U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/84-16(DRP)

Docket No. 50-331 License No. DPR-49

Licensee: Iowa Electric Light and Power Company
IE Towers, P. O. Box 351
Cedar Rapids, Iowa 52406

Facility Name: Duane Arnold Energy Center

Inspection At: Palo, Iowa

Inspection Conducted: November 23 - December 19, 1984

Inspector: L. S. Clardy

Approved By: D. C. Boyd, Chief
Projects Section 1B

12-27-84
Date

Inspection Summary

Inspection on November 23 - December 19, 1984 (Report No. 50-331/84-16(DRP))
Areas Inspected: Routine, unannounced inspection by the resident inspector of operations; maintenance; surveillance; plant t ips; Licensee Event Reports; IE Bulletins; TMI Items; allegations; and independe.t inspection. The inspection involved a total of 78 inspector-hours onsite by o.e NRC inspector including 12 inspector-hours onsite during off-shifts.
Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

*D. Mineck, Plant Superintendent-Nuclear
K. Young, Assistant Plant Superintendent-Radiation Protection and Security
*R. Hannen, Assistant Plant Superintendent-Operations
*J. Vinquist, Assistant Plant Superintendent-Technical Support
A. Clason, Maintenance Supervisor
*W. Miller, Technical Support Supervisor
*C. Mick, Operations Supervisor
*R. Zook, Assistant Operations Supervisor
*M. Grim, Nuclear Licensing

In addition, the inspector interviewed several other licensee personnel including shift supervising engineers, control room operators, engineering personnel, administrative personnel and contractor personnel (representing the licensee).

*Denotes those personnel present at the exit interviews.

2. Operational Safety Verification

The inspector observed control room operations, reviewed applicable logs and conducted discussions with control room operators during the inspection period. The inspector verified the operability of selected emergency systems, reviewed tagout records and verified proper return to service of affected components. Tours of reactor building and turbine building 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 inspector by observation and direct interview verified that the physical security plan was being implemented in accordance with the station security plan.

The inspector observed plant housekeeping/cleanliness conditions and verified implementation of radiation protection controls. During the inspection period, the inspector walked down the accessible portions of the Standby Liquid Control system to verify operability. The inspector also witnessed portions of the radioactive waste system controls associated with radwaste shipments and barreling.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under technical specifications, 10 CFR, and administrative procedures.

No items of noncompliance or deviations were identified.

3. Monthly Maintenance Observation

Station maintenance activities of safety related systems and components were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides and industry codes or standards and in conformance with technical specifications.

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and, fire prevention controls were implemented.

Work requests were reviewed to determine status of outstanding jobs and to assure that priority is assigned to safety related equipment maintenance which may affect system performance.

No items of noncompliance or deviations were identified.

4. Monthly Surveillance Observation

The inspector observed technical specifications required surveillance testing on the Reactor Core Isolation Cooling system and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with technical specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

No items of noncompliance or deviations were identified.

5. Plant Trips

Following the plant trip on November 23, 1984 the inspector ascertained the status of the reactor and safety systems by observation of control room indicators and discussions with licensee personnel concerning plant parameters, emergency system status and reactor coolant chemistry. The inspector verified the establishment of proper communications and reviewed the corrective actions taken by the licensee.

All systems responded as expected, and the plant was returned to operation on November 25, 1984.

On November 23, 1984, at 6:38 a.m., the start-up transformer deluge system initiated resulting in a trip of the startup transformer and a reactor trip.

The cause of the deluge system initiation was a failure of a rate-of-temperature rise detector to reseat after the auxiliary transformer explosion of November 4. This, coupled with a sticking air supply regulator, resulted in a sufficient loss of air pressure over time on the main deluge pilot valve to cause the deluge valve to open.

The deluge system is checked on a monthly surveillance but not for water flow or spray pattern. The system also is not checked after an automatic initiation to ensure all actuators are reset.

The licensee will now check the flow rate and pattern of the deluge systems in conjunction with their refueling cycle. The licensee will also revise its procedures to require an inspection of the deluge system to ensure all actuators are reset after an automatic initiation.

The transformer trip resulted from a phase 2 differential to ground trip from an arc-over from the phase 2 incoming 161 KV line to ground due to the high conductivity of the deluge system water.

Upon notification of the event the resident inspector and two Region III specialists responded to the event. The licensee's investigation into the event, plant shutdown, corrective actions and plant startup were monitored.

Since the nonessential loads were on the startup transformer due to a previous loss of the auxiliary transformer, the plant tripped on a turbine control valve fast closure. The essential loads were already on the standby transformer, and did not shift power sources. Therefore, the diesel generators were not required to start. All plant systems responded as required during the trip and shutdown and no other problems were encountered.

