerns. However, routine work with possible material condition impacts tended to be inconsistent.

Summary of Open Items
Violations: identified in Section 1.2

INSPECTION DETAILS

1.0 OPERATIONS

NRC Inspection Procedure 71707 was used in the performance of an inspection of ongoing plant operations. One violation was identified. Effective control room communications and operator rounds were observed during normal operations. Communications were formal and utilized three-peat communications which aided in communications both within and outside the operations department. However, a failure to communicate and a lack of questioning attitude resulted in an inadvertent mode change. Continued progress was made in the resolution of material condition and work around concerns due to increased sensitivity by all personnel.

1.1 Plant Shut Down Due To Air Leak in the Drywell

On September 8, 1995, the plant was shut down for forced outage 95-04 due to an air leak in the drywell. Despite limited planning time, a number of work activities were accomplished such as: the repair of several steam, water, and oil leaks; the repair of the above mentioned air leak; and a temporary fix to the drywell floor drain sump V-notch.

An inspection of the drywell determined that the leak originated from a 1.5 inch air line flange seal which had been abandoned in place. Due to ALARA considerations, the licensee was unable to determine the exact cause of the leak. Just as RF-5 was ending on April 29, 1995, an increase in leakage from this flange was identified. The flange was tightened to reduce the overall air leakage. Although a small amount of leakage continued to exist (a few bubbles per minute), licensee management determined that the leakage was acceptable. The installation of a pipe cap on this line was scheduled for the October 1996 refueling outage as a permanent fix; however, the failure of the flange materials caused the actions to be taken earlier than planned.

The drywell floor drain sump weir box was also inspected to identify possible causes behind the inconsistent readings recorded prior to the forced outage. Surface scum and rust were found in the V-notch and oil separator areas. Partial blockage of the V-notch was also noted. A water flush was used to clean the weir box and the oil separator which returned control room indications to normal. This was considered only a temporary fix by the licensee and continued problems with the system were expected. The licensee has installed an alternate method to monitor the drywell floor drain sump flow which will be used as a back up system when it is released for use. The inspectors will continue to monitor the licensee's actions in this area.

1.2 Personnel Error Resulted in Inadvertent Mode Change During Forced Shut Down

On September 9, 1995, the licensee identified that mode 2 was entered inadvertently following the performance of CPS 9031.14, "IRM Channel

Functional." A number of weaknesses contributed to this personnel error including poor communications and a lack of questioning attitude by control room personnel. Once the event was identified operators responded promptly to correct the condition.

Testing of the source range monitors (SRM) was performed in accordance with CPS 9031.13 in preparation for a reactor start up following forced outage 95-04. The mode switch was placed in startup/hot standby during the test as directed by the procedure. Following test completion, the mode switch was to be returned to shutdown; however, the mode switch was left in startup to support intermediate range monitor (IRM) testing (which is allowed by technical specification 3.10.2). A note was placed in the SRM procedure to alert other operators of the mode switch position.

The IRM functional test was then performed by an additional (relief) operator. Although the A and B reactor operators were aware that the mode switch had been left in startup, the operators failed to communicate this to the additional operator. During the test the operator noted that the mode switch was in start up as required by the procedure. As part of the test restoration, the relief operator was to return the mode switch to its original position (shutdown). However, since the operator believed the original mode switch position was start up, the mode switch was left in its current position and the procedure step was marked not applicable (N/A). A shift supervisor observed that the mode switch was incorrectly positioned approximately 8 hours later.

Entrance into a higher mode following mode switch interlock testing without all applicable LCOs being met is a violation of TS 3.0.4 (461/95012-01 (DRP)). Specifically, the surveillance for the average power range monitors (APRM) was not current. (An emergency control room ventilation radiation monitor was also a factor as described in Section 4.2 of this report.) Safety significance of the specific error was minimal as sufficient administrative controls existed to ensure the licensee did not actually start up the reactor with the surveillance not current.

Broader safety implications existed with respect to the weaknesses which contributed to this event. Poor communications and a lack of questioning attitude were evident in that discussions between the A, B and the additional operator failed to identify the proper mode switch position both during and following the IRM testing. In addition, the operators failed to bring this discrepancy to the attention of a senior reactor operator. Weak supervisory oversight was also demonstrated when the line assistant shift supervisor's review failed to note the significance of the N/Aed step.

