U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-237/91033(DRS); 50-249/91036(DRS)

Docket Nos. 50-237; 50-249 Licenses No. DPR-19; DPR-25

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

Facility Name: Dresden Nuclear Power Station, Units 2 and 3

Inspection At: Dresden Site, Morris, Illinois; and
1400 Opus Place, Downers Grove, Illinois

Inspection Conducted: December 3 - 31, 1991

Inspectors: V. P. Lougheed — Date 2/6/92

R. A. Langstaff — Date 2/6/92

K. Salehi — Date 2/6/92

Approved By: M. P. Phillips, Chief, Operational Programs Section — Date 2/6/92


Inspection Summary

Inspection from December 3 - 31, 1991 (Inspectiom Reports No. 50-237/91033(DRS); No. 50-249/91036(DRS))
Areas Inspected: Routine, announced, safety inspection of the licensee's engineering and technical support activities. Inspection modules used were 92701 and 37700.
Results: One violation was identified during this inspection regarding the failure to take action to identify the source of the correct leakage into the Unit 3 drywell liner and pocket area and the torus basement (Paragraph 4.A).

In addition to the violation, weaknesses were noted in the following:

1. Communication among groups within the Nuclear Engineering Department did not always ensure that appropriate technical personnel were involved with a project. The handling of the Turbine Building cracking (Section 5) indicated that the right people within the engineering department were not always contacted or utilized for engineering activities.

Conversely, communications between the technical staff and onsite engineering were good. (Section 6.D.1)

2. In addition to the violation, corrective actions were not always prompt partially due to the lack of adequate trending or tracking of events or component performance. (Section 5.A)

3. A large portion of the technical staff were newly hired (within the last 18 months) college graduates with little experience who had been assigned multiple systems without sufficient knowledge concerning the system. (Sections 4.B and 6.E)

4. The actions taken concerning the drywell leakage appeared to be contrary to the submitted response to generic letter 87-05. Although the surveillance to assure drain lines were open had been completed and the submittal to NRC indicated leakage would be reported and corrected, drain lines were found clogged and no corrective actions initiated. (Section 4)

Specific strengths were identified as follows:

1. The prioritization program for performing modifications was well thought out, workable, and highlighted safety significance for modification performance. (Section 6.B)

2. The onsite engineering assistance and involvement were found to be positive elements of the overall engineering support for Dresden. (Section 6.C)

3. The effort to evaluate other CECo and industry events for applicability to Dresden was good, however, not all appropriate people were familiar with this system and its use. (Section 6.D)

4. The experience levels for the corporate engineers (including those located onsite) were good. (Section 6.E)

5. The Engineering Assurance organization was doing a thorough job of highlighting ongoing problems in the engineering organization. (Section 7)

6. The comparative audit of all six nuclear sites to identify the "model plant" in a specific area was a good initiative that produced insightful results. The technical staff area had been scheduled for such an audit during 1992. (Section 7)

## DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*B. Shelton, Director - Engineering Performance
*C. Schroeder, Station Manager
*B. Adams, Regulatory Assurance Engineer
*S. Berg, Assistant Production Superintendent
*G. Bergan, Safety Engineer
*K. Deck, Safety Engineer
*R. Dee, Safety Engineer
*L. Gerner, Technical Superintendent
*D. Lowenstein, Regulatory Assurance Analyst
*B. Mayer, Nuclear Quality Programs Inspector
*R. Radtke, Regulatory Assurance Supervisor
*M. Strait, Technical Staff Supervisor
*T. Tolish, Field Engineer
*B. Viehl, Site Engineering Supervisor
*J. Watson, Nuclear Quality Programs Engineer
*D. Wheeler, Construction Superintendent

U.S. Nuclear Regulatory Commission (NRC)

W. Rogers, Senior Resident Inspector
D. Hills, Resident Inspector
*M. Peck, Resident Inspector
*D. Liao, NRC Intern

*Denotes those attending the exit interview conducted on December 20, 1991.