Several problems were evident with the loss of nonessential power. These were the loss of the Emergency Notification System, the loss of power to the Technical Support Center, and loss of power to some radiological controls equipment. These items are discussed in Inspection Report 50-331/84-14(DRP) and are already open items.

Prior to the event (on November 12, 1984) the licensee had placed the essential loads on the standby transformer. This was done to reduce the chances of a degraded voltage trip on the startup transformer which would result in a loss of nonessential power and a plant trip. The startup transformer was within allowable voltage limits and was not overloaded at any time. The startup transformer was at 95.4% of rated. The degraded voltage trip is at 92%. By placing the essentials on the standby transformer the startup transformer was operating closer to nominal. This reduced the chances of a trip and an unnecessary diesel generator start.

After the loads were switched the startup transformer was at 95.8% of nominal voltage and the standby was at 99.1% of nominal voltage.

The shifting of the essential loads was discussed prior to the shift between the operating shift supervisors and the operations supervisor. The operations department reviewed the Technical Specifications and Updated Final Safety Analysis Report and determined that operation in that mode was not prohibited.

However 10 CFR 50 Appendix A, General Design Criteria 17 states in part, "One of these circuits (one of two offsite power sources) shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained." Criterion 17 implies that whatever offsite source is powering the essential loads must have another backup offsite power source automatically available. But, if the standby transformer trips (for whatever reason) the essential loads are shifted to the diesel generators and not the startup transformer. To shift to the startup would take positive operator action.

A description of the normal electrical lineup at DAEC is as follows:

1. The auxiliary transformer supplies the nonessential loads. The auxiliary is capable of supplying only the nonessential loads and only from the main generator.

2. The startup transformer supplies the essential loads and is an automatic backup for the nonessential loads. It is powered from offsite.

3. The standby can supply only the essential loads. It is powered from offsite.

If the auxiliary transformer trips the loads shift to the startup transformer. This would have no effect on plant operations.

If the startup transformer trips off for any reason besides degraded voltage, the essential loads shift to the standby transformer. The diesels will also start but will not load. If it is a degraded voltage trip the diesels will start and the essential loads will load onto the diesels and the plant will trip by design. If the nonessential loads are powered from the startup transformer and a degraded voltage condition is not received but the startup transformer trips, the plant will still trip. The nonessential loads will not shift back to the auxiliary transformer.

If the standby transformer trips for degraded voltage the essential loads shift to diesel and the plant will trip. If the standby transformer trips for another reason the essential loads will shift to the diesels but the plant will not trip. The standby transformer will never shift loads automatically to the startup transformer.

No items of noncompliance or deviations were identified.

6. Licensee Event Reports Followup

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with technical specifications.

a. (Closed) LER 84-038: Secondary containment interlock malfunctions. The reactor building and machine shop interlock has been repaired. The cause of each event was equipment failure. A guard was posted in each instance while repairs were in progress. The licensee is continuing to evaluate improved interlock design.

b. (Closed) LER 84-039: Reactor Water Cleanup (RWCU) isolation. The licensee has not been able to determine a cause for the isolation. They will investigate the repeated isolations further during the next refueling outage when they have access to high radiation areas.

c. (Closed) LER 84-040: Auxiliary transformer failure and reactor scram. This event is discussed and closed out in Inspection Report 50-331/84-14(DRP).

No items of noncompliance or deviations were identified.

7. IE Bulletin Followup

For the IE Bulletins listed below the inspector verified that the written response was within the time period stated in the bulletin, that the written response included the information required to be reported, that the written response included adequate corrective action commitments based on information presented in the bulletin and the licensee's response, that licensee management forwarded copies of the written response to the appropriate onsite management representatives, that information discussed in the licensee's written response was accurate, and that corrective action taken by the licensee was as described in the written response.

a. (Closed) IEB 84-03: Refueling Cavity water seal. The licensee has determined that no active components are used in the refueling water cavity seal at DAEC. As such there is little chance of a gross leak to develop. Seal leakage is annunciated and there is adequate make up water (sources and backup sources) available. The spent fuel would remain covered in the event of a leak. The licensee also has emergency procedures in place for this type of event.

No items of noncompliance or deviations were identified.

8. TMI Items

(Open) Item II.K.3.16, Challenges and Failures to Safety Relief Valves. NRR accepted the licensee's response and closed this item on November 13, 1984 (D. B. Vassallo letter to L. Liu). The licensee has implemented the low-low set relief logic and the lower reactor water level main steam isolation valve setpoints. However the increased safety relief valve simmer margin cannot be implemented until the next refueling outage. Region III will consider Item II.K.3.16 open until the simmer margin is revised and inspected.