A number of personnel errors related to TS violations, some with similar causes, were documented in previous inspection reports. Plant management was aggressive in addressing an increase in these types of errors following RF-5; however, recent events signify additional attention may be warranted in this area.

1.3 Performance During Operator Rounds Was Effective

Performance during operator rounds was considered good. Good communication was demonstrated in the area of support to plant engineering when the operator reported a low oil pressure trip on a switchgear HVAC condensing unit. Due to the description provided by the operator, the system engineer was able to determine the probable cause for the trip. In addition, the operator agreed to provide a description of the event on the maintenance work request to aid in the repair planning process.

Good system knowledge was also observed during the rounds. For example, the operator discussed possible methods of obtaining a representative sample of the diesel generator day tank oil with members of the chemistry department. Initially, the chemists considered opening an instrument line to take the sample, however, the operator identified a potential for water contamination when breaching the instrument line based on previous experience. The operator then described an alternate method which was subsequently used to obtain an acceptable sample.

One weakness was noted concerning the initiation of work documents in response to identified material condition deficiencies. Facilities personnel notified the operator that two problems were identified associated with plant chillers B, C, and E (broken conduit connections and loose protective cable sheathing on a electrical supply cable). The operator quickly initiated a maintenance request (MR), hung the appropriate tags, and explained the likely disposition of the MR to the facilities personnel. Conversely, during a tour of the containment, the inspector identified that a number of lighting units were not functional which resulted in degraded lighting around stairwells and equipment. The operator identified that degraded lighting in containment was an ongoing problem and demonstrated a general tolerance of the situation by making no further effort to address the condition. Additional inspection in this area determined that a number of lighting concerns were addressed later in the inspection period.

1.4 Progress Noted in the Identification and Resolution of Some Operator Workarounds

During recent months, the NRC was concerned with the number of caution, danger, and deficiency tags which existed in the control room (see Inspection Report 95005). The licensee's subsequent increased sensitivity to resolving long standing deficiencies resulted in an overall decrease in the number of tags in the control room through various actions. Part of the tag reduction was due to the repair of previously degraded equipment in the plant and the removal of outdated hardware in the control room.

Other tags, more appropriately classified as information tags, were removed by incorporation into the licensee's operator aid program. Through interviews with control room operators, the inspector identified two specific procedures that had incorporated material condition

problems through this effort. However, one was an infrequent problem that was not cost effective to fix compared to the operator nuisance and the licensee was continuing to evaluate a permanent fix to the other. Therefore, licensee decisions appeared to be appropriate.

- CPS 3113.01, Rev.21, step 8.1.2.1.2a, directed the operator to slowly shut screen house warming line valve 1CW004 by manipulating a switch in the control room. The next step required the operator to manually shut the valve (local operation) to ensure valve closure.

- CPS 3412.01, Rev.8, step 8.1.3.1.5, required the operator to completely shut the respective switchgear HVAC condenser discharge valve when its associated chiller was taken out of service. If the valve failed to shut, the operator was to use an adjustable wrench to fully close the valve.

The licensee indicated that the screen house warming line valve was a large, infrequently (once or twice per year) manipulated valve. The step in the operating procedure was written to verify the valve was closed to prevent an unmonitored chlorine release to the lake. Although previous problems led to the replacement of the valve's operator, additional problems with this valve have been identified. The licensee did not plan to repair the valve since the actions would not be cost effective.

The licensee was fully aware of problems associated with the HVAC condenser discharge valve. At the time of the inspection, engineering personnel were considering an upgrade of the switchgear HVAC condenser discharge valve motors to eliminate the need for operators to locally verify closure.

A work around program was implemented in response to recent concerns. A work around list was developed to track the status of all previously identified work around items to ensure that timely action was taken. Operations personnel plan to review all radwaste and operations procedures to identify workarounds that may have been inadvertently incorporated into procedures. In addition, guidance was developed to aid operators in the identification of future workarounds. Although this program was still in the beginning stages at the conclusion of the inspection, a number of workarounds had been identified in recent months due to the increased sensitivity in this area. The inspectors will continue to monitor the actions taken in this area.

2.0 MAINTENANCE

NRC Inspection Procedure 61726 and 62703 were used to perform an inspection of maintenance and testing activities. No violations or deviations were identified. Good performance was noted when a C&I technician averted a reactor scram due to his questioning attitude. In other efforts, the maintenance department continued to reduce the

overall number of fluid leaks by performing repairs on a number of components including the motor driven reactor feed pump.

