U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-315/89032(DRS); No. 50-316/89032(DRS)

Docket Nos.: 50-315; 50-316 Licenses Nos. DPR-58; DPR-74

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

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

Inspection At: Bridgman, MI 49106

Inspection Conducted: November 13 through December 21, 1989

Inspectors: Mike Kopp for
R. A. Westberg — Date: 1/9/90

M J Kopp
M. J. Kopp — Date: 1/9/90

Approved By: Mike Kopp for
R. N. Gardner, Chief
Plant Systems Section — Date: 1/9/90

Inspection Summary
Inspection on November 13 through December 21, 1989 (Reports No. 50-315/89032(DRS); 50-316/89032(DRS))
Areas Inspected: Special safety inspection by regional based inspectors of actions on implementation of the ATWS rule, 10 CFR 50.62, per Temporary Instruction 2500/20 (SIMS Number MPA-A-20); followup of previously identified environmental qualification (EQ) inspection findings (62705); and onsite followup of events at operating reactors (93702).
Results: Of the three areas inspected, no violations or deviations were identified in the ATWS area. One violation was identified in the EQ followup area for failure to maintain auditable EQ files (Paragraph 4.). Additionally, two other violations were also identified in the onsite followup of events at operating reactors area; however, in accordance with 10 CFR Part 2, Appendix C, Section V.A, a Notice of Violation was not issued. The first of these violations regarded the submergence of Kapton cables associated with the reactor head vent valves and pressurizer vent valves, and the lack of weepholes in electrical boxes associated with the pressurizer Power Operated Relief Valve (PORV) limit switches (Paragraph 5.), and the second concerned the submergence of splices and cables associated with the Reactor Vessel Level Indication System (RVLIS) (Paragraph 6.).

Based on this inspection, the inspectors reached the following conclusions:

- The Quality Assurance applied to the ATWS Mitigation System Actuation Circuitry (AMSAC) modification/installation generally exceeded the guidance given by GL 85-06.

- Plant personnel, corporate engineering personnel and plant operators and supervisors appear to be well trained and knowledgeable in ATWS systems.

- The quality of the construction and installation of the AMSAC was excellent.

- The licensee has taken adequate corrective actions to resolve previously identified EQ findings.

DETAILS

1. Persons Contacted

Indiana Michigan Power Company

American Electric Power Service Corporation (AEPSC)

J. Ruperal, Senior Engineer, I&C
M. Finissi, Engineer, Power Systems Human Factors
+*R. Vasey, Licensing Engineer
*L. Caso, Engineer
*D. Cooper, Quality Assurance
*S. Wolf, Quality Assurance

Indiana Michigan Power Company

A. Blind, Plant Manager
L. Burris, Unit Supervisor (SRO)
W. Snyder, Reactor Operator (RO)
K. Worthington, Senior Auditor
*B. Bradley, Technical Engineer
*M. Stark, Technical Engineer
*C. Miles, Maintenance
*R. Allen, Maintenance
*J. Hoss, Project Engineering
*R. Czajka, Maintenance

U. S. Nuclear Regulatory Commission (U. S. NRC)

*B. Jorgensen, Senior Resident Inspector

*Indicates those personnel attending the interim site exit interview on December 7, 1989.

+Indicates those personnel participating in final telephone exit interview conducted December 21, 1989.

2. (Closed) Temporary Instruction (TI 2500/20) (SIMS Number MPA-A-20)

10 CFR 50.62, "The ATWS Rule", requires that each pressurized water reactor must have equipment from sensor output to final actuation device, that is diverse from the reactor trip system, to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform in a reliable manner and be independent (from sensor output to the final actuation device) from the existing reactor trip system.

The Westinghouse Owner's Group (WOG) submitted a generic design for ATWS Mitigation System Actuation Circuitry (AMSAC) in response to 10 CFR 50.62. This design, Topical Report Number WCAP-10858, "AMSAC Generic Design Package," was approved by the NRC in a Safety Evaluation Report (SER) dated September 17, 1986; however, this SER required further approval of the plant specific details.

