

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-237/88008(DRS); 50-249/88009(DRS)

Docket Nos. 50-237; 50-249

Licenses No. DPR-19; DRP-25

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

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

Inspection At: Morris, Illinois

Inspection Conducted: April 11-15 and 25-29, 1988

Inspectors: *F. J. Jablonski for*
N. C. Choules

6-3-88
Date

F. J. Jablonski for
S. D. Eick

6-3-88
Date

Approved By: *F. J. Jablonski*
F. J. Jablonski, Chief
Quality Assurance Programs Section

6-3-88
Date

Inspection Summary

Inspection on April 11-15 and 25-29, 1988 (Reports No. 50-237/88008(DRS);
No. 50-249/88009(DRS))

Areas Inspected: Routine, announced inspection of maintenance activities and licensee's action on a previous inspection finding, using selected portions of Inspection Modules 62700, 62702, 62704, 62705, 92701, and 92720.

Results:

- o Maintenance was accomplished, effective, and self assessed; however, continued aggressive and significant involvement by management is needed to improve and maintain the quality of newly developed maintenance programs especially in preventive maintenance of balance of plant components.
- o Management attention is needed to improve the work request process and the documentation of work done, and otherwise eliminate weaknesses that could limit future historical trending and root cause analysis of component problems.

- Corrective maintenance procedures need to provide detailed step by step instructions especially during tasks requiring disassembly and reassembly of equipment.
- The team concept for performing motor operated valve maintenance was perceived as a significant strength.
- The threshold for placing equipment problems on maintenance work requests was sufficient to maintain the material condition of the plant at an acceptable level.
- The painting program indicated significant management attention and involvement in plant housekeeping.
- QA Department audits successfully evaluated maintenance processes and activities for technical adequacy.
- No violations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- *N. Kalivianakis, General Manager (BWRs)
- *E. Armstrong, Regulatory Assurance Supervisor
- *J. Coonan, Assistant to ASM
- *E. Eenigenburg, Station Manager
- *R. Meadows, Maintenance Staff Supervisor
- *L. Sebby, Assistant to ASM
- D. Throne, Maintenance Staff
- *D. VanPelt, Assistant Superintendent of Maintenance (ASM)
- *J. Wujciga, Production Superintendent

*The above listed individuals attended the exit meeting on April 29, 1988. Other licensee personnel were contacted as a matter of routine during this inspection.

2. Licensee Action on Previous Inspection Findings

(Open) Open Item (237/87009-01 and 249/87008-01): Program for documenting actions taken for equipment failures. Each time a piece of equipment had two failures within six months a computer printout was automatically initiated. The licensee's review system required review and appropriate corrective action of the failures; however, for those instances when corrective action was not required a system had not been established to formally record and justify the review. The licensee was in the process of revising the requirements for documenting reviews of equipment failures. This item remains open.

3. Evaluation and Assessment of Maintenance

The purpose of this inspection was to evaluate and assess the accomplishment and effectiveness of maintenance activities at Dresden. The inspection coincided with a planned outage of Unit 3. The evaluation and assessment were accomplished by:

- o Review of the Dresden Station Improvement Plan
- o Review of the Motor Operated Valve Maintenance Program
- o Review of the Preventive Maintenance Program
- o Evaluation of maintenance backlog
- o Review of completed work requests
- o Evaluations of maintenance rework
- o Observation of maintenance activities
- o Walkdown of plant systems
- o Review of training records.

This inspection also assessed the quality verification process related to maintenance, which was accomplished by:

- Review of audit and surveillance reports;
- Review of QC checklists and installations procedures.

In preparation for this inspection, the inspectors reviewed a number of 1987 maintenance related LERs. Most of the LERs were associated with the High Pressure Coolant Injection (HPCI) system and the Feedwater (FW) system.

3.1 Dresden Station Improvement Plan

Based on results of the licensee's self assessment of maintenance, an assessment by INPO, and the NRC's Diagnostic Evaluation Team inspection, the licensee developed the Dresden Station Improvement Plan. The licensee formally presented to Region III the results of the Plan's status as of April 19, 1988. As described in the following sections, during this inspection the inspectors reviewed results of selected maintenance activities to verify implementation as stated in the plan.

