

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-254/90013(DRS); 50-265/90013(DRS)

Docket No. 50-254; 50-265

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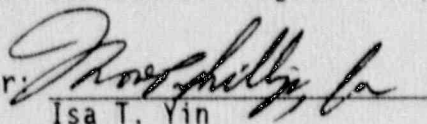
Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Quad-Cities Nuclear Power Station - Units 1 and 2

Inspection At: Quad-Cities Sites, Cordova, Illinois

Inspection Conducted: August 6-10, and 14-16, 1990

Inspector:


Isa T. Yin

9/6/90
Date

Approved By:


M. P. Phillips, Chief
Operational Programs Section

9/6/90
Date

Inspection Summary

Inspection on August 6-10, and 14-16, 1990 (Report No. 50-254/90013(DRS); 50-265/90013(DRS)).

Areas Inspected: Routine announced inspection of licensee corrective actions initiated for the issues identified in its self-initiated Safety System Functional Inspection (SSFI) of the Swing Emergency Diesel Generator (1/2 EDG) system. The inspection was based on NRC Inspection Procedure 92720.

Results: Licensee effort in conducting the SSFI for the 1/2 EDG system was good. Based on this review and evaluation, the inspection determined the following:

1. The licensee's initiatives to conduct the SSFI, and the positive actions taken by the site staff to promptly correct the deficiencies identified during this inspection were considered to be strengths within the CECO organization. Specifically:
 - a. The development of a Design Basis Document retrieval and verification program, and the electric cable separation and placement walkdown/evaluation program was indicative of the licensee's recognition of its areas of weakness and the necessity to devote resources to improve these weaknesses.
 - b. Prior to the completion of the inspection, the station promptly established plans and schedules to close out those items identified as Category A (high potential for affecting operability).

- c. Swift actions were taken to repair and adjust the EDG start air system pressure regulator and conduct testing for the painted relief valves to ensure their proper operation.
 - d. Although the original SSFI scope was limited to system modifications, extensive EDG electrical system walkdowns and reviews of test records were also performed. These efforts were beyond the original scope.
 - e. Hardware changes resulting from the SSFI were verified by the inspector to be installed in accordance with design requirements.
2. Lessons learned and deficiencies identified in the other CECO SSFI type inspections were not evaluated for applicability to Quad-Cities. Specific examples included: (1) Dresden SSFI findings in EDG systems such as the testing of the start air system relief valves and selection of thermal overloads for continuous running motors were not evaluated for applicability during or subsequent to the SSFI conducted at Quad-Cities; (2) the EDG start air system pressure regulator deficiencies identified at LaSalle and Dresden did not result in corrective actions, thus the same problems were found at Quad-Cities during this inspection; and (3) there was no inspection conducted at Quad-Cities to determine if the relief valves had been compromised by being painted, even though this deficiency had been identified at Dresden.
 3. Because there was an initial lack of prioritization for corrective actions for the SSFI findings, 14 out of the 24 Category A findings had not been closed out to date.
 4. The Critical Control Room (CCR) drawings being used at the plant had not been as-built verified. The licensee had developed a pilot Detailed Walkdown Program to verify piping physical conditions and configurations, but this program was not planned to ensure CCR drawings were accurate.
 5. The licensee had developed a Design Basis Documentation program to address the lack of design requirements identified during this and other licensee SSFIs. Quad-Cities had been selected as the pilot project among all of the licensee's BWR sites.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- *J. W. Wethington, NQP Superintendent
- *J. Dierbeck, Technical Staff Supervisor
- *C. A. Moerke, NED-BWSD Supervisor
- *D. Craddick, Assistant Superintendent - Maintenance
- *M. MacLennan, Technical Staff Engineer
- *D. C. Bucknell, Assistant Technical Staff Supervisor
- *J. A. Neal, Onsite Nuclear Safety Administrator
- *R. A. Robey, Technical Superintendent
- *R. D. Buss, Regulator Assurance
- *G. Spedl, Production Superintendent
- *M. Schreim, BWR Systems Design
- T. Barber, Regulatory Assurance
- S. K. Mehta, Corporate NQP
- S. Stapp, NQP
- D. R. Bax, Station Manager
- D. A. Gibson, Regulatory Assurance Supervisor

U. S. Nuclear Regulatory Commission (NRC)

- *J. Shine, Resident Inspector
- *D. Dueno, Reactor Inspector (Intern)

*Indicates those attending the exit meeting at the site on August 16, 1990.

