

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-315/92016(DRP); 50-316/92016(DRP)

Docket Nos. 50-315; 50-316

License Nos. DPR-58; DPR-74

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

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

Inspection At: Donald C. Cook Site, Bridgman, MI

Inspection Conducted: August 5, 1992 through September 15, 1992

Inspectors: J. A. Isom

D. J. Hartland

Approved By:  B. L. Jorgensen, Chief
Reactor Projects Section 2A

9-21-92
Date

Inspection Summary:

Inspection from August 5, 1992 through September 15, 1992 (Report Nos. 50-315/92016(DRP); 50-316/92016(DRP)).

Areas Inspected: Routine unannounced inspection by the resident and region-based inspectors of: plant operations; engineering and technical support; actions on previously identified items; reportable events; outages; and Temporary Instructions.

Results: No violations or deviations were identified.

The inspector noted strengths in the operator response to the loss of condensate event.

The inspector also noted a weaknesses in the corporate engineering department's timely resolution to water intrusion into the vital switchgear room through the modified ventilation system. The inspector viewed this weakness as an isolated event based on only one example of such weakness.

One new inspector followup item regarding a potential for future expansion joint failures in safety-related systems was identified. The open item is discussed in Paragraphs 3a.

DETAILS

1. Persons Contacted

- * E. E. Fitzpatrick, Vice President, Nuclear Operations
- * A. A. Blind, Plant Manager
- K. R. Baker, Assistant Plant Manager-Production
- L. S. Gibson, Assistant Plant Manager-Projects
- * J. E. Rutkowski, Assistant Plant Manager-Technical Support
- B. A. Svensson, Executive Staff Assistant
- T. P. Beilman, Maintenance Superintendent
- P. F. Carteaux, Training Superintendent
- D. C. Loope, Radiation Protection Supervisor
- L. J. Matthias, Administrative Superintendent
- T. K. Postlewait, Design Changes Superintendent
- J. R. Sampson, Operations Superintendent
- * P. G. Schoepf, Project Engineering Superintendent
- * G. A. Tollas, Acting Safety & Assessment Superintendent
- * L. H. Vanginhoven, Site Design Superintendent
- * G. A. Weber, Plant Engineering Superintendent
- * J. T. Wojcik, Chemistry Superintendent
- M. L. Horvath, Quality Assurance Supervisor

The inspector also contacted a number of other licensee and contract employees and informally interviewed operations, maintenance, and technical personnel.

*Denotes some of the personnel attending the Management Interview on September 17, 1992.

2. Plant Operations (71707, 71710, 42700)

The inspector observed routine facility operating activities as conducted in the plant and from the main control rooms. The inspector monitored the performance of licensed Reactor Operators and Senior Reactor Operators, of Shift Technical Advisors, and of Auxiliary Equipment Operators including procedure use and adherence, records and logs, communications, and the degree of professionalism of control room activities.

The inspector reviewed the licensee's evaluation of corrective action and response to off-normal conditions. This included compliance with any reporting requirements.

Major operational events during this inspection period are summarized below:

a. Unit 1 Summary of Operations:

The licensee had Unit 1 in Mode 6 with the core off-loaded throughout this inspection period and continued with the refueling outage that began on June 22, 1992. The Westinghouse contractors completed the plugging and sleeving of the steam generators on September 9, 1992. The results of this effort is provided in Paragraph 6a.

b. Unit 2 Summary of Operations:

At the beginning of the inspection period, the licensee had placed Unit 2 in Mode 5 and was in the process of disassembling the "C" low pressure turbine for inspection to determine the cause of turbine vibration problems.

On August 26, 1992, with the unit at about 8 percent power for turbine vibration analysis, the operators experienced a balance of plant transient from a partial loss of condensate. The transient was initiated when the "N" condensate booster pump (CBP) suction strainer end cap ejected during a CBP pump shift. This resulted in the loss of approximately 20,000 gallons of water into the condenser pit sump. No damage to equipment occurred.

The operators responded well to the loss of condensate event. The reactor operators responded quickly to the transient and rapidly reduced power to minimize the possibility of a reactor trip which may be caused by a manual turbine trip; they started the auxiliary feed pumps to maintain level in the steam generators, and they tripped feedwater and condensate pumps in order to minimize the flooding in the turbine building. The licensee installed a strongback on each of the CBP suction strainer caps as an interim measure to prevent future such events and at the end of the inspection period, was welding all the suction strainer caps to the piping for both Units.