The inspectors also interviewed members of the licensee's engineering and technical staff, quality assurance organization, operations department, and maintenance department.

2. Licensee Actions on Previously-Identified Items (92701)

A. (Closed) Open Item (237/91015-03) "Updating the Process Computer after a Refueling Outage": The licensee issued a temporary change to procedure DTS 8148 to require the computer to be updated within two weeks after establishing the WTC and WD correlation. A permanent procedure change was also being prepared. This item is considered closed.

B. (Closed) Open Item (237/91015-01; 249/91014-01) "Completion of Training Following Modification Implementation": The licensee held a meeting on August 8, 1991, to discuss the significance of signing

the "training complete" box on modification approval forms. As a result of the meeting, those who may sign that specific box were advised that when training or notification is required, all specified personnel training or assigned notification must be completed prior to signing the "Training Completed" box. This item is considered closed.

3. Review of Design Changes (37700)

A. Modification M12-3-90-029 "Install Hardened Wet Well Vent": This modification installed a hardened vent to the primary containment as required in Generic Letter 87-16. The modification added a vent path to be opened prior to reaching maximum primary containment pressure.

The overall quality of the modification approval letter and safety evaluation was good. They appeared comprehensive and addressed potential effects on system operations. In addition, post-modification testing criteria were adequate and addressed system design requirements.

The inspectors identified a concern with the classification of this modification. The modification approval letter invoked ASME Section V requirements which were not reflected on the modification installation approval form. The licensee agreed to resolve this concern.

B. Modification M12-3-88-57 "Replace Actuator for Feedwater Regulating Valve": This modification replaced the air Operated actuator on a feedwater regulating valve with an electro-hydraulic actuator. The modification was performed to correct control problems experienced with the valves. The inspector reviewed the 10 CFR 59.59 safety evaluation and performed a walkdown of the installation. No concerns were identified.

C. Minor Design Changes P12-2-89-682, P12-3-89-690, and P12-3-89-691, Torus Wide Range Level Transmitter Replacements: The licensee was replacing the torus wide range Barton level transmitters with Rosemont level transmitters to correct previous equipment problems and improve replacement component availability. Both Unit 3 transmitters were replaced during the 1991-92 refueling outage. One of the two Unit 2 level transmitters was also replaced, with the other scheduled for the next refueling outage.

The inspectors reviewed the 10 CFR 50.59 safety evaluation, the instrument accuracy calculation, procurement and receipt inspection information, and the associated calibration procedure for the transmitters. The inspectors also walked down the existing instrument lines, where possible. An associated licensee event report (LER 50-249/91-003) was also reviewed.

The inspectors identified two concerns, one related to the adequacy of the designer's and installer's walkdowns and the other related to the potential for personnel electrocution.

Some of the existing instrument lines for the torus wide range level transmitters were incorrectly sloped, and this condition had not been identified by either the designer's or installer's walkdowns performed by onsite engineering. In this configuration, the lines could develop either air or water pockets which would adversely affect instrument accuracy. The licensee subsequently determined that the accuracy would not be affected beyond that required for design and that no modification of the existing instrument lines would be required. The inspectors concurred with the licensee's assessment.

The inspectors noted one employee safety concern due to standing water in the torus basement and the presence of an electrical outlet box on an extension cord in the standing water. As a result, one of the sensing instrument lines for Unit 2 was not accessible. This condition was brought to the licensee's attention for correction.

D. Temporary Alterations: Temporary alterations were controlled by procedure DAP 07-04, "Control of Temporary System alterations," revision 14. The inspectors reviewed the temporary alteration log and noted that the licensee had 47 temporary alterations in place at the time of the inspection, 17 exceeded six months duration, and 7 exceeded one year. Temporary alterations had an extended justification prepared if the alteration exceeded either three months or its original estimated duration. No concerns were identified during the inspectors review of the safety evaluations, technical justifications, and extended justifications on a sample of temporary alterations.

