U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-315/92015(DRS); 50-316/92015(DRS)

Docket Nos. 50-315; 50-316 Licenses No. DPR-58; DPR-74

Licensee: Indiana Michigan Power Company
1 Riverside Plaza
Columbus, OH 43216

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

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

Inspection Conducted: August 31 through October 9, 1992

Inspectors: Bruce L. Burgess for Ronald A. Langstaff — Date 11/16/92

Bruce L. Burgess for Greg M. Nejfelt — Date 11/16/92

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Approved By: Bruce L. Burgess — Date 11/16/92
Bruce L. Burgess, Chief
Operational Programs Section

Inspection Summary

Inspection on August 31 through October 9, 1992 (Reports No. 50-315/92015(DRS); No. 50-316/92015(DRS)
Areas Inspected: Routine, announced safety inspection of the engineering and technical support program including design changes (IP 37700).
Results: Five previously identified violations were closed. No violations or issues requiring further NRC review were identified as a result of this inspection.

Problems Reports involving engineering were effective in identifying, evaluating, and resolving plant deficiencies. The design change program was effective in controlling the modification process and satisfied regulatory requirements. Improvement in corporate design engineering involvement in post-modification testing was noted. System engineering appeared to be effective in their technical support and system oversight role. Safety assessment and quality verification activities were adequate in scope and effective in identifying deficiencies.

DETAILS

1. Persons Contacted

American Electric Power Service Company

*E. Fitzpatrick, Vice President - Nuclear Operations
E. Koenig, Nuclear Maintenance Support Section
*D. Malin, Manager, Nuclear Licensing
*P. Monk, Nuclear Engineering Department
T. Postlewait, Manager, Site Engineering Support
R. Russell, Project Engineer
P. Schoepf, Superintendent, Project Engineering
R. Simms, Site Quality Assurance
C. Swenson, Nuclear Engineering
L. Van Ginhoven, Superintendent, Site Design
M. Wilken, Nuclear Licensing Section

Indiana Michigan Power Company

A. Blind, Plant Manager
T. Anderson, Training
K. Baker, Assistant Plant Manager - Production
P. Carteaux, Training Superintendent
T. Hart, Electrical System Engineer
R. Hennen, Supervisor, System Engineering
F. Pisarksy, Supervisor, Maintenance Engineering
J. Rutkowski, Assistant Plant manager - Technical Support
J. Wiebe, Superintendent, Safety & Assessment

U.S. Nuclear Regulatory Commission, Region III

B. Burgess, Chief, Operational Programs Section
J. Isom, Senior Resident Inspector
G. Wright, Chief, Operations Branch

Everyone listed above participated in the exit meeting held on October 9, 1992. Individuals indicated by an asterisk participated via teleconference. Other individuals, including the licensee's engineering staff, were contacted during the inspection.

2. Action on Previously Identified Items

a. The following violations are considered closed based on this inspection. The violations were identified by the essential service water (ESW) safety system functional inspection (SSFI) conducted in June and July of 1990 and were transmitted to the licensee by a separate letter dated November 9, 1990.

(1) (Closed) Violation (315;316/90201-10): Inadequate design control for replacement of a valve in a component cooling water (CCW) heat exchanger.

(2) (Closed) Violation (315;316/90291-11): Lack of procedural adequacy and adherence for design verification, maintenance, and surveillance activities.

(3) (Closed) Violation (315;316/90201-12): Inadequate document control for plant drawings.

(4) (Closed) Violation (315;316/90201-13): Lack of an adequate test program for battery surveillance testing.

b. (Closed) Violation (315;316/91006-01): Design control and interface deficiencies. This violation was identified in a previous modification inspection conducted in March, 1991. Based on the results of this inspection, this violation is considered closed.