Other licensee personnel were contacted as a matter of routine during the inspection.

2. Background

The licensee's QA Department conducted two detailed engineering oriented inspections:

- Safety System Modification Overview of the Unit 2 High Pressure Coolant Injection system, conducted in late 1986 and early 1987, with the final report issued on December 14, 1987.
- Safety System Functional Inspection (SSFI) of the 1/2 Emergency Diesel Generator (EDG), conducted in 1989, with the final report issued on June 19, 1989.

The purpose of this inspection was to evaluate the effectiveness of the corrective actions taken in response to the issues identified during the SSFI of the 1/2 EDG (system selected for the NRC inspection). The NRC review of the SSFI report concluded that the scope was limited to a review of a number of modifications, an extensive electrical system

walkdown, and detailed reviews of EDG tests. The system was evaluated to ensure its conformance with technical and regulatory requirements. The licensee SSFI goal was to determine the effects of previous modifications performed on the 1/2 EDG systems assuming the original design and installation were adequate and acceptable. The scope did not incorporate deficiencies identified from prior EDG SSFIs to see if similar problems existed at Quad Cities.

3. Review Sample Selection

The 1/2 EDG SSFI identified 204 specific concerns and deficiencies; among which 193 items had been closed by QA at the time of this inspection. The inspector selected the following items for his evaluation of the licensee's corrective actions:

Closed Items

- Nos. D1A to D1P Air and fuel system support deficiencies
- No. D7 When performing seismic evaluation on a 8" pipe line, the wrong seismic response spectra were used.
- No. C9A EDG start air system pressure gauges and low pressure alarm switches had not been calibrated for more than five years.
- Nos. C9C, and D Within the EDG start air system, the compressor ability to recharge at 230 psig and to trip at 250 psig within 30 minutes was not verified.
- Nos. D12A, and C Assurance was not provided that the required minimum amount of fuel oil was on site. (D12C was technically closed; but remained open due to some typographical error in the response.)

Open Items

- No. D16 B Control room kilowatt meter had not been calibrated since preoperational test.
- Nos. D5A3, B, G, and F, Drawings errors involving check valve locations in the EDG room ventilation system, and valves and tubing in the start air system.

4. Evaluation of Items

a. Licensee Control

The NRC performed a followup inspection of CECO corrective actions for its SSFI of Unit 3 EDG at Dresden in June 1990 (see Inspection Report No. 50-249/90016). In conjunction with the Dresden inspection, the Quad-Cities (Q-C) site staff examined all the 284

1/2 EDG SSFI items in July 1990, and grouped them into three categories: A, B, and C; with Category A having a high potential for affecting operability, Category B having some potential for affecting operability, and Category C having no potential for affecting operability. At the time of this inspection, 14 of the 24 Category A items remained open, 17 of the 101 Category B items remained open, and 60 of the 159 Category C items remained open. During discussions with the Q-C staff, it was recognized by CECO that the prior lack of categorization of items and corresponding prioritization of closeout activities had resulted in many Category A items remaining open for more than one year. Prior to the conclusion of the NRC inspection, the Q-C staff developed a schedule to close a majority of the open Category A items before the end of 1990.

b. Dresden Findings

The EDGs in Q-C and Dresden were supplied by Western Engine Company, with the same model number [MO-20-645E4, and were purchased in about the same time frame. Despite the similarity, the findings resulting from the CECO SSFI of the EDG at Dresden in 1987 were not evaluated for applicability during or subsequent to the CECO SSFI of EDG at Q-C in 1989. Pertinent Dresden findings such as testing of start air system relief valves and thermal overload relay selections for the continuous running motors were not utilized to determine if similar findings existed at Quad-Cities. The licensee concurred with the inspectors observations, and initiated actions to evaluate the Dresden findings.

c. Specific Items

(D1A to D1P) Most of the piping support deficiencies required hardware corrections. The NRC inspection verified that the work was properly performed.