3.2 Motor Operated Valve (MOV) Maintenance Program

A major area of concern in the numerous plant evaluations performed in 1987 by INPO and NRC was that routine inspections and maintenance were not completed for non-EQ safety-related (SR) and Balance of Plant (BOP) valves. The licensee selected a person as MOV Coordinator responsible for a comprehensive schedule to improve MOV reliability by inspection/overhaul of all SR and BOP MOV operators. The licensee committed to have all SR Non-EQ MOV operators completed by December 1989. Current schedule and completion rates indicated a completion date of June 1989 should be realistically attainable. BOP work will start after SR-EQ work is completed.

3.3 Preventive Maintenance Program

3.3.1 Safety-Related System

As part of a maintenance improvement initiative, development of an extensive and systematic PM program was in progress. Fifteen plant systems were identified and prioritized as having the greatest impact on plant safety and operability. The HPCI system was selected as the model system to have in place a comprehensive and systematic PM program, including predictive maintenance.

HPCI system PM tasks were developed by time series analysis of HPCI related WRs and LERs. Component/failure histories were evaluated and recommended PMs and frequencies were established. The inspectors

determined that problems identified in the 1987 HPCI related LERs, reviewed prior to this inspection, were included in the recommended PM tasks to prevent recurring failures with the Gland Seal Leak Off Pumps, air-operated valve failures, lube oil filters, and drain pot steam traps.

During the past 12 months, 144 corrective WRs were initiated to correct various belt problems. Unit 2 LER 87-018 described the failure of a HPCI room cooler fan belt. PM was included as part of the corrective action which consisted of periodic belt replacement of the HPCI and Low Pressure Coolant Injection (LPCI) room coolers and inspection of belts on other systems during operator rounds.

A complete list of mechanical, electrical, and instrumentation equipment needed for HPCI system operation had been prepared for the Unit 2 HPCI system and was being prepared for Unit 3 by use of current information on site and a 100% system walkdown. This list includes the equipment identifications number, a description of the item, vendor names and models, sizes and safety classification. The 487 identified items were incorporated into the Total Job management (TJM) program and will be beneficial for maintenance department failure analysis and performance trending.

The Nuclear Safety Department developed a Deviation Report (DVR) trend system that tracks/trends similar events over the past several years. The inspector obtained a copy of the DVR trend report and concluded that the report should help to identify recurring problems and provide input for the PM program. A backlog of DVRs greater than 45 days has been eliminated, that is, the proposed corrective action for DVRs was made prior to 45 days. Actual closeouts of DVRs written since October 1988 ranged from one to five months. The inspector verified that DVR status was tracked on Regulatory Assurance Daily activity lists.

3.3.2 Balance of Plant Systems

The licensee's PM program non-safety related equipment was limited in scope. For instance, as described in LER 87-011, condensate pump motors were not insulation resistance tested prior to the motor's failure. Since that failure, the licensee completed motor insulation resistance tests for condensate pump motors but did not test other similar motors to prevent future failures.

The inspector's review of Unit 2 LERs 87-016, 87-023, and 87-024, and Unit 3 LERs 87-008, 87-011, 87-013 indicated a high failure rate of feedwater (FW) system components.

Only after the FW oscillation event reported in Unit 3 LER 87-013, did the licensee form an engineering task force to review FW system problems. Recommendations from the task force included proposed modifications to both Unit 2 and 3 FW systems. Those modifications are planned for Unit 3 during the current outage and to Unit 2 during the upcoming outage. It is noted that FW system was second on the licensee's priority list for upgrade of that system's PM program.

3.4 Accomplishment of Maintenance

3.4.1 Maintenance Backlog

The inspectors reviewed the licensee's system for monitoring the backlog of corrective maintenance (CM) work requests (WR) and preventive maintenance (PM) WRs. The non-outage CMWR backlog had decreased from about 1350 in October 1987, to approximately 1100 on April 25, 1988. The number of estimated man hours to complete those WRs was approximately 3/,000 hours. Progress was made to reduce the backlog but the goal of 900 was not achieved.

The non outage PM WR backlog was a moderate 148 on April 25, 1988; 9000 man-hours were estimated for completion. For the first quarter of 1988, 36% of the maintenance department's time was spent doing PM tasks. When the time spent by Operations personnel on PMs (surveillances) was included, the time spent of PMs increased to 50% and was the figure reported to INPO for the first quarter 1988. It should be noted that the NRC is not interested in the time devoted to PM but to the completion of PM tasks which are critical to maintain system operability.