3. Inspection Overview

a. Background Information

This inspection assessed the quality and effectiveness of engineering involvement in plant activities. Engineering activities for the D.C. Cook plant were performed by several licensee organizations including Nuclear Engineering, Site Engineering, Plant Engineering, and Maintenance Engineering. Nuclear Engineering Department and Site Engineering are under the corporate organization structure. Nuclear Engineering, located at corporate headquarters in Columbus, Ohio, provided design expertise for technical issues and design changes. Site Engineering, located at the plant, provided limited design expertise (Site Design) and support for performing modifications (Project Engineering). Plant Engineering provided system engineering, test engineering, and other plant engineering support. Maintenance Engineering provided technical support for maintenance activities. The licensee infrequently used consultants or contractors for engineering work.

b. Methodology

Problem reports were reviewed to evaluate the effectiveness of engineering involvement in corrective action. Modifications were reviewed to assess the technical quality of individual modifications and the modification process in general. System engineering involvement in plant activities was assessed because of their overview and technical support role. Safety assessment and quality verification activities pertinent to engineering were also reviewed.

c. Results

No violations or issues requiring further NRC review were identified as a result of this inspection. Problem Reports involving engineering were effective in identifying, evaluating, and resolving deficiencies. The appropriate technical expertise was involved in the resolution of problems. As a result, problems were generally evaluated in a thorough manner and appropriate corrective action was taken. The design change program was effective in controlling the design change process and satisfied regulatory requirements. Improvements in design engineering involvement in post-modification testing was noted. The interface between engineering organizations, such as system, maintenance, and corporate design engineering was evident and considered effective. System engineering appeared to be effective in their technical support and system oversight role. Safety assessment and quality verification activities were adequate in scope and effective in identifying deficiencies.

4. Problems Reports

Based on a review of problem reports (PRs), the licensee's corrective action program was considered effective in identifying, evaluating, and resolving deficiencies. Problem reports where engineering involvement was evident were selected for review.

The licensee's corrective action program was described in Procedure PMI-7030, "Condition Reports and Plant Reporting," Revision 18. After initial operability reviews, PRs were assigned to the appropriate departments, such as Maintenance or Plant Engineering, for evaluation. Although the preparers of PR evaluations often were not engineers, the proper technical expertise, such as maintenance or system engineering, were involved in the evaluations. Cooperation

and effective communication between disciplines involved in problem resolution was evident. In general, PR evaluations thoroughly addressed the problem and identified appropriate corrective actions. In some cases, the corrective action went beyond the identified problem to prevent recurrence of similar problems. There were sufficient reviews and approvals with management involvement to ensure effective resolution. The following examples were representative of the PRs reviewed and the results obtained.

a. Problem Report 92-038: This PR documented the inability to shut down the 1AB emergency diesel generator (EDG) by normal means during surveillance testing in January 1992. This event was due to the failure of control air system solenoid valve SV-5. SV-5's failure allowed pilot operated valve POV-4 to admit air to the system. The failures root cause was age related degradation of the solenoid internals. As a corrective action, SV-5 was rebuilt. The licensee's investigation revealed that the seven solenoid valves the system had not been placed in a preventive maintenance program. As part of the Emergency Diesel Generator Air System Action Plan, these valves were placed in a preventive maintenance program, along with other EDG pneumatic components. In addition, a minor modification was proposed to replace the obsolete solenoid valves.

b. Problem Report 92-117 (LER 92-02, Unit 1): This PR and subsequent Licensee Event Report (LER) documented that EDG 1AB was declared inoperable following an overspeed trip in February 1992. The cause of the event was the combination of several unrelated conditions. The supply damper had been de-energized in the open position (due to the problems with the damper). The open damper allowed cold (outside) air to enter the EDG room, which blew directly on the governor warming line. The low room temperature alarm did not sense this localized cold air, and the governor warming line was not insulated. The root cause of the event was the unawareness that the governor warming line was not providing adequate flow to the governor oil heat exchanger. Adequate compensatory measures were taken until the warming line was insulated. The event and circumstances surrounding the event (e.g., damper problem, locations of the EDG room temperature sensors) were thoroughly investigated and evaluated by the licensee. System engineering was effectively involved in the investigation, supported by corporate design engineering.

