

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-315/88016(DRS); 50-316/88018(DRS)

Docket Nos. 50-315; 50-316

Licenses No. DPR-58; DPR-74

Licensee: American Electric Power Service Corporation  
Indiana & Michigan Power Company  
1 Riverside Plaza  
Columbus, OH 43216

Facility Name: D.C. Cook Nuclear Plant, Units 1 and 2

Inspection At: D.C. Cook Site, Bridgman, Michigan

Inspection Conducted: July 11-15, 18-22, 27, and August 8, 1988

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8/23/88  
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Inspection Summary

Inspection on July 11-15, 18-22, 27, and August 8, 1988 (Reports No. 50-315/88016(DRS); 50-316/88018(DRS))

Areas Inspected: Routine, announced inspection of maintenance activities using selected portions of Inspection Procedures 62700, 62702, 62704, 62705, and 62720.

Results: Control in some of the areas inspected appeared to be weak. Based on this inspection, the inspectors reached the following conclusions:

- Maintenance was accomplished, effective, and self assessed; however, continued aggressive and significant involvement by management is needed to reduce the backlog of job orders.

- Continued management involvement is needed to implement the recommendations of the licensee's self assessment including upgrade of the preventive maintenance (PM) program.
- Housekeeping and material condition of the plant was adequate and the threshold for placing equipment problems on maintenance job orders appeared sufficient to maintain the material condition.
- Coordination of contractor and site maintenance personnel was well planned and effective for the accomplishment of maintenance, and the program for improving motor operated valve performance appeared to be adequate.
- Quality verification was not always effective in producing performance oriented audits. At times, action to correct audit findings was poor, however, the persistence of the quality organization at getting matters corrected was perceived as a strength.
- Management's approach to resolution of technical issues from a safety standpoint was not adequate as shown in the violation described in Section 2.3.4.

## DETAILS

### 1. Persons Contacted

#### Indiana and Michigan Electric Company (I&MEC)

- \*\*W. Smith, Jr., Plant Manager
- \*\*K. Baker, Operations Superintendent
- \*T. Beilman, Instrumentation and Calibration Superintendent
- \*A. Blind, Assistant Plant Manager, Organization and Administration
- \*J. Droste, Maintenance Superintendent
- \*D. Gallagher, Maintenance Administrative Compliance Coordinator
- \*L. Gibson, Assistant Plant Manager, Technical
- T. Postlewait, Technical Superintendent, Engineering
- \*J. Rutkowski, Assistant Plant Manager, Production
- \*D. Wizner, Maintenance Production Controller

#### U.S. Nuclear Regulatory Commission (USNRC)

- \*B. Jorgengen, Senior Resident Inspector
- \*\*J. Heller, Resident Inspector

\*Indicates those attending the exit meeting at D.C. Cook Plant on July 27, 1988.

\*\*Indicates those attending the exit meeting at D.C. Cook Plant on August 8, 1988.

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

### 2. Evaluation and Assessment of Maintenance

The purpose of this inspection was to evaluate and assess the accomplishment and effectiveness of maintenance activities at D.C. Cook. The evaluation and assessment were accomplished by:

- Review of Preventive Maintenance Program
- Review of Motor Operated Valve Improvement Plan
- Evaluation of maintenance backlog
- Review of completed job orders
- Observation of maintenance activities
- Evaluation of maintenance rework
- Walkdown of plant systems



- 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 the licensee's self assessment reports

## 2.1 Preventive Maintenance Program (PM)

The equipment included in the PM program did not appear complete. For instance, balance of plant (BOP) motor operated valves (MOV) and motors were not included in the program. However, a program was developed for diagnostic testing of all safety-related (SR) MOVs and some BOP MOVs important to safety or with recurring problems. The program included PM diagnostic testing, parts and procedures. The PMs were based on vendor recommendations and operating history. Approximately 33% of the safety-related (SR) valves receive a general inspection and lubrication change-out during every 18 month refueling outage. The current MOV program appeared adequate and the final program was scheduled to be implemented in July 1989.

Administration of the PM program was not computerized and continued reviews of the program to expand or decrease PM items had not been established. This same weakness was identified during the licensee's self assessment of PM. The licensee plans to upgrade both the administrative and equipment aspects of the PM program, but will not be completed until late 1989. Review of equipment failures and interviews with licensee personnel indicated that there had been few failures due to the lack of PMs, especially with MOVs.

## 2.2 Accomplishment of Maintenance

### 2.2.1 Maintenance Backlog

The inspectors reviewed the licensee's system for monitoring the backlog of PM and corrective maintenance (CM) job orders (JO). On July 19, 1988, the total JO backlog was approximately 5100. There had been an increase of about 1200 JOs due to the Unit 2 outage that began in April 1988. The non-outage CM JO backlog was about 1300. There had been little change in this backlog due to the outage.