The inspectors reviewed a computer printout of 222 PMs. The inspectors considered 44 of the PM items to be CM work and 15 others were questionably classified as PM. Definitions for PM/CM classification of WRs had not been established; therefore, completion of the "right" tasks, as well as the accuracy of the licensee's PM/CM accounting system was questionable.

A review of all uncompleted CM priority A (emergency) and B1 (repair starts within one day) WRs indicated adequate technical reasons for not being completed. The inspectors also reviewed a sample of outage and non outage CM WRs for proper prioritization. A perceived strength in the maintenance program was that in many cases WRs had higher priority than needed. This lower threshold increased the potential for getting work done on time. A minor weakness in the maintenance program was identified by the inspectors during the review of priority B1 WRs. Considerable time was needed for the licensee to determine the status of the B1 work requests. The licensee indicated at the exit meeting that a periodic review of the status of priority B1 work requests would be made.

The inspectors did not identify any reasons that would preclude continued reduction of the backlogs, nor were there any backlogged items which would significantly impact system operability.

3.4.2 Review of Completed Work Requests

The inspectors reviewed approximately 40 WRs for completeness, accuracy, and technical content. Three specific areas evaluated were adequacy of work instructions, work history, and electrical/mechanical PM.

3.4.2.1 Work Instructions

The inspectors determined that there were insufficient details in the WRs for several work packages. For example, for other than routine maintenance tasks, the WRs lacked assembly and disassembly details specific to the task, a corrective maintenance procedure or reference to the vendor's manual that included such information. One-third of the WRs reviewed pertaining to MOV concerned loose valve actuator to valve yoke bolted connections. In some cases, bolts had sheared or vibrated free of the threaded connection. No torquing requirements were given in the instructions for repair and typical "work performed" comments included "tightened bolts using ordinary force on wrench." A valve supplier was contacted by the licensee to inquire about torquing requirements that should be used on these connections. The supplier's response recommended torque values were based on the diameter of bolts used, but no actual requirements were given. The licensee did not have a procedure for torquing mechanical connections; however, a corporate "Mechanical Closure Directive" was being developed that will give specific torquing/tensioning directions for all types of mechanical connections. This directive will be complete and available for use onsite by August 1988.

3.4.2.2 Work History

The inspectors noted that as-found conditions of equipment, work performed, and post-maintenance test results were not included in the work "work performed" narrative of CM WRs. The inspectors also noted that several WRs had been cancelled. A review of associated work packages and the computerized TJM maintenance history determined that reasons for these voided WRs were not always documented as prescribed in Dresden Administrative Procedure (DAP) 15-1, Revision 20. The TJM system manual did not require a reason for cancellation; although, many times cancelled WRs were discarded and the TJM printout was the only maintenance history available. In all cases, the cancelled WRs were tracked with another WR, a modification, or a surveillance that completed the work. The above noted administrative problems did not appear to have had an impact on the proper performance of specific maintenance

tasks; however, these types of weaknesses could limit future historical trending and root causes analysis. The licensee was aware of these weaknesses and changes to the WR process were being addressed in the ongoing maintenance improvement initiative.

3.4.2.3 Electrical and Mechanical PM

- The inspectors reviewed WRs and verified that PM inspections for two of four Unit 3 LPCI pump motors were scheduled for inspection during the second week of the inspection in accordance with Procedure DMP 040-32, "Environmental Qualification (EQ) Maintenance and Surveillance of GE Low Pressure Coolant Injection (LPCI) and Core Spray (CS) Pump Motors." The remaining two LPCI and CS pump motors were scheduled for inspection per Procedure DMP 040-32 during the current Unit 3 outage.
- The inspectors reviewed WRs and verified that PM inspections of three Unit 2 condensate booster pumps and motors had been performed. The licensee had an interim plan to do PMs on condensate booster pumps and motors any time a pump was out of service. Eventually these PMs will be part of a scheduled PM program.
- The inspector reviewed the licensee's PM surveillance requirements for 4.16 kV breakers. Breaker maintenance procedures were recently revised but more revisions may be necessary due to recommendations from a contractor's review and time series analysis. Recommended changes included more detailed steps in performing corrective maintenance tasks. Breaker maintenance was on-going for Unit 3 and Unit 2 breakers were scheduled to begin during the upcoming Unit 2 outage. Surveillances consisted of inspections and lubrications; no concerns were noted.