c. Problem Report 92-203: This PR documented residual heat removal (RHR) socket weld failures caused by flow induced vibrations in February, 1992. As part of the evaluation, previous RHR system leaks (such as those identified in the PR-92-193) were reviewed. Due to recurrent system leaks, a task force was created to investigate design change history, corrective maintenance history, industry experiences, and RHR system chemistry control practices. About 80 Unit 2 RHR system branch pipe socket welds were thoroughly inspected using liquid penetrant tests. Although no surface flaws were noted, a similar inspection was planned for the Unit 1 RHR system. The licensee was also investigating the through-weld crack corrosion mechanism associated with the weld failures. This PR was an example of effective coordination between several engineering organizations (e.g., system engineering and design engineering), and where the scope of the evaluation went beyond the specific identified problem (i.e., the single weld failure).

d. Problem Report 92-297 (LER 92-004, Unit 2): This PR and subsequent LER documented EDG inoperability and slow start attempts. This problem occurred following installation of a minor modification. Minor modification 12-MM-253 replaced the EDG pilot operated valves during the fourth quarter of 1991. Previous PRs had documented similar problems. The apparent adverse trend was reviewed in March 1992, documented in this PR, and determined to be reportable. The LER documented that EDG 2AB was considered inoperable due to exceeding the 10 second technical specification (TS) limit for EDG start time. The initial root cause evaluation inappropriately identified vendor information as a contributing cause. Subsequent reviews identified an error in verifying the suitability of the new pilot operated valves for the intended application, and not aggressively challenging vendor information. The review and approval process was effective in identifying the weaknesses in the initial root cause evaluation, and the problem report evaluation was revised.

e. Problem Report 92-441 (LER 91-011, Unit 1): This PR and subsequent LER documented that EDG 1AB was not placed on increased surveillance frequency when required by TS. This event was discovered in April 1992, while the diesel generation system engineer was reviewing the previous 100 start demands to develop a data base for the EDG Reliability Program initiative. The review identified a 1990 condition report documenting a start failure that had not been properly

logged. This valid start failure, with an incomplete start in 1991, required the surveillance frequency to be increased. However, since the operations log had not documented the 1990 incomplete start, this requirement was missed. This was one of several examples in which the licensee identified a problem as a result of an initiative or self-assessment type of activity.

f. Problem Report 92-899: This PR documented the lifting of CCW safety relief valve 2-SV-51 at 275 psig below the 600 psig setpoint in June, 1992. Although the valve was outside of the in-service test (IST) program boundary, the licensee took actions to add this safety relief valve and another 141 safety-related relief valves to a preventive maintenance program. These actions were taken even though the valves were not due to be incorporated into the licensee's IST program for another four years. This PR is an example of where the corrective action went beyond the scope of the original problem.

5. Design Changes

Based on the review of several modifications, the design change program and its implementation was considered effective. The licensee's program for design changes was outlined in procedure PMI-5040, "Design Change Control Program," Revision 14. The licensee used four types of modifications for design changes. Request for Changes (RFCs) were used for major safety-related modifications and were controlled under procedure PMP 5040 MOD.004, "Request for Change," Revision 5. Minor Modifications (MMs) were used for minor safety-related modifications and were controlled under procedure PMP 5040 MOD.002, "Minor Modification Process," Revision 7. Plant Modifications (PMs) were used for nonsafety-related modifications with no safety interface and were controlled under PMP 5040 MOD.003, "Plant Modifications," Revision 5. Temporary Modifications (TMs) were controlled under procedure PMP 5040 MOD.001, "Temporary Modifications," Revision 4.

In general, permanent modification activities were coordinated by Project Engineering located on site. The inspectors considered the project engineering role beneficial as it relieved other engineering organizations, such as system engineering, from the administrative burden of processing modifications.

Conceptual designs for the modifications were generally sound and conservative. The 10 CFR Part 50.59 safety evaluations for modifications were adequate. Because of effective communication between plant and corporate design engineering, major installation and operation problems were avoided. Quality assurance (QA) involvement was evident in the installation activities. In general, post-modification testing verified the modification design and system operability. Design engineering involvement in post-modification testing was evident. Although expected, such involvement was recognized as an improvement from that identified in previous inspections. Several modifications were the result of the licensee being proactive in replacing components before they failed or because replacement parts had become obsolete.