The total PM backlog was 363 with a moderate 132 non-outage PM backlog. Most of the non-outage backlog was less than 90 days old or written before the PM was required to be performed. Review of data submitted to INPO for the first quarter of 1988 indicates that 95% of the PMs were performed within the specified intervals.

The total number of JOs initiated during 1988, up to July 27, 1988, was 8676. A total of 7096 JOs were completed. The backlog was difficult to judge at the time of the inspection because there were so many outage related JOs. The licensee does not estimate the man-hours to do JOs, which hampered the determination of additional manpower. This weakness was identified in the licensee's self assessment performed in late 1987. The inspectors reviewed computer printouts of all uncompleted CM JOs. The review indicated adequate technical reasons for not being completed and the operability of equipment required by the Technical Specification was not jeopardized.

### 2.2.2 Completed Job Orders

Forty completed job orders (JO) were selected and reviewed for identification of equipment, description of problem, adequacy of work instructions, description of work performed, replacement parts used, required approvals, required post-maintenance testing, and Technical Specifications (TS) operability tests, if applicable. Work instructions usually referenced an existing PM or CM maintenance procedure. These procedures were detailed and adequately addressed equipment repairs needed. Post maintenance and TS operability tests were referenced and results documented on a Technical Specification and Testing (TST) form.

A weakness was identified in the documentation on JOs of "as-found" conditions of equipment needing repair. Although the lack of documentation does not appear to be a safety issue, the licensee will consider adding a section to the JO form that specifically addresses root cause evaluations.

### 2.2.3 Summary of Maintenance Accomplishment

- The backlog of maintenance indicated that CM and PM was being accomplished.
- Nothing in the backlog indicated a negative effect on system operability.
- Documentation of "as found" conditions was such that root causes of problems could not be analyzed.

No violations were identified.

## 2.3 Effectiveness of Maintenance

### 2.3.1. Rework

The licensee did not have a formal program to keep track of rework. The licensee's Safety Assessment Group tracks equipment failures by use of a Consolidated Trend Program (KTP) based on condition reports. However, only a limited number of equipment failures were identified by condition reports. For example, a review of a Nuclear Reliability Data System (NPRDS) printout indicated that containment isolation valve CCR-441 had a diaphragm failure three times in two months.

These failures were not identified in a Condition Report; therefore, the failures were not tracked through KTP. After investigating this event, the licensee determined that improper maintenance on the second failure appeared to be the root cause of the third failure identified during post-maintenance testing. By review of air actuator and valve diaphragm replacements the inspector determined that approximately 6% were replaced per year. Although no immediate safety concerns existed, management should be more sensitive to identifying repetitive failures through JO tracking/trending. This same tracking weakness was identified during the maintenance self-assessment.

### 2.3.2 Component Cooling Water (CCW) System

The inspectors reviewed the CCW system LERs, NPRDS reports, system diagrams, procedures, maintenance records, and performed a CCW system walkdown to determine if the system was being properly maintained. The inspectors verified that Technical Specification surveillance requirements of verifying CCW valve positions and pump discharge pressure were being performed by review of completed surveillance records. The inspectors reviewed the PM program for the CCW system and verified from review of PM records that PMs were being performed as specified. PMs on the CCW system included pumps, valves, electrical breakers, and MOVs. During the walkdown of the CCW system, using drawings, the inspector verified that as-built status of the plant matched the drawings. No items of concern were identified during the review of the CCW system.

### 2.3.3 Containment Purge and Containment Isolation Valves

Containment Purge and Containment Isolation Valves records were reviewed to ensure PMs were completed and the work history was evaluated to identify any possible adverse trends. No problems or concerns were noted in the review. Appropriate PMs, surveillances, and post-maintenance testing were performed after maintenance work.

A Request For Change (RFC) 12-2877 was also reviewed during this inspection. The RFC required an installation of a drive lock pin in all Containment Purge valves installed in the non-horizontal position. This change helped prevent a downward shift of the valve disc on its seat which could cause seat leakage. This problem was identified during leak testing of the purge valves and subsequent discussions with the vendor. All 10 CFR 50.59 reviews were complete and all valves were appropriately tested after the design change.

### 2.3.4 DC Ground Detection System

The inspectors reviewed the operation of the 250 Vdc ground detection system and associated operating procedures. Interviews with operations personnel indicated an attempt to find and correct a ground was performed at the time a ground was annunciated in the control room. Procedure 1-OHP 4021.012, "Location 250 VDC Grounds," Revision 2, provided guidance for locating a ground. Personnel were aware that one ground could mask another ground.

The inspectors noted that there was a negative ground on the Unit 1 CD battery system. The ground had existed since January 5, 1988. Several attempts were made by the licensee to isolate equipment and locate the ground, but were unsuccessful. The licensee stated that a plant outage would be required to locate the ground because some equipment could not be isolated during normal operations.