2.1 **Continuing Effort to Resolve Long-Standing Deficiencies Resulted in Improved Material Condition**

The licensee made continued progress in improving overall material condition of plant equipment. Previous inspection reports documented an overall lack of timeliness in resolving previously identified low priority problems. In response to this concern, the licensee increased management focus on the resolution of equipment problems which resulted in improved material condition as noted in Inspection Report 95011.

As a part of this continued effort, a number of long-term oil and water leaks were repaired on the motor driven reactor feed pump. Work was performed around-the-clock due to the possible complexity of the repairs. The inspectors observed the feed pump work and found the workers knowledgeable of the work performed and possible contingency plans. Support from the system engineer during all phases of work was very good. The engineer developed a thorough action plan which described three possible repair options. Since the complexity of the repairs was initially unknown, the engineer also ordered additional pump parts, including a new pump cover, to ensure all parts would be available when needed. The purchase of an additional pump cover was a positive effort since it allowed maintenance workers to visualize the possible repairs. In addition, 24-hour engineering support was provided by plant engineering and the pump vendor was available daily to answer any additional questions.

The fire protection jockey pump was another example of a previously identified problem that existed for a long time. However, the licensee was persistent in attempting repairs. Despite overhauling the pump and like for like replacement, the pump continued to experience bearing failures, high vibration, and poor pump performance. Maintenance and engineering determined the root cause for the failures was excessive run time on the pump at low flow and high discharge pressure. In addition, the original pump shaft diameter and bearing size were considered contributors to the repeat failures.

The pump was replaced with a more rugged shaft and bearing combination, which improved performance and should extend the service life. However, the most significant improvement was in reducing system leakage in the fire protection header. The reduced leakage was due to replacement of the several valves and repair to an underground run of piping. Due to these improvements the pump run time was reduced from nearly continuous operation to operating 30 seconds every 2.5 hours.

The inspectors will continue to monitor the licensee's efforts in resolving long term issues.

2.2 Technician's Questioning Attitude Prevented a Reactor Scram

A controls and instrumentation technician demonstrated good attention to detail during a surveillance of the Division III scram discharge volume (SDV) level switch on August 22. During the surveillance, the Division IV SDV high level alarm annunciated in the control room. After a short period of time, a technician in the control room recognized that the test conditions in combination with the unexpected alarm on the Division IV instrumentation would have resulted in a reactor scram if the test continued.

The technician immediately contacted the other technicians stationed at the level switch and stopped the test. The licensee's root cause evaluation determined that the Division IV switch was bumped during the surveillance which caused the switch to short to ground. The licensee had identified previous shorting problems due to wires contacting the switch's metal protective housing when the cover was removed during testing. In this case, insulation on one of the Division IV switch wires had degraded. When the switch was bumped the partially uninsulated wire contacted the metal housing and shorted. The licensee completed the necessary repairs and returned the switch to service. Corrective actions to prevent recurrence were being evaluated at the conclusion of the inspection.

3.0 ENGINEERING

NRC Inspection Procedure 37551 was used to perform an onsite inspection of the engineering function. No violations or deficiencies were identified. Various departments, in conjunction with licensee management, were aggressive in pursuing actions related to the possible contamination of the Division I diesel generator fuel oil. However, weaknesses were identified in two areas due to poor communications.

3.1 Prompt Conservative Actions Taken in Response to Questionable Diesel Generator Fuel Oil Analysis Results

Following inconclusive results and an increasing trend of particulate contamination of the Division I diesel fuel oil, the licensee took prompt actions to resolve the issue. The licensee addressed immediate operability concerns for the division and arranged for replacement of Division I fuel oil on a priority basis. These actions were taken before offsite analysis results could be obtained.

On August 22, 1995, chemistry personnel experienced difficulty analyzing the fuel oil. The procedure required passing the fuel through a .8 micron filter to check for particulate contamination; however, the fuel oil did not pass through the filter. Additional samples were taken and supplementary analyses were performed by the licensee, two offsite laboratories, and the fuel oil vendor. The licensee experienced the same problem with the second sample although no significant particulate deposit was observed on the filter paper. Division II and III were sampled and found to be acceptable.