The licensee paralleled the unit to the grid on September 2, 1992. On September 8, 1992, the operators commenced a plant shutdown from 87 percent power after vibration levels on the No. 6 generator bearing increased from approximately 6 to 11 mils. At the end of the inspection period, the licensee had placed Unit 2 in Mode 3 and the generator rotor was removed for shipment to a vendor facility for analysis and resolution of the vibration problem.

No violations, deviations, unresolved or inspector followup items were identified.

3. Engineering and Technical Support (37828)

The inspector monitored engineering and technical support activities at the site and, on occasion, as provided to the site from the corporate office. The purpose of this monitoring was to assess the adequacy of these functions in contributing properly to other functions such as operations, maintenance, testing, training, fire protection and configuration management.

a. Potential Age Degradation of Safety-Related Expansion Joints

The inspector identified a concern related to potential future failures of expansion joints installed in safety-related systems. During a review of two previous failures in 1990 and 1992, the inspector concluded that the age of the expansion joints was a factor in the failures.

The first event occurred on July 29, 1990, when expansion joint XJ-54N on the Unit 1 essential service water (ESW) system ruptured and the opposite train was inadvertently isolated due to a labeling error. In response to this failure and other degraded expansion joint conditions that had been identified at that time, the SW system engineer performed an evaluation which was concluded in May 1991. As part of the evaluation documented in Problem Report PR 90-0946, all expansion joints in the plant were inspected. The system engineer determined that the root cause of the problems was incorrect installation. In addition, misaligned piping, incorrect material, and improper material were identified as contributing to accelerated wear and failure. Corrective maintenance measures were initiated at that time. However, the system engineer determined that a formal preventive maintenance program was not necessary. This decision was based on the conclusion that, in addition to the corrective maintenance plan that was initiated, routine operations department and system engineer walkdowns would detect any degradation of the joints. No evaluation was documented in the report regarding the life expectancy of the joints as compared to the service life of the installed joints.

Subsequently, the licensee declared an Unusual Event (UE) on July 18, 1992, when ESW was isolated to both Unit 1 EDGs in response to flooding in the essential/nonessential (ESW/NESW) pipe tunnel. The UE was terminated after the source of the water was determined to be ruptured expansion joint 1-XJ-73 on a NESW header. The licensee determined the root cause to be age related degradation. The expansion joint was purchased in 1971 and apparently was installed during construction. Documented licensee corrective to this event, per PR 92-1147, did not include an evaluation of age degradation of expansion joints that are currently installed in the plant or a discussion on the need to

include expansion joint replacement in a preventive maintenance (PM) program. However, a PM program request form was subsequently approved on August 5, 1992.

The inspector reviewed the vendor manual and noted that the life expectancy of the joints was not addressed in the manual; however, a vendor brochure provided an estimated life expectancy of approximately 5 years, assuming ideal conditions (ie., no misalignment or improper installation). Licensee evaluation of the age degradation of expansion joints currently installed in safety-related systems, including the age, location, and life expectancy of the expansion joints, is considered an Inspector Followup Item (50-315/92016-01; 50-316/92016-01).

b. Switchgear Room Water Intrusion

In Inspection Report 50-315/92014 (DRP); 50-316/92014 (DRP), the inspector reviewed a maintenance work activity related to repeated melting of a control fuse for the "S" spent fuel pit pump breaker. The maintenance department had identified rainwater in the ventilation ducts supplied by the "Unit 2 CRID inverter and CRD equipment rooms" supply fan, 2-HV-SGRS-1A, to be the root cause of melting of the "S" spent fuel pump breaker control fuse. During periods of heavy rainfall, rainwater was entrained in the air flowing through the ventilation system and would drip on top of the electrical cabinet which housed the breaker for the "S" spent fuel pit pump breaker. This resulted in water intrusion into the "S" spent fuel pit pump breaker cubicle and caused an electrical short which melted the control power fuse. During follow-up interviews with maintenance and engineering personnel and review of supporting documentation, the inspector concluded that the licensee was aware of the potential water intrusion for some time and had failed to implement effective corrective action on a timely basis.

The licensee had made design modification No. RFC 2868 in 1989 to provide increased air flow to both Unit 1 and 2 vital switchgear rooms. Included in this design change was the replacement of existing air intake hoods to a system with louvered penthouses. In July 1990, the licensee installed fine mesh screens on the penthouse faces to capture increased dirt and debris that was being drawn into the switchgear room. The intrusion of dirt and debris into the room was identified as a concern in a December 8, 1989 maintenance memorandum to AEP engineering. Although this memorandum also discussed the concern relating to possible water intrusion through the new intakes during severe weather, the AEP engineers dismissed this concern in their February 9, 1990 memorandum stating that the new penthouse design intake structure "should meet the intended design function in all weather conditions."