The inspectors inquired if the licensee had performed and documented a safety evaluation regarding continued operations with the ground. The licensee indicated an evaluation had not been performed. In a telephone conversation between the licensee and Region III on July 28, 1988, the licensee committed to perform a safety evaluation.

On August 8, 1988, the inspectors reviewed a safety evaluation that was prepared on August 5, 1988. The safety evaluation was incomplete in that it did not address whether the operability status of a system would be indicated to the operators if fuses were blown should the ungrounded polarity also become grounded. The licensee agreed to review the system for potential indication and equipment operability due to blown fuses.

The inspectors noted that FSAR Section 8.3.4 stated "The battery distribution switch board consists of several metal-clad structures and each with a 250 Vdc, 2-wire ungrounded main bus;" indicating the battery systems normally operated ungrounded. Although the licensee had attempted to locate the ground, corrective action was incomplete in that no technical evaluation was performed to ensure that operability of safety-related equipment was not effected by the ground. Failure to complete proper corrective action regarding long term operation of the plant with the ground is a violation of 10 CFR 50 Appendix B, Criterion XVI (315/88016-01).

During the review of the operations of the ground detection system, the inspectors noted that there was no continuous recording of the magnitude (voltage) of a ground, nor were personnel required to record the voltage when the ground annunciator alarmed. During the telephone conversation on July 28, 1988, the licensee committed to record the ground voltage once a shift whenever a ground alarm is noted in order to identify any new grounds that may be masked.

### 2.3.5 Plant Observations and Systems Walkdowns

The overall material condition of the plant appeared to be adequate based on the inspector's walkdown of several portions of the Component Cooling Water (CCW) and Containment Purge Systems. MOV stems appeared to be lubricated and various pump oil levels were noted as acceptable. JO tags were noted during the walkdowns and were identified on the open JO list with one exception. A JO tag (727902) was noted in the control room and during followup was identified as completed and closed in September 1987. The JO tag was removed by the licensee during the inspection and was an isolated finding.

The inspectors observed the conditions for which JOs were written for diesel generator (DG) fuel oil transfer pump leaks, DG related oil leaks, a battery leak, a fan bearing high temperature, and an



auxiliary feedwater steam turbine isolation valve (1 MCM-221) packing leak. The leaks and temperature anomaly were minor. The threshold for writing work requests appeared to be low, which is considered a strength.

The inspectors noted that the 1 MCM-221 valve, which was leaking a small amount of steam was not isolable and required a plant shutdown and cooldown to repair. Interviews with engineering personnel indicated the leakage was being closely monitored and there had been no change since April 1988.

### 2.3.6 Ongoing Work

#### 2.3.6.1 Valve Maintenance

During the performance of MOVATS testing of valve 2-ICM-251 according to JO 24366, the inspector noted a well-coordinated work environment with contractor, licensee, and MOVATS personnel. This coordination appeared to be effective in the accomplishment of the maintenance activity.

During observation of the replacement of valve 2-CMO-413 according to JO 28351, the inspector noted that the replacement valve appeared to be different than the original valve. Craft personnel indicated that the adjacent valve 2-CMO-411, would also be replaced. Further investigation of the replacement indicated that valve 2-CMO 413 was a Pratt butterfly valve replaced with a like-for-like valve. However, valve 2-CMO-411 was a Centerline butterfly valve, that would be replaced with a Pratt butterfly valve. Since like-for-like valves were not being used for the 2-CMO-411 replacement, a minor modification was issued. All engineering and design reviews, including a 10 CFR 50.59 review, were completed and approved according to Procedure PMP 5040 MOD.002, "Minor Modifications," Revision 0.

#### 2.3.6.2 Electrical Circuit Breaker Maintenance

The inspectors observed maintenance (cleaning and adjustment) of two Pressurizer Heater Circuit breakers (600/480 volt). The work was conducted in accordance with procedures. The equipment used was in calibration per the attached stickers. The replacement arc chute used on one of the breakers was traced for conformance to procurement requirements. The part was procured as safety-related and certificates of Compliance and Conformance were verified by AEP engineers.

#### 2.3.6.3 Calibration of Pressure Indicating Transmitter

The inspectors observed a portion of the calibration of a Pressurizer Indicating Transmitter by I&C personnel. The pressure gauges used for the calibration had current calibration stickers and personnel performed the calibration in accordance with the calibration procedure for the transmitter.



#### 2.3.6.4 Essential Service Water Pump Replacement

The inspectors observed the removal of the Unit 2 West Essential Service Water Pump. Performance of this pump and the causes for its replacement were discussed with the responsible performance engineers. The original pump was replaced because performance had degraded over the years. The replacement pump was removed after one month because it failed to meet the manufacturer's performance curves. The pump's developed head was about ten feet less than the manufacturer's data over its entire operating range. On July 22, 1988, a new pump was installed, but the test data also did not correlate with the manufacturer's data.