No items of noncompliance or deviations were identified.

9. Allegations

On November 8, 1984, Region III received an anonymous allegation concerning specific maintenance practices on the auxiliary transformer at DAEC.

The allegation stated that "The auxiliary transformer has had a history of problems, especially in the winter and spring, including numerous control room alarms and automatic transfers of power." The individual stated that there had been no attempts to investigate or correct the problems and that management had a "cavalier" attitude toward the problems.

During the course of followup the inspector interviewed operating shift supervisors, senior licensed operators, licensed operators, auxiliary operators, maintenance supervisors and maintenance personnel. The inspector determined that the allegations were not substantiated.

Discussions with operators and maintenance personnel indicated that the only transfer of power alarm was the "Cooling Power Auto Alarm". This recurring alarm condition did exist for a prolonged period. The transformer fans can be controlled in manual or automatic. In automatic they cycle based on transformer temperature. After the fans or some of the fans cycled off, then back on, a surge was created causing the fan power supply to shift and the alarm to come on. A temporary fix was leaving the fans in the manual mode. A permanent fix was implemented on August 9, 1984, under Maintenance Action Request (MAR) 32713. This request replaced a faulty fan with a new one.

Another alarm that did come in was the "Gas Detector Alarm". This alarm was recalibrated once under MAR 53332 on January 12, 1984.

Another problem which became evident after the auxiliary transformer explosion was the fact that the combustible gas meter sampling line was connected such that accurate results could not be readily obtained (lines interchanged). This problem was corrected. It should be noted that required oil samples of the auxiliary transformer oil showed no evidence of or increase in gases.

Maintenance personnel had been placing increasing emphasis on transformers due to recent problems associated with the cooling tower transformers. An

example would be that in September, 1984, the main transformer was drained and inspected due to an increase in gas concentration. No problems were identified during the inspection.

A review of turbine building logs for January, February, March, April, May, June, August, September, and October 1984 showed that, on the routine checks of the main, startup, standby and auxiliary transformers as required by page 9 of the logs, no problems were identified.

The narrative portion of the logs list the following alarms over the time period.

(1) Main Transformer Low N2 Pressure
(1) Standby Transformer Low N2 Pressure
(5) Auxiliary Transformer Gas Detector Alarm
(2) Startup Transformer Alarm
(2) Auxiliary Transformer Alarm
(2) Startup Transformer Low N2 Pressure

During this time period the plant was shutdown and restarted several times and went through several weather extremes during the different evolutions.

The only log entry on the auxiliary operators logs that indicated a problem might be evident on any transformer was a June 19, 1984 entry listing a problem with low lube pressure on the 1X1B transformer. The log also stated that electricians were investigating the problem.

No items of noncompliance or deviations were identified.

10. Independent Inspection

a. Radiation Waste Shipments

On November 28, 1984, the licensee was notified by the Hanford, Washington waste disposal site that they had received a 55 gallon drum with a hole in it. The hole looked like a nail puncture. The inner lining was intact and there was no leakage from the drum. The drum was a solidified low level activity shipment. The licensee immediately dispatched a team to Hanford and also suspended all rad waste shipments.

The licensee identified that the drum had been previously identified at DAEC as having a hole in it, the hole was circled by spraying around the hole with white paint, removing the serial number and placing it aside in the rad waste area. At a later date the drum was used for a rad waste shipment even though it had been marked and placed aside. The only personnel involved in the shipment were rad waste personnel.

Some confusion may have existed because the licensee marks hot spots on drums the same way the hole was marked. Personnel may have avoided that side of the drum thinking it was a hot spot. The drum would have been placed in the truck with hot spots facing inward.

Licensee corrective actions include a different way to mark and dispose of defective drums, quality control inspection of each drum that is packed, and increased or better inspection of drums prior to their use.

The Hanford site will take some sanctions against DAEC depending on the adequacy and acceptability of the licensee's corrective actions.

A Region III health physics specialist will review the event and licensee actions.

b. Security

During the inspection period the licensee removed the control room door for equipment installation. The inspector verified that proper safeguards were taken to ensure access was controlled to the control room.

No items of noncompliance or deviations were identified.

11. Exit Interview

Due to the length of the inspection and the diversity of areas inspected, exit interviews were conducted on a weekly basis between the NRC inspector and the appropriate licensee personnel. In each case the scope and findings of the individual inspection areas were summarized.