4. Drywell Liner Leakage

The inspectors observed water leaking from the Unit 3 drywell liner sand pocket drains and from the vicinity of the downcomer legs into the torus basement. The leakage was estimated, by the inspectors, to be approximately five gallons per minute (5 gpm). The licensee indicated that leakage was normally present when the refueling cavity was flooded, and that after the refueling cavity was drained the leakage stopped. After reviewing the history of this condition, the inspectors identified three significant concerns:

- Failure to take appropriate, timely corrective action
- Lack of system engineer experience and familiarity with the system
- Lack of management attention to ensure implementation of generic letter response to NRC

A. <u>Failure to take Appropriate, Timely Corrective Action</u>

Although leakage in the drywell liner sand pocket region had been observed as early as 1987, the licensee had not initiated a deficiency or nonconformance report nor taken any actions to identify the source of the leak or correct the problem. The leakage was significant because of the potential to effect the operability of the primary containment through corrosion of the containment liner. The NRC issued Information Notice (IN) 86-99, "Degradation of Steel Containments," and Generic Letter (GL) 87-05 in March 1987 requesting licensees to address a similar condition which resulted in a significant reduction in wall thickness of the drywell liner at Oyster Creek. A supplement to IN 86-99, describing Oyster Creek's corrective actions, was issued in February 1991.

As part of its response to the Generic Letter, CECo committed to perform surveillances of the sand pocket drain lines every outage; leakage was to be promptly reported and corrected. In addition, in 1988 the licensee performed an ultrasonic examination of the containment and concluded that the containment had not degraded at that time. However, leakage has continued during every refueling outage conducted since that time and has increased from the original "few drops per minute" to the current 5 gpm.

The failure to take prompt corrective action is a violation of 10 CFR Part 50, Appendix B, Criterion XVI, which requires that measures bee established to assure that conditions adverse to quality are promptly identified and corrected (50-249/91036-01).

B. Lack of System Engineer Experience and Familiarity with System

The system engineer had only 18 months of experience since graduating from college and was not familiar with the issues concerning the leakage problem. While the system engineer was aware that surveillances were conducted as a result of an "industry problem" associated with the leakage and that UT measurements had been taken of the drywell liner, he was not aware that the two issues were related, nor was he aware of either the IN or the GL. Further, he was not aware of the supplement to the IN which had been issued after he had encountered similar leakage at Unit 2. The system engineer was not aware of the Dresden response to the GL, nor did he know what commitments existed to monitor and correct leakage. For example, drain lines remained plugged after the surveillance had been performed which was contrary to the purpose of the surveillance.

In addition to the primary containment, the engineer was also responsible for two other major systems. The inspectors attributed the engineer's lack of detailed system knowledge to his work load and his lack of experience.

C. Lack of Management Attention to Ensure Implementation of Generic Letter Response to NRC

By letter dated September 6, 1988, the licensee responded to GL 87-05 and stated that surveillances to check for leakage from the sand pocket region drain lines would be performed and "any evidence of leakage through any of the drain lines constitutes an abnormal condition to be reported and for corrective measures to be initiated." In addition, the licensee committed to perform ultrasonic testing of the primary containment liner to determine if degradation had occurred.

The licensee did not make any effort to correct the leakage. Surveillances of the drain lines during refueling outages were begun in 1988. Unit 3 surveillance records showed that leakage had been present since the surveillances were first implemented and had increased every refueling outage. Leakage also occurred on Unit 2, although it was less extensive than Unit 3. Although the Unit 3 surveillance was performed prior to this inspection, some of the sand pocket drain lines remained clogged contrary to the intent of the GL. The inspectors concluded that a lack of management attention had allowed the leakage problem to persist.

Although no deviation or nonconformance report had been generated, despite the fact that the surveillances continued to identify the leakage condition, in December of 1990, the system engineer initiated Action Item Request (AIR) 12-90-07 to corporate engineering to determine the source of the Unit 2 leakage. No action was taken on the AIR until September 1991, when the station again encountered leakage during the Unit 3 refueling outage and the system engineer reinitiated the AIR.