The following modifications and aspects of the modification process were reviewed.

a. Modification RFC-DC-12-3043: This design change modified the minimum flow lines from the motor driven feed pumps to return to a common 3-inch test line instead of using a 1-inch return line. The modification had been installed on Unit 2 during the 1992 refueling outage. Unit 1 installation was in progress at the time of this inspection. The design change was made in response to a 1989 problem report to prevent dead heading one of the pumps when both pumps were in operation under low flow conditions. The inspectors considered the overall design to be sound. The 10 CFR Part 50.59 safety evaluation was adequate. Post-modification testing specified by design engineering demonstrated the effectiveness of the design. The test results were reviewed and approved by design engineering before the modification was released to operations. Although the test results were informally documented by copies of electronic mail, the documentation was considered adequate. The lack of appropriate documentation for this modification appeared to be an isolated case.

b. Modification RFC-DC-12-3070: This modification eliminated bleed down of the pressurizer power operated relief valve (PORV) backup air bottles by providing a positive shutoff when normal air header pressure was available. The modification had been installed on Unit 2 during the 1992 refueling outage. Unit 1 installation was in progress at the time of this inspection. This modification, identified by a control room task force, minimized bottle replacement and

nuisance alarms. System engineering was consulted during the design process to ensure compatibility. Appropriate quality control involvement was evident. Post-modification testing was considered appropriate and effective.

c. Modifications 12-MM-253 AND 12-MM-268: Modification 12-MM-253 replaced 4-way pilot operated valves POV-1 and POV-2 on the EDG starting air valves, and the 3-way pilot operated valve POV-3 on the EDG slow start control circuit, due to lack of spare parts. Because the original valves were not longer available, replacement valves were procured commercial grade and dedicated for safety-related application. The modification was installed during the fourth quarter of 1991, with dedication (including bench testing) and functional/operability testing apparently performed successfully. Problems with EDG performance (e.g., slow or failed starts) were first noted during routine surveillance and operability testing in December 1991, and continued into January 1992. On December 19, POV-2 on the EDG 2AB was replaced with a new spare, because component failure was considered to be the cause of the slow operation on the EDG 2AB. After another slow start of the EDG 2AB on January 13, POV-2 was bench tested. The required pilot pressure to obtain the desired response time, actuating against a 100 psig supply, was found to be approximately 55 psig, rather than the actual 40 psig pilot pressure provided by the system. Published vendor information stated that the required pilot pressure was 35 psig; however, it was determined this information was only valid in applications in which the valve was operated continuously. The EDG application normally only cycles the POVs 1-2 times per month. The root cause of the event was that the replacement valves dedication plan (No. HP-0062) failed to consider response time as a critical characteristic, and did not adequately challenge vendor information. The valves should have been tested under actual starting and operating conditions. As a result of the problems with EDG 2AB, the licensee re-installed the original POV-1 and POV-2 on EDG 2AB. A failed start of EDG 1DC on January 26, 1992, convinced the licensee to re-install the original POVs on the remaining three EDGs. Re-installation of the POVs was performed under modification 12-MM-268, and included verifying the condition of the original valves.

d. Modification 2-MM-321: This modification replaced the stainless steel seal rings on RHR discharge heat exchanger flow control valves 2-IRV-310, 2-IRV-311, and 2-IRV-320 with seal rings of a teflon base material. The seal rings were replaced during the 1992 Unit 2 refueling outage to stop leakage past the control valves as an interim measure until a permanent repair could be determined. The evaluation by the vendor only supported the satisfactory use of the seal ring for one fuel cycle. The inspectors considered this modification acceptable as a interim repair measure.

e. Modification 12-MM-325: This modification, completed in May 1992, replaced the eight safety valves in the EDG starting air system, due to the valves failing in-service inspection testing. Because the valves were obsolete, the replacement valves were procured commercial grade and dedicated for safety-related application. The inspectors noted that the initial dedication plan (No. PV0104) contained minor errors such as an incorrect material hardness acceptance criteria. The licensee identified these errors during implementation of the dedication plan (i.e., receipt inspection) rather than in the design verification. The dedication plan was corrected, and the modification was installed and tested successfully.