(D7) The misapplication of response spectra in the piping seismic analysis resulted in extensive re-work and investigation for similar problems by Impell. The Impell piping analysis results were forwarded to S&L for pipe support review. The CECO closeout of the item appeared to be solely based on the review of the Impell nonconformance report. There was no evidence that CECO reviewed or evaluated the technical adequacy and the effectiveness of design interfaces as part of the finding resolution. The lack of adequate control of Architect-Engineer activities had been identified as an NRC finding at Zion during a SSOMI conducted in March through May 1988 (see Inspection Report No. 50-295/88003).

(C9A) The pressure gauges and the low pressure alarm switches at all three EDGs were calibrated in April through May 1990. The items were now placed in regular calibration schedules. The CECO action was considered to be adequate.

(C9C and D) The inspector reviewed the June 1990 test records for all three EDGs, and verified that the start air system compressors were able to recharge the receivers from a specified low pressure to a specified trip pressure within acceptable periods of time. The CECo action was considered to be adequate.

(D12A and C) The CECo technical staff verified that maintaining the 1/2 EDG storage tank level at 61% level, and refueling the day tank after monthly load testing would ensure that the Technical Specification requirement of 10,000 gallons of fuel oil would be met. The daily surveillance check mark was increased to 65% level for additional margin. The 1/2 EDG run time during a design basis accident and loss of offsite power based on the calculated and tested diesel fuel consumption rate was also verified to be meeting the UFSAR requirements. After review of the documents, the inspector concurred with the licensee and the Impell evaluations; however, there were two areas where the documentation was not clear.

- (1) There were discrepancies between Q-C site staff and Impell calculations of storage and day tank volumes corresponding to the tank levels. Although the CECo technical discussions on the rationale were good, there was no design calculation to incorporate the final CECo technical positions.
- (2) The SSFI finding statement that the EDG should be able to run for seven days from fuel oil in the storage and day tanks was incorrect. The UFSAR requirement was 3 1/2 days; and the Impell response evaluation was based on the 3 1/2 day requirement.

(D16B) Control room kilowatt meter for 1/2 EDG was calibrated in February 1990. The 1 and 2 EDGs kilowatt meters were scheduled for calibration in September 1990. The item still remained open due to some inter-departmental interface problems. Shortly after the SSFI, Regulatory Assurance (RA) sent the item to the Instrument Maintenance Department (IMD) for resolution. IMD did not clearly respond to RA that they were not responsible for this area of work, and QA did not review the item until one year later. At that time, corrective actions were appropriately assigned and scheduled.

(D5A3, B, G, and F) The EDG room HVAC pneumatic control system check valves were found installed at different locations than specified on the P&IDs. Additional valves and tubing, not shown on the P&IDs, were also found in the EDG start air system. All these discrepancies were attributed to drawing errors by the SSFI team. The inspector performed walkdowns of these systems, reviewed the affected P&IDs, and concluded that these were not drawing problems, but were installation and uncontrolled system modification problems. Since the drawing errors were not considered to be significant, no CECo operability assessments had

been performed until August 1990. The operability assessments were not considered to be meaningful by the inspector, because they were assessing the wrong issues.