The licensee's procedure required issuing a deviation report only for conditions which either warranted a unit to be derated or if a reportable event occurred. This threshold for deviation reports contributed to the failure to implement corrective action to prevent continued leakage or ensure that the containment liner was not adversely affected.

At the time of inspection, the presence of leakage, identified through the surveillances, had not been reported to the NRC. The tech staff management and senior plant management viewed that the statement in their response to GL 87-05 did not constitute a commitment to report this leakage to the NRC. However, based on the inspectors' discussions with NRR, this was not the understanding of the NRC.

During the inspection, technical staff management stated that they considered the leakage only to be a nuisance. This was based on a report prepared in 1988 indicating that UT results showed no appreciable reduction in thickness of the drywell liner, with some liner plate measurements exceeding the expected tolerances. Based on the as-found plate thickness and an estimated corrosion rate of 10 mils per year, the licensee estimated that 27 years remained before liner thickness would be a problem. However, the supplement to IN 89-66, issued in 1991, stated that corrosion rates were actually on the order of 35 mils per year at Oyster Creek. No re-analyses was performed based on the information provided in the IN supplement or the increasing leakage.

D. Conclusion

The licensee's failure to initiate corrective actions as required by the regulations was caused by a lack of appreciation of the issue by both the system engineer and station management. After discussions with NRC management on December 26 and 31, 1991, the licensee agreed to perform the following actions during the

1991-92 Unit 3 refueling outage: (1) perform UT measurements at 5 of the original 22 sample locations in the containment liner to ascertain the amount of liner degradation; (2) perform a visual inspection, if possible, of the refueling cavity liner to determine the leakage source; (3) sample the water in the Unit 3 torus basement to verify that it was from the refueling cavity; and (4) clear the plugged sand pocket drain lines.

5. Turbine Floor Cracking

During a walkdown in the turbine building, the inspectors found a large crack that could potentially affect safety related equipment. The crack was approximately 1" to 1 1/2" deep, consisting of spalled concrete. The inspectors reviewed the licensee's activities in response to the formation of the crack and identified two concerns:

- Corrective action
- Communication among corporate engineering organizations

Although the turbine building is not a safety related structure, several pieces of safety related equipment could be affected by spalling of concrete from the crack, including safety related switchgear MCC-29 and portions of the standby gas treatment system.

A. Corrective Action

The crack was first identified by the licensee in April 1991. No actions to prevent further propagation of the crack have been taken to date. In June 1991, Sargent and Lundy (S&L), evaluated the cracking and recommended that the outer layer of the cracked concrete be completely removed in order to evaluate the extent of the cracking. The licensee did not implement this recommendation. In November 1991, after the licensee noted that the crack had propagated and the concrete separation was more pronounced, S&L was again requested to inspect the cracking. S&L reiterated their earlier recommendation. At the time of the inspection, no deviation report or nonconformance report had been initiated. The inspector considered the lack of tracking of this issue in a formal corrective action system to be a weakness.

B. Communication Among Corporate Engineering Organizations

The onsite engineer with cognizance for this issue reports to the Systems Engineering Design section within the corporate engineering organization. The corporate engineering group with the responsibility for evaluating civil structural issues is the Mechanical/ Structural Design Engineering Section. The Mechanical/ Structural Design Engineering Section did not review S&L's initial structural evaluation nor were they aware of the problem prior to the NRC informing them of the cracking during this inspection. The inspector considered this to be a weakness in communications.

6. Engineering and Technical Support

This portion of the inspection focused on the effectiveness of the licensee's engineering and technical support organizations. Engineering support was provided to the site primarily by three groups, the station's Technical Staff, the Nuclear Engineering Division's projects engineering group at the site (Engineering and Construction (ENC) group), and the rest of the Nuclear Engineering Division's discipline engineering groups located at Downers Grove. The station's Technical Staff provided system engineering and other technical support at the site. Corporate engineering activities were coordinated through the ENC group, which would either perform the work or forward it to the corporate office where the projects group would interface with the discipline engineering groups. Engineering was evaluated focusing on the following:

- Engineering Backlog and Management Tracking of Workload
- Prioritization of Modifications
- Engineering Support
- Engineering Communications Effectiveness
- Training, Qualification, and Certification

A. Engineering Backlog and Management Tracking of Workload

The inspectors reviewed the backlog and workload for both site and corporate engineering organizations. Most action items were completed by their scheduled dates.