The inspector also found that a water intrusion problem was occurring in the Unit 1 switchgear room. To address this problem, the system engineer had initiated job order #A52263 on April 19, 1991, to document rain water leaking from the 1-HV-SGRS-7 supply fan ductwork. The inspector was informed by the system engineer that, to date, there has been no water dripping on top of the electrical cabinets in the Unit 1 switchgear room. Fan 1-HV-SGRS-7 supplies air to the 600V transformer and MCC mezzanine rooms in the Unit 1 vital switchgear room. This supply fan intake structure was also modified by RFC 2868 and as a result had the same type of penthouse intake system as supply fan 2-HV-SGRS-1A.

Because of the problems discovered in the "S" SFP pit breaker cubicle on July 14, 1992, the licensee issued minor modification 374 to add rain-blocking plenums on the penthouse intakes. In the meantime, 2-HV-SGRS-1A fan was turned off and herculite was wrapped around the 1-HV-SGRS-7 fan ductwork.

One inspector followup item was identified in this area. No violations, deviations, or unresolved items were identified.

4. Actions on Previously Identified Items (92701, 92702)

- a. (Closed) Open Item 50-315/91027-03; 50-316/91027-03: Analysis for Considering Radio Frequency Interference as a Failure Mode for the Reactor Protection System H-line Replacement.

During review of the safety analysis for the proposed reactor protection H-line replacement, the inspector could not verify that the licensee's evaluation eliminated the possibility of a radio frequency interference with the new digital reactor protection system as a potential safety issue. However, since this issue was raised, the licensee has retracted their request for reactor protection H-line replacement for other technical reasons. The licensee's withdrawal of this reactor protection system modification request is documented in the letter from American Electric Power to NRC (AEP:NRC:1159A), of February 25, 1992. Therefore, the possibility of a radio frequency interference affecting the operation of an H-line reactor protection system is no longer a concern. This open item is closed.

- b. (Closed) Open Item 50-315/91027-02; 50-316/91027-02: Analysis to Determine Whether Minor Mod 166, "Install Artificial Leak-By on SI Pump Discharge Check Valve 2-SI-110S," Would Create Undesirable Radiological Hot Spots.

The inspector was concerned that the licensee's minor modification (MM) 166 for Unit 2 might create a potential for hot spots in the safety injection discharge piping. This minor modification was designed to allow the pressure in the safety injection pump headers to be relieved to the refueling water storage tank by passing a small amount of flow through the SI pump miniflow line.



Although the inspector reviewing this open item for closure agreed that there was a potential for radiological hot spots as a result of this minor modification, because the most likely actions which would be recommended as a result of this analysis was being conducted already, the inspector determined that this open item could be closed. The licensee routinely performs radiological surveillances in the safety injection pump rooms to detect changes in radiological conditions such as one caused by a radiological hot spot.

- c. (Closed) Violation 50-315/91027-01; 50-316/91027-01: Failure to Determine Whether Modifications Involved an Unreviewed Safety Question.

The inspector identified six modifications which were not properly evaluated in compliance with 10CFR50.59. The inspector determined that those modifications represented potentially significant changes to the facility design or operation and as such the modifications qualified for a safety evaluation.

The inspector reviewed the licensee's corrective actions taken to resolve the Notice of Violation and found them acceptable. The licensee reviewed the six modifications and confirmed that an unreviewed safety question does not exist as a result of these design changes. The licensee stated that the documentation supporting these conclusions will be added to the respective design change packages.

Additionally, the licensee will revise their training at AEPSC to provide mandatory annual classroom training for those engineers performing safety evaluations that will include a written exam. Also, the Quality Assurance Division will perform audits of the safety review process and an increased focus on the 10CFR50.59 (a)(i) screening performed in safety reviews.

No violations, deviations, unresolved or inspector followup items were identified.

5. Reportable Events (92700, 92720)

The inspector reviewed the following Licensee Event Reports (LERs) by means of direct observation, discussions with licensee personnel, and review of records. The review addressed compliance to reporting requirements and, as applicable, that immediate corrective action and appropriate action to prevent recurrence had been accomplished.

- a. (Closed) LER 315/91005-LL: Design Documents could not be located that would demonstrate the capability of the Diesel Generator Ventilation and Exhaust structures to withstand the effects of a tornado.