The ESW pump developed 9800 gpm at a total developed head of 142 feet, which is about 93% of the head as shown on the manufacturer's pump curve. Table 9.8.5 of the FSAR requires the ESW pump to develop 10,000 gpm flow at a total developed head of 145 feet. The low developed head is an unresolved item, pending further testing and evaluation by the licensee (316/88018-01).

#### 2.3.6.5 Training

Training and qualification records were reviewed for maintenance personnel that participated in maintenance activities witnessed by the inspectors. Training files were readily available. The inspectors determined from review of the training records that personnel were qualified to perform the assigned maintenance activities.

#### 2.3.7 Summary of Maintenance Effectiveness

- Containment purge and isolation valves received appropriate PM, surveillance, and post maintenance testing after maintenance work.
- Coordination of contractor and licensee maintenance personnel was well planned and effective.
- Engineering support was evident in the minor modification effort of valve replacements.
- Corrective action was not effective for a chronic dc ground condition.
- No formal method was used to keep track of maintenance rework.
- Craft personnel appeared knowledgeable and exhibited skills appropriate to the task.
- Housekeeping and material condition of the plant was adequate.
- One violation was identified.

## 2.4 Licensee's Assessment of Maintenance (Quality Verification)

The inspectors reviewed audit reports, corrective action documents, NPRDS equipment failure printouts, and a self-assessment report to evaluate the licensee's quality verification process. The documents were reviewed for root cause analysis, timely corrective action, technical assessments, and justifications for closeout of corrective action documents.

### 2.4.1 Review of Audits and Surveillances

The inspector reviewed maintenance audits conducted in 1986, 1987 and 1988. Audits performed in 1986 and early 1987 were very program oriented with little observation of work activities. In late 1987 and 1988 audits were more performance oriented and included some observation of work activities to verify that procedures were followed, and maintenance personnel were qualified to perform the maintenance observed, however, audits could still be more performance oriented if more maintenance activities were observed and evaluated for technical adequacy.

The inspectors noted that QA and QC had performed numerous surveillances of maintenance activities and had identified some problems.

The inspectors reviewed several surveillance and audit indexes. Tracking of audits and surveillance findings appeared to be good. The inspectors noted that QA does not accept just any corrective action. A few items were sent back to the groups responsible for corrective action three or four times. This was considered a strength for QA but a weakness for the respondents. Response to audit items were timely and usually adequate.

The inspector reviewed auditor qualifications and noted there was a good mixture of backgrounds including experience with mechanical, electrical, radiation protection, chemistry, ASME/NDE, and security.

### 2.4.2 Review of Licensee's Self-Assessment

The licensee performed a INPO self-assessment of maintenance in late 1987. The self-assessment report was published February 10, 1988. The report identified several findings and included recommendations to make improvement. As indicated throughout this report, weaknesses identified by the inspectors were also identified during the self-assessment.

The inspectors discussed with the maintenance superintendent the licensee's plans to implement the recommendations of the self-assessment report. The licensee delayed action on most of the recommendations until an INPO corporate evaluation, which included maintenance, was completed. The evaluation was recently completed and the licensee had the results in rough draft. During August 1988, the licensee will put together a Maintenance Policy that will include the self-assessment recommendations. Implementation of the maintenance policy will follow with complete implementation expected by late 1989.



### 2.4.3 Summary of Licensee's Assessment (Quality Verification) of Maintenance

- Audits of performance should be improved.
- Tracking of audit and surveillance findings was good.
- QA's threshold for accepting corrective action on findings was high and is considered a strength.
- The fact that a few groups had to respond three or four times to a QA finding is considered a weakness.

### 2.5 Conclusions

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

- Continued management involvement is needed to implement the recommendations of the licensee's self assessment including upgrade of the preventive maintenance (PM) program.
- Housekeeping and material condition of the plant was adequate and the threshold for placing equipment problems on maintenance job orders appeared sufficient to maintain the material condition.
- Coordination of contractor and site maintenance personnel was well planned and effective for the accomplishment of maintenance, and the program for improving motor operated valve performance appeared to be adequate.
- Quality verification was not always effective in producing performance oriented audits. At times, action to correct audit findings was poor, however, the quality organization persistence at getting matters corrected was perceived as a strength.
- Management's approach to resolution of technical issues from a safety standpoint was not adequate as shown in the violation described in Section 2.3.4.

### 4.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. An unresolved item disclosed during this inspection is included in Paragraph 2.3.6.4.

### 5.0 Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on July 27 and August 8, 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 identified the maintenance self-assessment report as proprietary.