The station technical staff appeared to be strained based on the number of systems and issues being dealt

with. This may have been the result of, or exacerbated by, the lack of experience of several of the systems engineers.

Station management tracked work items for engineers using the nuclear tracking system (NTS) and a daily listing of regulatory activities. Updating the status and prioritizing the remaining items was generally done during the daily meetings between technical staff management and group leaders. During the inspection, the licensee focused attention on a reduction of the number of overdue regulatory activity items.

B. Prioritization of Modifications

The licensee had developed and implemented a numerical point system for prioritizing major modifications. The system applied different weighting factors to various attributes of the modification, such as whether it would improve public safety, safety system performance, productivity, etc. The highest factor was assigned to items of safety significance. The overall score then determined the relative priority of each modification. The inspectors considered the prioritization system to be workable and useful.

The licensee did not prioritize minor modifications or other more routine work, stating that these items were often performed on the basis of what was "hot".

C. Engineering Support

The inspectors evaluated the interfaces among plant operations and maintenance staff, plant technical staff, onsite engineering, and corporate engineering.

Technical staff personnel (TS) indicated that they were kept informed about the status of their systems. In addition, TS routinely reviewed all work request cover sheets submitted on their systems. If corporate support was needed, they would contact ENC at the site or directly contact various disciplines within NED.

The interface between operations and TS was generally good, although TS lack of system expertise reduced their effectiveness. TS generally responded to operations when called upon.

The presence of the corporate Engineering and Construction (ENC) group onsite improved the overall quality of modifications and has improved engineering's response.

The corporate strategy of establishing a more self-sufficient engineering organization was also a positive step. The licensee recently established a dedicated architect/engineer (A/E) for each site. Because the dedicated A/E for Dresden was not the original A/E, the licensee was in the process of transfering the responsibility to the new A/E.

D. Engineering Communication Effectiveness

The inspectors examined the communication paths among the segments of the licensee's engineering support organizations. The normal flow of problems or concerns would be as follows:

- identification by plant personnel,
- informal communication of problem to TS, followed by a written work request (discussed in Section 6.C above),
- informal communication between TS and ENC, followed by either a request form or an AIR,
- communication between ENC and corporate engineering to determine whether the problem should be handled onsite or at corporate, and
- communication between corporate and the dedicated A/E for items involving a potential modification.

Per procedures, all formal communications from engineering to the site was in the form of a letter to the station manager.

The inspectors evaluated communications among onsite engineering (ENC), corporate engineering (NED), and the Technical Staff (TS). Communications between corporate engineering and the dedicated A/E was not evaluated.

1. Between Onsite Engineering (ENC) and Technical Staff

The communication between these two groups was good. The inspectors found the staff in the two organizations communicated freely on technical issues related to Dresden. The daily morning meetings between the technical staff and the onsite engineering personnel enhanced the communication between these two groups. Another example of good communications was the weekly conference calls between the station's nuclear

engineers and the nuclear fuel services organization.

2. Between ENC and Corporate Engineering

Communications between ENC and corporate engineering were not always effective or timely. One example is discussed in Section 5.B above. Another example was the lack of awareness by corporate engineering personnel with a training program developed by the Mechanical/Structural staff. This program was for the preparation, review, and approval of calculations. Another example was that it took one month for the issues discussed in AIR 91-07 to get to the appropriate discipline group from the project engineering group. The inspectors concluded that communication flow between ENC and corporate engineering still needed improvement.

In contrast, the communication between the onsite and corporate sections of the same group within NED was acceptable. This communication normally flowed through the onsite Engineering Group Supervisor.