The inspector found that the licensee had completed all design

modifications needed to ensure that Unit 1 and 2 emergency diesel generator (EDG) ventilation structures could withstand the effects of a tornado. During an internal engineering review, the licensee could not locate design documents which would demonstrate the capability of the emergency diesel generator (EDG) combustion air engine exhaust, and room ventilation systems to withstand the effects of a tornado. The components affected included combustion air intake filter and silencer, the EDG exhaust stack and silencers and the duct work associated with the room ventilation supply to Unit 1 and 2 EDGs. The licensee completed modifications to the outside structures on August 16, 1991 and the installation of the dampers to protect the EDG room ventilation ductwork was completed on November 22, 1991.

b. (Closed) LER 315/91006-LL: Personnel Error During the Design Change Process Resulted in Being Outside the Design Basis for Separation of Safety-Related and Non-safety Related Circuits.

The inspector closed this LER based on closure of open items 315/91017-1B and 316/91017-1B by an NRC electrical design system functional inspection (EDSFI). The open items were initiated to track corrective action to the event documented in the LER as part of a Severity Level IV violation issued in Report 91017. The LER documented a design change error which resulted in the Unit 1 CD EDG being declared inoperable on July 23, 1991. At that time, the licensee discovered that the design change, installed November 29, 1990, erroneously removed a circuit breaker which was designed to prevent a postulated fault in a balance-of-plant motor control center (MCC) from causing the main feed breaker to a safety-related MCC to trip. The safety-related MCC provides power to the 1CD EDG auxiliaries.

As discussed in Inspection Report 50-315/91017(DRP);50-316/91017(DRP), the inspector determined that the root cause of the event was inadequate review of the design change package by licensee corporate engineering and management personnel. As long-term corrective action, the licensee modified design procedures and provided in-depth training on all procedures governing design activities to the entire Nuclear Engineering Department.

c. (Closed) LER 315/91007-01: Shutdown Rods Mispositioned During Attempt to Move Control Rods Due to Malfunction of Multiplexing Relay in the Rod Control System

This LER was closed based on satisfactory performance of licensee root cause evaluation and corrective action. The LER was issued to document licensee entry into TS 3.0.3 and declaration of an Usual Event after it was discovered that four shutdown rods were inserted approximately six steps into the core. The root cause was failure of a power cabinet multiplexing relay. The relay was replaced and the control rod system was returned to operability.

The shutdown rods were apparently moved inadvertently during routine surveillance testing of the full length control rods performed earlier that day. During the testing, an Urgent Alarm was received. Initial troubleshooting of the condition by maintenance personnel found nothing wrong, but it was noted that the power cabinet was selecting the shutdown bank instead of the control bank. Since it was assumed at that time that the unit operators had made that selection, the alarm was reset and the surveillance was completed. The misaligned rod condition was suspected later that day due to the dilution that was required to maintain thermal power and the rod position indications, and was confirmed using the flux mapping system.

d. (Closed) LER 316/91003-LL: Condenser Air Ejector Gas Not Sampled and Analyzed in Accordance with Technical Specifications.

The inspector determined that the corrective actions taken by the licensee to ensure that condenser air ejector samples could be obtained with the normal gas monitoring system out of service was adequate and that the corrective actions taken would reasonably prevent this type of problem from occurring in the future.

On March 12, 1991, with the condenser evacuation noble gas monitor, SRA-2905, out of service, three noble gas samples were missed because of accumulation of water at the sample point. The decision was made to discontinue sampling without an approved Technical Specification variance. Additionally, the Chemical Supervisor did not know gas samples could be obtained from another location. The licensee revised "Techniques for Gaseous Sampling," procedure 12 THP 6020 LAB.038 to incorporate the steps used to allow sampling of the condenser air ejector at an alternate sample point when excessive water prevents sampling at the normal sample point. Although there were four similar LERs from years 1984 and 1985, the inspector determined that this particular event was an isolated event based on the absence of this type of problem recently.

e. (Closed) LER 316/91004-LL: Reactor Protection System Actuation Due to Ice and Snow Damaging Off-Site Electrical Transmission Lines.

The inspector's review of this event concluded that no licensee corrective action was necessary because the cause of the reactor trip was beyond the control of the licensee. On March 13, 1991 a reactor trip was initiated by turbine trip from a high moisture separator-reheater condition. This was determined to be a normal plant response to a loss of the off-site electrical transmission system. The inspector found that the licensee satisfactorily addressed abnormalities with closure of main steam isolation and combined intercept valves. A problem with overspeeding of the Unit 2 turbine-driven auxiliary feedwater pump was eventually corrected by the licensee and is documented in NRC inspection report 50-315/91022(DRP); 50-315/91022(DRP).

f. (Closed) LER 50-316/91005-LL: Bolts Removed From Pressurized Essential Service Water Line Expansion Joint Due to Reversed Component Labels

The inspector closed this LER based on satisfactory completion of licensee root cause evaluation and corrective action. This LER was issued on a voluntary basis to report an event that occurred when maintenance work was inadvertently initiated on the wrong Unit 2 ESW train. On June 14, 1991, the licensee entered TS 3.0.3 after it was discovered that maintenance personnel had erroneously removed the flange bolts from an "E" (East) ESW train expansion joint, after the "W" (West) ESW train was declared inoperable 15 hours earlier. A licensee review of this event later determined that the "E" ESW train remained operable because water loss through the flange was insignificant and system pressure was maintained. In addition, the licensee concluded that the expansion joint would have remained in place during a design-basis earthquake.