The Cook plant specific design was approved by the NRC in a SER dated April 14, 1989, and was conditional based on the satisfactory completion of isolation device testing. The plant specific design implemented the Logic 1 option from WCAP-10858 (AMSAC actuation on low steam generator water level) was installed and tested on both units during the 1988 refueling outage for Unit 2 and the 1989 refueling outage for Unit 1.

The objective of this inspection was to determine that ATWS mitigating systems comply with the 10 CFR 50.62 rule requirements and that the effectiveness of the QA controls applied to the major activities (design, procurement, installation, and testing) for ATWS equipment complies with GL 85-06, "QA Guidance for ATWS Equipment that is not Safety-Related" or to Appendix B, and to assess the operational adequacy and reliability of ATWS equipment. The inspection concentrated on the Unit 2 AMSAC installation since the modifications and hardware were representative of both units.

a. Documents Reviewed

(1) Letters - M. P. Alexich to Nuclear Regulatory Commission

(a) Schedule for compliance with 10 CFR 50.62, "ATWS Rule", dated November 7, 1986.

(b) Additional Information - ATWS Mitigating Actuation Circuitry, dated October 28, 1987.

(c) Additional Information - ATWS Mitigating Actuation Circuitry, dated December 18, 1987.

(d) Response to telephone request dated May 2, 1988.

(e) Clarification of Nomenclature dated June 15, 1989.

(2) Safety Evaluation Reports

(a) SER of Topical Report No. WCAP-10858, "AMSAC Generic Design Package".

(b) SER of Site Specific AMSAC Design, including Revision 1 to WCAP-10858.

(3) Design Change Package for RFC No. 02-2873, "Install Anticipated Transients Without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC)."

(4) AMSAC Functional Test Work Request No. 030034.

(5) Procedures

(a) OHP 4021.001.006, "Power Ascension", Revision 8.

(b) OHP 4024.212 DROP 14, "Annunciator Response for AMSAC Initiated", Revision 3, CS-2.

(c) OHP 4024.212 DROP 15, "Annunciator Response for AMSAC Test or CTRL Bus Abnormal", Revision 3, CS-2.

(6) Drawings

(7) Procurement Packages

(a) HFA Relays - GE

(b) Inverters - Solid State Controls

(c) Programmable Controllers - Foxboro

(d) Switches - GE

(8) Lesson Plan No. RQ-C-1474, "AMSAC and Neotronics Analyzer", Revision 0.

(9) Training Records - various.

b. Inspection Results

The inspector reviewed the following aspects of the Cook AMSAC:

(1) Design Engineering

Review of the AMSAC schematics, the elementary drawings, and the site specific design submittals confirmed that the AMSAC did not compromise the safety features of the existing safety-related protection systems. A walkdown of selected portions of the Unit 2 AMSAC also supported this conclusion. Review of the AMSAC modifications package for Unit 2 indicated that the design endorsed by the NRR SER was properly implemented.

One item delineated in the SER as requiring resolution by the audit process on site during the inspection related to the qualification of the devices isolating the interface between AMSAC and the safety-related circuits. The inspector reviewed the documentation supportong the qualification of the General Electric (GE) HFA relays and found it acceptable; therefore, this item is considered closed.

(2) Procurement and Installation of the ATWS Mitigating Equipment

The inspector selected four of the QA scope procurement packages at random and verified that the technical requirements of the site specific design were in compliance with the SER and the ATWS rule. Through review of the procurement packages, the inspector determined that the proper receipt inspection and storage controls were employed for the AMSAC installation.

During the walkdown of the Unit 2 AMSAC system, the serial numbers of several of the system's components were recorded and the inspector was subsequently able to verify the traceability of the equipment identification designations to the quality documentation.

The inspector's review of the modification package indicated that the latest specifications, drawings, and procedures were employed for the AMSAC installation.

The walkdown of the AMSAC system verified the following:

(a) The equipment installed met the design requirements for physical, dimensional, and operational characteristics.