3.4.3 Summary of Maintenance Accomplishment

- Backlogs of PM/CM WRs were reduced although stated goals for CM had not been met. However, the infrastructure for accomplishing maintenance activities appeared such that the goals should be attainable; operability of system components was not adversely affected.
- Administrative weaknesses were noted in classification of work as PM or CM; determining status of B1 WRs; and reporting to INPO the percentage of PM work done.
- The low threshold for establishing priority A items was perceived as a strength.

- WRs lacked work instructions for disassembly-assembly and torquing; WRs had incomplete work history data that hampered analysis of root causes and trends.
- Specified electrical and mechanical PM work was satisfactorily accomplished.

3.5 Effectiveness of Maintenance

3.5.1 Review of Maintenance Rework

To evaluate effectiveness of maintenance the inspectors reviewed the two methods utilized for monitoring maintenance rework. One method involved rework for individual WRs caused by procedure deficiencies, engineering or design problems, material defects, failure of post-maintenance testing, training inadequacies, or personnel errors. The other method used a computerized program that provided a readout when a piece of equipment had two WRs performed within six months. The total number of rework items identified by both systems was 28 in 1986, 12 in 1987, and four in 1988. The licensee indicated that reporting of rework for individual WRs had not been successful in evaluating the effectiveness of maintenance because personnel were apprehensive and feared disciplinary actions. The licensee plans to change the rework reporting system to alleviate personnel fears.

3.5.2 Observation of Work Activities

The inspectors observed portions of approximately ten electrical, instrument, and mechanical maintenance activities to determine if those activities were performed in accordance with required administrative and technical requirements. Except for one minor observation the inspectors concluded that maintenance activities were effectively accomplished based on the following:

- Administrative approvals were obtained;
- Equipment was properly tagged;
- Replacement parts were acceptable and certified;
- Approved procedures were available and properly implemented;
- Work was accomplished by experienced and knowledgeable personnel;
- Radiological controls were established; and
- Appropriate post maintenance testing was included.

The inspectors noted that the procedure used for the inspection of Unit 3 D-3 Diesel Generator did not reference specific and applicable sections of the vendor technical manual; however, no apparent discrepancies were noted by the inspector. Reference to the specific sections of the vendor manual required to perform the work could prevent incomplete or incorrect maintenance. The licensee agreed to consider the inspector's comments.

A perceived strength was observed during the performance of MOV maintenance. The "team" concept improved efficiency, identification, and solution to problems, and appeared to be beneficial in ALARA considerations due to the familiarity of the workers with job requirements. Each team consisted of one foreman and six to eight electrical or mechanical personnel.

3.5.3. Plant Observations and System Walkdowns

To assess the material condition of the plant, the inspectors made general observations of the plant and conducted system walkdowns of the HPCI and FW systems. The inspectors evaluated equipment condition and verified that WRs had been written and tags hung on components needing repair. The inspectors did not identify any item for repair or maintenance that had not already been noted by station personnel. MOV stems were observed to be lubricated and various pump lubricants appeared clean with oil levels within acceptable sightglass range. Numerous BOP pump oil leaks were observed but had been previously identified on WRs. The inspector reviewed records of completed and missed lubrications including grease and oil changes for the period of October 1987 through April 1988. Less than two percent of the greasings were missed per month. When missed, the greasing was completed the following month. The percentage of missed oil changes was somewhat larger because some had to be deferred to an outage. The licensee has a person dedicated to the lubrication program and it appeared that the reduction in the number of overdue lubrications will continue.

During a walkdown on April 30, 1988, the inspectors observed work done on MOVs 3-1501-3 A & B in reference to WR 73614. The valve motors and associated bolts were laying unmarked on the floor about six feet from the valve; however, at the time no work was being performed. The inspectors pointed out to the foreman that the motor and bolts should somehow be marked or bagged to prevent component loss. On April 15, 1988, the inspectors again observed that the motor and bolts were still in the same condition as previously stated. Although this appeared to be an isolated case, the inspectors informed licensee management that similar maintenance activities involving disassembly of equipment should be better controlled.