As discussed in Inspection Report 50-315/91014(DRP);50-316/91014(DRP), the inspector identified several factors that contributed to the event, in addition to the mislabeled expansion joints. The inspector determined that the condition was not identified in a timely manner due to a lack of effective communication between maintenance personnel and the Unit Supervisor, compounded by inadequate supervisory presence at the job site. As long-term corrective action, a lessons learned memo was issued to re-enforce the importance of communicating to supervision and operations shift management of abnormal conditions in the plant.

During review of this LER, the inspector identified a concern relating to corrective action to a similar event that occurred in 1990. This is discussed in paragraph 3a. This LER is closed.

No violations, deviations, unresolved or inspector followup items were identified.

6. Outages (37700, 42700, 60705, 60710, 61701, 61715, 86700)

The results of some of the major licensee activities during this outage are summarized below:

a. Unit 1 Steam Generator Slewing and Plugging Status:

The licensee completed inspection and repairs to the Unit 1 steam generator (SG) U-tubes. After performing eddy current examinations, the licensee sleeved or plugged steam generator U-tubes as tabulated below:

		<u>Total</u>	<u>Total</u>	<u>Equivalent</u>	<u>Plug</u>	<u>Percent</u>
		<u>Sleeves</u>	<u>Plugs</u>	<u>Plugs</u>		
SG 11:	826	311	346		10.2%	
SG 12:	180	231	239		7.0%	
SG 13:	459	212	231		6.8%	
SG 14:	374	198	214		6.3%	
<u>Total:</u>		<u>1839</u>	<u>952</u>	<u>1030</u>		<u>7.6%</u>

The conversion factor of 23.5 sleeves equals 1 plugged tube was used to arrive at the number of equivalent plugs. There are 3388 tubes in each of the four steam generators.

b. Results of Unit 1 and 2 Thimble Tube Wear Inspection:

The licensee continues to monitor the success of their efforts to minimize thimble tube wear. Thimble tube wear was initially identified as a problem at the Cook Plant during the Unit 2 cycle 6-7 refueling outage. Since the problem was identified, the licensee has performed thimble tube wear inspections during their subsequent outages. During this most recent refueling outage, the licensee replaced 22 thimble tubes for Unit 2 and plans to replace 15 thimble tube for Unit 1. The new thimble tubes have a chrome plated coating at axial locations corresponding to the lower core plate and fuel assembly nozzle area. The licensee has determined that the lower core plate and lower assembly nozzle areas receive the largest amount of wear. Although the licensee does not know for certain that the use of chrome plating to reduce wear on the thimble tubes will be a success, evidence of the success of a chrome plating application to mitigate wear has been observed on the rod cluster control assemblies. The licensee plans to perform eddy current inspections of each thimble tube for both Units during the next planned outages to quantify the benefit of the chrome plating and to determine whether additional hardware changes will be required.

No violations, deviations, unresolved or inspector followup items were identified.

7. Temporary Instructions

The inspector closed temporary instruction, "Verification of Plant Records," TI 2515/115. The objective of this TI was to determine if record falsification by non-licensed individuals has occurred in the plant. The inspector determined that there was no evidence of record falsification, based on a review of recent audits performed by the licensee and the inspector's own independent evaluation.

The inspector performed an independent audit by arbitrarily selecting six monitored rooms which contain equipment important to plant safety. These rooms were the Unit 1 AB EDG and SI pump rooms, Unit 2 4KV

switchgear and N Train battery rooms, and control room ventilation and SFP pump rooms. The inspector compared approximately 100 entries among the six rooms during the period from March through August 1992 against security access records and did not note any discrepancies. The inspector noted that the licensee is currently implementing a self-monitoring program to detect possible record falsification. The first quarterly report of results was scheduled to be issued in October 1992.

This TI is considered closed.

No violations, deviations, unresolved, or inspector followup items were identified.

8. Inspector Followup Items

Inspector followup items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. An inspector followup item disclosed during the inspection is discussed in Paragraph 3a.

9. Management Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on September 17, 1992 to discuss the scope and findings of the inspection. In addition, the inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents or processes as proprietary.