5. NRC Walkdown Inspection

During observation of the licensee's corrective actions associated with the 1/2 EDG, the inspector also observed the 1 and 2 EDGs for similar deficiencies. During the walkdown, the inspector identified the following problems:

a. Air Pressure Regulator (APR)

The APR on 1 EDG was found at 238 psig. Procedure 2MMS-6000-1-S4 required the pressure setting to be between 195 and 200 psig. This condition had been identified by CECO prior to the NRC inspection, and the repair/adjustment was scheduled for the next refueling outage. Four Work Requests (WRs) issued between April 1988 and July 1989 indicated that there were problems with the APR settings for all three EDGs. None of the above information available to Q-C had resulted in APR surveillance, adjustment, and/or replacement. During the NRC inspection, Q-C Unit 1 was placed in an unscheduled outage, the APR was removed, and found to contain damaged internal parts. Due to the lack of replacement parts, the APR was unable to be completely repaired; however, the pressure level was adjusted down to 205 psig. A Q-C site technical evaluation showed this pressure to be acceptable until APR replacement could be done. The inspector concurred with the CECO disposition. The Q-C staff stated that the surveillance frequency for APRs would be increased, and a more detailed APR adjustment procedure would be developed.

b. Air Pressure Relief Valve (APRV)

APRVs were found covered with paint at all three EDG start air system receivers. The paint could interfere with proper actuation of the pressure relief mechanism. This same problem had been observed during a recent NRC inspection at Dresden (see Inspection Report No. 50-249/90016). The Q-C site staff had been aware of the NRC Dresden finding, and had responded by issuing procedure QMMS 1500-1, "Relief Valve Setpoint Testing," Revision 4, in June 1990. The inspector reviewed the procedure, and noted that the procedure considered valve weeping before reaching the low end of lift pressure to be acceptable. The Q-C site staff agreed with the inspector that this should not be the case. Prior to the conclusion of the inspection, five WRs were issued to remove and test all the affected APRVs. Subsequent to the inspection, the Q-C staff informed the inspector that some of the APRVs had not met the acceptance criteria, and that the testing scope had been expanded to test all air receiver RVs.

c. Fuel Pump Leak

The engine driven fuel oil pump was found leaking at 2 EDG. The catch pan below the leak had a considerable amount of fuel oil accumulation. The inspector expressed concern that the fuel leak and the placement of the catch pan near the diesel engine block could create a potential fire hazard. The Q-C staff concurred with the inspector, and noted that a Daily Order had been issued on August 3, 1990, to the Unit 2 operators to wipe the leak clean and empty the pan during every shift. Apparently the order had not been implemented by the operators. Prior to the end of the NRC inspection, the leak was funneled and drained into an oil separation system. In addition, the schedule for fixing the leak had been moved from the next refueling outage to the next short term outage.

d. Electric Cable Placement

During the inspection of the 2 EDG room, the inspector found several electrical cables that did not appear to be properly routed. The SSFI walkdown in February and March 1989 had identified that cable routing was not in agreement with design documents. Cable separation and placement deficiencies had been identified during the NRC's SSOMI at Zion (see Inspection Report No. 50-295/88003). CECO had been performing informal walkdowns and evaluations to assess the applicability of the Zion findings to its older BWRs. These informal walkdowns had identified discrepancies that were similar to those identified at Zion. The licensee had established the following schedule for the initial detailed walkdowns of the cables:

Quad Cities - Unit 2	December 1991
Quad Cities - Unit 1	June 1992
Dresden - Unit 2	June 1992
Dresden - Unit 3	December 1992

The inspector considered the CECO actions to be adequate. Prior to the end of the inspection, the discrepancies identified during the NRC walkdown were evaluated by Impell to be acceptable. The inspector had no further questions.

6. CECO Detailed Walkdown Plan (DWP)

The licensee SSFI and the NRC walkdown identified that the site drawings in general did not represent the as-built system configurations. Specific examples included:

- a. SSFI findings D5J to D5KK prescribed a large number of 1/2 EDG piping support system drawing discrepancies. A CECO BWR Systems Design Superintendent letter dated August 1, 1989, to all A-Es and CECO BWR sites stated that pipe support and M-isometric drawings were not to be used for design input or review unless specified in the calculation packages. The discrepancies were attributed to many hardware modifications that were not reflected in the as-

built drawings. The modifications had been performed to meet the intent of NRC Bulletin 79-14. Prior to the August 1, 1989 letter, the use and control of site piping support drawings was uncertain, and resulted in many discrepancies identified by the SSFI team.