The licensee was concerned that the fuel would be unable to pass through the diesel generator fuel filters (approximately 10-15 microns). An inservice fuel filter from Division I was removed and inspected. No problems were observed. Fuel was passed through a sample of the fuel filter, which demonstrated acceptable flow. The licensee concluded this concern was not valid.

Since the Division I fuel oil tank had been cleaned and recoated during RF-5 and new fuel oil added, several potential contributors to the problem were possible. The licensee took the conservative path to drain, wipe down, and visually inspect the tank. No problems were identified and the new fuel oil replacement was completed on August 24.

The independent laboratories later determined that the original fuel oil was acceptable. An undetermined substance in the oil reacted with the synthetic filter paper used by the licensee causing the filter paper to swell, which resulted in the lack of flow through the filter. One independent laboratory passed an equal amount of the fuel through a .2 micron filter and the licensee supplied .8 micron filter. The .8 micron showed a factor of 10 greater weight gain over the .2 micron filter. The gain was attributed to the filter swelling effect. The licensee, fuel vendor, and the independent laboratories were still investigating what caused the reaction. The inspectors consider the actions taken by the licensee to be prompt and conservative.

3.2 Untimely Resolution of Reactor Core Isolation Cooling Oil Sampling Effects

On August 16, the oil level in the RCIC turbine bearing sight glass dropped below the minimum operating level during a system surveillance. The turbine was immediately shut down, the oil level was corrected and the surveillance was completed with no further problems. A condition report was written to document the low level condition. The inspector reviewed the event and determined that poor communications contributed to this event. In addition, untimely corrective actions were noted following the event.

In July 1991, the licensee began taking RCIC oil samples from the oil cooler every 30 days in order to obtain a more representative oil sample. The new sampling method removed oil from the RCIC turbine oil system; however, no change in turbine bearing sight glass oil level was observed due to the construction of the oil system. Since the indicated oil level in the sight glass had not changed, oil was not added to replenish the amount withdrawn due to the sample. When the turbine was started during the routine 90-day surveillance, the shaft driven oil pump refilled the void in the cooler created by the sample. Normally, the amount of oil removed between surveillances was not enough to create a low oil level; however, on August 16, enough oil had been removed to create a low oil level.

Members of plant engineering were fully aware of the potential to create low oil conditions due to the new sampling method. The plant engineer

responsible for the RCIC system did not communicate this potential to operations or maintenance because it was believed that this would create confusion in the departments. In addition, it was decided that replacement oil would not be added following sampling since this action would cause the sight glass oil level to be artificially high, although in actuality the quantity of oil in the system was satisfactory.

After observing the low oil level on August 16, 1995, the licensee added oil, tested the RCIC system, and declared the system operable. However, operations, engineering and licensing apparently did not recognize the importance of reviewing the operating history of the turbine to determine if the bearing was currently degraded due to possible past operation with inadequate lubrication. Although the event occurred August 16, this evaluation was not completed until September 7. The evaluation determined that the RCIC turbine had not been operated with inadequate lubrication prior to the August 16 event. Due to the heightened sensitivity to proper lubrication following a failure of the Division III EDG bearing, the failure to recognize the importance of this evaluation was a weakness.

3.3 Failure to Properly Submit a Procedure Change Resulted in Incorrect Acceptance Criteria for Fuel Oil Transfer Pump

NRC Inspection Report (IR) 95011 documented the previous untimely resolution of Division II emergency diesel generator (EDG) fuel oil transfer pump testing difficulties. These difficulties were due to suspected inaccuracies in the licensee's current testing methodology. Since that time, the engineering department had aggressively pursued alternatives to their current testing methodology. The Division II pump was tested on September 6, 1995, to determine pump operability and to evaluate the accuracy of several of the alternatives. Initially, the pump was declared operable based on the acceptance criteria within the procedure, however, further review determined that the acceptance criteria were incorrect. Although the pump failed to meet the current acceptance criteria, the pump was still considered operable since its capacity was in excess of Final Safety Analysis Report requirements.

Due to a previous failure in July 1995, the plant support group placed the Division II transfer pump on an increased testing frequency as requested by plant engineering. Although this request also contained the revised acceptance criteria to be implemented into the procedure, the plant engineer failed to address the request to the procedures group. Due to this omission, the testing procedure was not revised prior to the scheduled test. This was considered a weakness by the inspector.