f. Blanket Approved Valve Modification Process: In late 1988, the licensee developed a process by which safety-related and nonsafety-related valves and valve components could be replaced (with a component different than the original) under blanket approved design changes, 12-MM-22 and 12-PM-740. The process was developed primarily for replacements due to corrective maintenance or changes in valve suppliers. The advantages of this process included timely valve change-outs by eliminating much of the paperwork associated with a design change. Further, within the limitations of the blanket approval, certain reviews were not necessary, and no procedure revisions or operator training were required. The program had not been formalized (or addressed in the procedures controlling plant design changes), but rather, consisted of the blanket design change proposal and safety classification, with blanket modification

approvals and review checklists, and several guidance and clarification documents. For each replacement, certain documentation was required to be completed and reviewed, such as, a suitability worksheet (which included seismic considerations), a safety evaluation, and a job order. According to the licensee, this process was generally working, with exceptions related to documentation.

Based on the inspectors' review of available documentation and discussions with the cognizant licensee staff, the blanket approved design change process appeared to satisfy applicable regulatory requirements. However, formal licensee control of the process was lacking in that no program existed to clearly delineate limitations, requirements, responsibilities and authorities to ensure that expectations were consistently met, and quality of the documentation was at an acceptable level. The licensee planned to revise the process in the near future. According to the licensee, changes would include additional limitations and restrictions, such as replacement of safety relief valves or operator-type valves (e.g., air or motor operated) would not be allowed under the program. The licensee was also considering additional program controls.

g. Commercial Grade Dedication: The inspectors conducted a limited review of the licensee's program for commercial grade dedication and reviewed the dedication plans for two minor modifications, 12-MM-253 and 12-MM-325. The program was controlled by general procedure (GP) 3.5, "Dedication of Commercial Grade Items for use in Nuclear Safety-Related Applications in the Donald C. Cook Nuclear Plant," Revision 2, and supplemented by nuclear engineering procedure (NEP) 4.1, "Dedication of Commercial Grade Products and Services for Nuclear Safety-Related Applications," Revision 5. The results of the review indicated that the program met applicable requirements and industry standards. The inspectors noted minor errors in both dedication plans reviewed which had not been identified by the licensee's normal review and approval of the design documentation. These errors appeared to be due to a lack of attention to detail rather than a programmatic weakness.

h. Temporary Modifications: The inspectors considered the two temporary modifications reviewed to be adequately controlled with the appropriate level of engineering involvement. Details were as follows:

(1) Temporary Modification 2-92-003: This modification installed a clamp (i.e., strongback) upstream of charging system valve 2-CS-354 in February 1992 to stop a minor leak from a weld until permanent repairs could be made during the 1992 Unit 2 outage. The additional seismic loading created by the strongback on the Class 1 piping had been adequately evaluated by the licensee.

(2) Temporary Modification 2-92-017 and Leak Sealing of Pressurizer Spray Valve: This modification and associated leak sealing was performed in July 1992 to stop leakage in the gasket area of pressurizer spray valve 2-NRV-164. Longer studs on the body to bonnet flange were substituted to allow addition of adapters used to inject liquid sealant into the gasket seating area of the flange. Because the sealant was injected into a non-pressure boundary area, no NRC approval was required. Appropriate engineering involvement was noted in that the sealant had been checked for material compatibility, the additional weight was evaluated for seismic loading, and a evaluation had been performed to show that the loading on the studs was within design margin.

6. System Engineering

System engineering appeared to be effective in their technical support and system oversight role. The inspectors based this conclusion on review of PR evaluations, plant design changes, and system related initiatives in addition to interviews held with licensee representatives.