During system walkdowns, the inspectors noted that the majority of components such as valves, gauges, and panels were labeled and identified, as a minimum, by a Master Part List (MPL) number. Also, a color coding and painting program had been implemented that differentiated Unit 2 from Unit 3 equipment. However, in the process of painting, many caution tags, MOV top bearing Zirk grease fittings, and local equipment indicating lights in U-2 Standby Liquid Control skid area were partially obstructed by paint overspray. This was

brought to the attention of the licensee who conducted walkdowns to identify other such items, replace tags, and clean indicating lights as necessary. The licensee indicated that painters would be made aware of these concerns and such events would be avoided in the future.

3.5.4 Training

Training and qualification records were reviewed for 11 maintenance personnel that participated in maintenance activities witnessed by the inspectors. Training files were readily available and documented all training received since the employees were hired by the licensee. The inspector determined from review of the 11 training records that personnel were qualified to perform the assigned maintenance activities. The licensee has committed to continue to give experienced maintenance personnel 80 hours of continued training per year.

MOV training addressed the setting and adjusting of limit and torque switches and the use of MOV maintenance procedures. Routine training consisted of classroom lectures and mock-up training, with separate classes for mechanical and electrical personnel. Combined electrical and mechanical instruction will be considered later.

3.5.5 Summary of Maintenance Effectiveness

- Maintenance activities observed during the inspection were generally accomplished in an effective manner using personnel who were knowledgeable and professional. The use of MOV maintenance "teams" was considered beneficial for performing efficient work, problem identification, and ALARA considerations.
- The material condition and housekeeping of the plant were good considering the ongoing outage of Unit 3. The painting program should reduce the risk of operators manipulating equipment on the wrong unit.

3.6 Licensee's Assessment of Maintenance (Quality Verification)

The inspectors reviewed audit reports and corrective action documents to evaluate the licensee's quality verification process. The documents were reviewed for root cause analysis, timely corrective action, technical assessments, and justification for close out of corrective action documents.

3.6.1 Review of Audits and Surveillances

The inspectors reviewed maintenance "product" audits conducted in 1987 and 1988. The audit reports pertained to activities performed by instrument, electrical and mechanical maintenance departments. The audits evaluated processes and programs for technical adequacy,

as well as verification of compliance to procedures. After work observation, the auditor reviewed the maintenance personnel's qualification records to ensure that the personnel met the training requirements applicable to the job performed. Problems or concerns identified in the audits appeared to be followed up in a timely manner with effective corrective action.

3.6.2 Standardized QC Checklists and Installation Procedures

The inspectors verified that standard QC checklists and installation procedures had been prepared for several installation jobs such as cable terminations, instrument installations, structural steel installation and concrete expansion anchors installation. The inspector reviewed modification packages MOD 12-2-87-33B, MOP 12-3-86-31 and MOD 12-3-86-41-01 and verified that the standard checklists and installation procedures were used.

3.6.3 Summary of Licensee's Assessment (Quality Verification) of Maintenance

- Audits evaluated maintenance processes for technical adequacy and assessed the technical competency of personnel who perform maintenance activities.
- Standardized QC checklists and procedures were used to enhance the quality of modification and maintenance activities.

3.7 Conclusions

Based on inspection activities described in this report, the inspectors concluded that:

- Maintenance was accomplished, effective, and self assessed; however, continued involvement by management is needed to improve and maintain the quality of newly developed maintenance programs especially in PM of BOP components.
- Management attention is needed to improve the WR process and the documentation of work done, and otherwise to eliminate weaknesses that could limit future historical trending and root cause analysis of component problems.
- Corrective maintenance procedures need to provide detailed step by step instructions especially during tasks requiring disassembly and reassembly of equipment.
- The team concept for performing MOV maintenance was perceived as a significant strength.

- The threshold for placing equipment problems on maintenance work requests was sufficient to maintain the material condition of the plant at an acceptable level.
- The painting program indicated significant management attention and involvement in plant housekeeping.
- QA Department audits successfully evaluated maintenance processes and activities for technical adequacy.
- No violations were identified.

4. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on April 29, 1988, and summarized the purpose and findings of the inspection. The inspectors discussed the likely content of the inspection report with regard to documents or processes reviewed by inspectors during the inspection. The licensee did not identify any such documents or processes as proprietary.