- b. SSFI findings D9J, K, and L were discrepancies found in the Q-C Critical Control Room (CCR) drawings. These discrepancies did not affect normal system operations; however, the inspector was concerned that they would be relied upon during abnormal conditions. The present control for the CCR drawings was instituted in April 1984 after 12 years of operation. There was no record to show that any as-built verification of these drawings had ever been conducted prior to, or since the designation and use of these controls. For example, discrepancy item D9L was caused by a 1980 modification that had never been implemented, although the drawing had somehow been revised to show the proposed change.
- c. The NRC walkdown of the EDG room ventilation pneumatic control system identified several discrepancies that had not been identified by the licensee's SSFI. The NRC walkdown found that P&IDs M-1532, "Flow Diagram, Pneumatic Control and Wiring Diagram of Diesel Generator 1/2 Room Ventilation System Panel 2212-32X," Revision C, dated October 3, 1989, and M-1533, "Flow Diagram, Pneumatic Control of Diesel Generators 1 and 2 Room Ventilation Systems," Revision C, dated August 26, 1985 failed to indicate the presence of most of the pressure gauges and pressure regulators. In addition, one bleed-off tube and valve (not shown on the P&ID) was found in the 1/2 EDG room.

The licensee was aware of the drawing problems, and had developed a program, entitled "Quad Cities Detailed System Walkdown Plan," Revision 0, dated July 6, 1990, to document the as-built plant status. A pilot walkdown was being conducted for the Core Spray system and was scheduled to be completed before the end of 1990. A list of 28 systems, including HPCI, RCIC, EDGs, CS, and RPS was to be walked down primarily in the order identified. The inspector reviewed the program, and noted that its attention was focused on piping physical configurations. The program did not verify system functional capabilities or equipment operability, nor did it place importance on verifying CCR drawing accuracies because CCR drawings consisted mostly of electrical, instrument, and control drawings and diagrams. CECO management understood the inspector's concern, and planned to factor some of the comments in a future program revision.

7. EDG Room Ventilation

The NRC walkdown of the EDG room ventilation systems and controls identified two discrepancies that had not been identified by the licensee's SSFI as follows:

- o The EDG room acceptable temperature range for short term and long term EDG operations was not documented, and was uncertain.

- There are moderation dampers installed at 1 and 2 EDG room ventilation systems for temperature control, but not for the 1/2 EDG room. The moderation dampers control the amount of air supply from either outdoors or from the turbine building.

Plant operational experience showed that all isolation and moderation dampers had been functioning properly; however, the SSFI and the NRC inspector raised concerns that there had not been any testing performed to date to substantiate system operability during abnormal plant conditions involving loss of the system control air. The licensee planned to test both design bases for the system.

8. Design Basis Documentation

In addressing the lack of design requirements identified during this and other licensee performed SSFIs, the licensee had issued a letter, dated June 25, 1990, to Dresden, Quad-Cities, and LaSalle engineering organizations. The letter delineated the BWR target systems for the establishment of a Design Basis Document (DBD). The six target systems were the EDG, HPCI or HPCS, LPCI or RHR, LPCS, ESW or CCSW, and AC/DC distribution. The engineering and the station procedures were to be completed by December 1990. Design verification was then to be a part of the DBD program. Q-C was selected by the licensee to be the pilot project among all of the BWRs owned by CECO.

9. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 16, 1990 at the Quad-Cities Nuclear Power Station. The inspectors summarized the purpose, scope, and findings of the inspection. The licensee representatives acknowledged this information. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. The licensee representatives did not identify any such documents/processes as proprietary.