4.0 PLANT SUPPORT

NRC Inspection Procedures 71750 and 83750 were used to perform an inspection of Plant Support Activities. An error by a radiation protection technician caused one channel of the main control room

outside air inlet radiation monitor to be inoperable for a short period of time.

4.1 Good Support Given For Installation of Vehicle Barrier System

During the week of August 28, the licensee began installation of the vehicle barrier system required by the NRC as described in NUREG/CR-6190. Good coordination and support by all personnel involved was noted during this effort. Maintenance personnel installing the barrier system were meticulous in the placement of the individual barriers. Questions that arose were answered by the design engineer who was present at the work site and provided good support to the maintenance workers. In addition, security force members provided additional coverage during the work. The inspectors will continue to monitor the licensee's actions in this area.

4.2 Radiation Monitor Inoperable Due to Personnel Error

On September 8, 1995, a main control room outside air inlet radiation monitor lost power when its breaker was bumped. The loss of power caused loss of the monitor's alarm setpoint data. A radiation protection (RP) technician re-entered the alarm setpoint data in accordance with CPS 7410.75; however, the high alarm setpoint was set non-conservatively by a factor of 100.

This error caused the control room radiation monitor LCO not to be met when mode 2 was inadvertently entered as described in Section 1.2 of this report. (This removed one of the required logic inputs for automatic emergency control room ventilation initiation.) The coincidental timing of the two errors caused this LCO to also be a factor in the violation (461/95012-01 (DRP)) described in that section. The safety significance of this event was minimal, since although mode 2 was inadvertently entered, the reactor was not actually started up while in this condition. In addition, the alert setpoint was inputed correctly.

This condition was discovered approximately 18 hours later when an RP technician questioned the format of a computer generated graph which displayed radiation monitor performance. Upon identification of the discrepancy, the main control room personnel were informed and the setpoint data was edited to the correct values. A review of system surveillances determined that shiftly surveillances were performed to verify that the radiation monitors were functioning properly; however, alarm set points were only verified during channel functional tests. As part of the corrective actions, the licensee revised CPS 7410.75 such that double verification of set points was required. The inspectors will further review root causes and corrective actions when the associated LER is issued.

5.0 SELF ASSESSMENT/QUALITY VERIFICATION

Personnel

The licensee had taken aggressive actions (described in inspection report 461/95009) to address previous personnel error concerns. However, causes of a recent inadvertent mode change were similar to some of the previous events, indicating these actions were not entirely effective. The licensee performed a thorough and introspective review of this latest event, recognizing associated weaknesses with possible site wide implication, as contributors. At the conclusion of the inspection, the licensee was reviewing corrective action alternatives. The thorough review was considered a good effort; however, the inspectors will continue to monitor the effectiveness of licensee actions to address the identified weaknesses.

Material Condition

Through increased plant management focus, the licensee was effectively addressing material condition concerns. A work around program was implemented. The ability to recognize workarounds had improved. Resolutions of several previous low priority operator workarounds were noted.

However, routine work with possible material condition impacts, tended to be inconsistent. The licensee aggressively pursued diesel generator fuel oil concerns. Several examples of good operator involvement in problem identification and resolution were noted. On the other hand, the licensee was untimely in resolving RCIC oil sampling effects and in implementing a procedure change for diesel generator fuel oil transfer pump acceptance criteria. As the licensee was still early in the effort, the inspectors will continue to evaluate the effectiveness of licensee actions to address material condition over the longer term.

6.0 PERSONS CONTACTED AND MANAGEMENT MEETINGS

The inspectors contacted various licensee operations, maintenance, engineering, and plant support personnel throughout the inspection period. Senior personnel are listed below.

At the conclusion of the inspection on September 25, 1995, the inspectors met with licensee representatives (denoted by*) and summarized the scope and findings of the inspection activities. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

*J. Cook, Vice President
*R. Morgenstern, Manager - Clinton Power Station
*R. Wyatt, Manager - Nuclear Assessment
*J. Palchak, Manager - Nuclear Training and Support
*L. Everman, Director - Radiation Protection
*P. Yocum, Director - Nuclear Assessment

*K. Moore, Director - Plant Operations
*A. Mueller, Director - Plant Support Services
*R. Phares, Director - Licensing
*R. Kerestes, Director - Nuclear Safety and Analysis
*D. Korneman, Director - Plant Engineering, NSED
*J. Langley, Director - Engineering Projects, NSED