System engineering at the D.C. Cook plant functioned primarily in an oversight role. As such, the system engineers were not directly involved in the modification process, testing, and routine maintenance. In their oversight role, the system engineers maintained cognizance of their assigned systems and significant system activities by reviewing surveillance test results, and by performing walkdowns on their systems. The system engineers routinely reviewed industry and NRC information for applicability and were often involved in evaluating PRs. System engineers were also responsible for summarizing activities affecting their assigned systems in the System Engineering Monthly Reports. In addition to providing an excellent source of information to licensee management and others, the reports promoted system ownership.

System engineers were recognized as system experts by both management and staff because of the quality of technical support provided to other licensee organizations. Management support was evident in that sufficient flexibility was provided to the engineers for adjusting priorities due to emergent work or plant outage activities. Because the system engineering program was relatively new, licensee management considered the program still evolving from a system troubleshooting and repair mode to one which will be mainly predictive. The licensee planned to increase the staff to reduce the current workload on individual system engineers, and to allow more efficient management and oversight of systems.

In their overview function, system engineering was effective in identifying deficiencies during routine system walkdowns, review of industry events, and review of equipment histories. For example, system engineering identified that two check valves in a potential post-LOCA leak path (through the volume control tank) were not included in the in-service testing program from a review of an LER from another utility. In another example, system engineering identified discrepancies which resulted in issuing an LER documenting missed EDG Technical Specification surveillances from review of EDG start histories.

System engineering actively participated in system-related initiatives. For example, the diesel generation system engineer was the cognizant individual for the EDG Air System Action Plan. In this role, system engineering was working with plant maintenance and corporate design engineering to improve the quality and reliability of the air system. Short term goals, developed as part of the action plan, included refurbishment of the control air system and incorporating additional tasks into the preventive maintenance program. Long term plans included a design change to simplify the diesel starting air circuitry which would improve diesel reliability and reduce start times. In another example, the emergency core cooling system engineer was actively involved in the RHR socket weld task force to resolve problems associated with leaks from system welds. As part of the task force recommendations, a non-destructive testing (NDT) schedule for these and similar welds was planned, along with installation of additional structural support to the branch pipes.

7. Safety Assessment and Quality Verification

Based on the inspectors' review of selected licensee self-assessment activities, the licensee appeared to be effective in identifying and resolving engineering related problems. The following summarizes the results of this review.

a. Safety Assessments

The licensee conducted SSFIs to provide independent assessment of engineering activities and plant systems. SSFIs were scheduled annually using independent consultants and were modeled after the SSFIs conducted by the NRC using similar techniques. The licensee conducted a containment spray system SSFI in 1992. The SSFI was a three-week on-site effort by a team of seven contractors. The SSFI confirmed the effectiveness of the licensee's system engineering program. The licensee also conducted an electrical distribution system functional inspection (EDSFI) Readiness Review in 1991. The readiness review was an expanded SSFI performed in preparation for the NRC EDSFI. The use of independent consultants probably contributed to the effectiveness of the review as evidenced by two issues identified which resulted in LERs. For example, LER 91-005 for Unit 1 reported that the EDG 1CD was declared inoperable due to a circuit separation problem as a result of a November 1990 modification. Another example was LER 91-005 for Unit 1 which reported that EDG ventilation and exhaust ductwork, components, and structures did not have the necessary documentation to demonstrate the capability to withstand a postulated tornado.

b. Quality Verification

The quality verification activities performed by the licensee's QA organizations appeared to be effective in identifying deficiencies. This conclusion was based on the inspectors limited review of a number of QA audits and surveillances which concerned engineering and the modification process. The QA audits and surveillance were appropriate in scope in that all phases of the design change process, from procurement to installation and testing, were assessed. Based on the QA findings identified, the inspectors also concluded that the audits and surveillances were of sufficient depth and were performance-based. The corrective actions taken to resolve QA findings were considered appropriate. In addition to the modification process, the licensee also conducted audits in specialized areas such as station blackout and service water.

8. Exit Meeting

The inspectors met with licensee representatives (denoted in Paragraph 1) on October 9, 1992. The inspectors summarized the purpose, scope, and findings of the inspection, and the likely informational content of the inspection report. The licensee acknowledged this information and did not identify any information as proprietary.