3. Between Corporate Engineering and Technical Staff

The inspectors evaluated the programs established by the licensee to identify generic engineering issues and found that there was still a need for improvement. Although a good mechanism had evolved to collate and evaluate the information; personnel were not always familiar with either the system or the information.

E. Training and Qualification Effectiveness

The inspectors evaluated the experience and training of tech staff and engineering personnel and determined that in many cases, the system engineers did not have detailed, indepth knowledge of their systems. In contrast, corporate engineering personnel were experienced, as many of the onsite corporate engineers had been site Technical Staff engineers. The reasons for the lack of system engineer familiarity with their systems were related to the following:

- Lack of industry or site experience, and
- Insufficient training prior to assuming role as a systems engineer

1. Lack of Industry or Site Experience

The inspectors noted that many of the station technical staff were engineers hired directly out of college with about 18 months of experience. While the engineers demonstrated a positive working attitude, their lack of experience and the lack of sufficient training prior to assuming the role of system engineer hampered their effectiveness.

During a walkdown of a system affected by a modification, the cognizant engineer for the modification was unable to locate some of the system components without the inspectors' assistance. Another system engineer did not recognize the significance of a problem until the inspector obtained the design drawings and showed the engineer that the installed system did not meet design requirements. An additional case of insufficient experience is discussed in Section 4.B above.

Using the system engineering position as a developmental position to some extent is not by itself undesirable; it may, in fact, be beneficial. However, where experience levels are generally low and this is not recognized or compensated for by oversight by senior engineers and an agressive training program is not implemented, effectiveness of the systems engineering program is severly hampered. We consider this to be the case at Dresden.

The majority of onsite engineering personnel had more experience than the station technical staff. This was primarily because they had been hired from the cadre of experienced station TS personnel. However, one notable exception is discussed in Section 3.C above.

The overall experience for the NED personnel was good. Most had several years of technical experience in their respective fields.

2. Insufficient Training Prior to Assuming Role as a Systems Engineer

Although a comprehensive matrix for tracking and matching qualification versus training had been developed for personnel within corporate

engineering, similar program did not exist for the site technical staff personnel.

Although a "system notebook" concept was in place to provide detailed system information to system engineers, it did not compensate for the lack of formal training or a qualification program.

The lack of a training matrix was discussed with the site Tech Staff training management and the licensee's corporate engineering training management.

7. Review of Quality Assurance Effectiveness

The inspectors evaluated the licensee's oversight activities associated with engineering. These were primarily performed by the licensee's corporate Quality Assurance/Nuclear Safety (QA/NS) and Engineering Assurance (EA) groups. Corporate QA/NS performed audits of engineering, both at the site and at the corporate office. The corporate audits tended to focus on current problems, although they also reviewed previous findings to ensure that corrective actions were adequately implemented. The EA organization provided a comprehensive technical review of engineering efforts, auditing corporate engineering, onsite engineering, and various A/E's.

One self-initiated action on the part of these Q organizations was the performance of a "comparative audit." In this audit, the same team audited the operations area at all six nuclear sites. They concentrated on good practices, transfering any findings to the site's Nuclear QA group. The comparative audit developed a "model station" to show the stations the ways to improve as a result of this audit. A comparative audit of technical support (including the technical staff) was planned for 1992.

The onsite QA organization followed up on corrective actions to NRC findings, as well as their own, and appeared to provide a good resource to prevent recurrence of previous problems.

In addition to the above two QA organizations, corporate engineering instituted an internal audit process, under the cognizance of EA. The inspectors determined that EA thoroughly highlighted ongoing problems in the engineering organization. For example an evaluation of the quality of designer and installer walkdowns identified numerous deficiencies.

8. Exit Interview

The inspectors met with the licensee representatives (denoted in Paragraph 1) on December 20, 1991. The inspectors summarized the scope and findings of the inspection. The licensee acknowledged the statements made by the inspectors with respect to the items discussed in this report. 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 and the licensee did not identify any such documents or processes as proprietary. A telephone conference was held with Mr. L. Gerner of the station to discuss the licensee's actions concerning the issues discussed in Section 4 of this report on December 31, 1991.