(b) The equipment installed was oriented and supported as specified in the design package.

(c) The physical separation criteria for maintaining electrical independence between redundant divisions and between AMSAC and safety-related circuits were maintained.

The inspector's review of the AMSAC installation procedure indicated that housekeeping and fire protection controls were properly implemented during construction.

(3) Confirmation of Completed Work

The inspector verified that the AMSAC system performed as specified in the site specific design through a review of the modification package and the functional test.

The inspector reviewed the AMSAC training lesson plan and verified the completion of that training for all personnel currently on shift. One shift supervisor and one control room operator were interviewed relative to AMSAC operation, operator actions, and annunciator location with acceptable results.

The licensee has committed to a complete end-to-end test of the AMSAC system during each refueling outage under administrative control using station procedures. At the time of this inspection this commitment had not been reached; however, the inspector did

verify that the AMSAC system had been tested following installation and reviewed the test documentation with acceptable results.

During a control room tour, the inspector verified the existence of the permanently installed bypass switch and its indicating lights for the AMSAC bypass/disable function. The inspector also verified the existence and location of the AMSAC manual initiation switch.

Review of the existing control schematics for the turbine trip and auxiliary feedwater pump start verified that once AMSAC is initiated, they would go to completion and that subsequent return to normal status would be accomplished by deliberate operator action.

(4) Quality Assurance and Qualifications

The inspector verified that the major activities such as design control, procurement, installation, and testing were accomplished as QA scope in accordance with established procedures. Relative to the AMSAC control cabinet, the QA controls applied exceeded the guidance given by GL 85-06. Personnel contacted during the inspection were found to be knowledgeable and capable relative to AMSAC and its operation.

3. Licensee Actions Concerning Previously Identified EQ Findings

a. (Closed) Unresolved Item (50-315/86015-01(DRS); 50-316/86015-01(DRS)):

This item concerned the auditability of the licensee's EQ files. The inspector noted that the EQ files did not permit independent verification of the qualification status of the EQ equipment.

During this inspection, the inspector reviewed the licensee's corrective action regarding auditability of the EQ files. The licensee's failure to have auditable EQ files in place prior to the November 30, 1985 deadline is considered a violation of NRC requirements. This unresolved item is considered closed; however, further discussion of this item is contained in Paragraph 4. of this report.

b. (Closed) Unresolved Item (50-315/86015-02(DRS); 50-316/86015-02(DRS)):

This item concerned the licensee's failure to address, in the EQ files, the affects of insulation resistance on Conax electrical penetration assemblies, Haveg Kapton insulated penetration feedthrough extension wires, and Brand Rex triaxial cables inside containment.

During this inspection, the inspector reviewed the licensee's corrective action regarding the affects of insulation resistance on the subject EQ equipment. The licensee's failure to demonstrate the adequacy of the test results is considered a violation of NRC requirements. This unresolved item is considered closed; however, further discussion of this item is contained in Paragraph 4. of this report.

c. (Closed) Unresolved Item (50-315/86015-03(DRS); 50-316/86015-03(DRS)):

In response to NRC Information Notice 86-03, the licensee identified seven Limitorque operators that contained jumper wires for which environmental qualification could not be verified. The licensee took immediate corrective action and replaced the jumper wires with environmentally qualified wires. The licensee also performed a review of the safety significance and determined that the valves were either located in a radiation only environment, or were not required to change position in the event of an accident, or had a redundant counterpart capable of fulfilling the safety function.

Due to the generic nature of this deficiency, SECY 87-32 recommended no enforcement action be taken. This paper was approved by the Commission on March 23, 1987.

No further NRC concerns were identified.

d. (Closed) Unresolved Item (50-316/86015-04(DRS)):

This item addressed the use of "T" drains and grease relief valves for operators used inside containment. The NRC inspector noted that neither a grease relief valve nor a "T" drain were installed on valve operator IMO-54 located inside containment.

During this inspection, the inspector reviewed the licensee's corrective actions regarding the configuration of valve operator IMO-54. Subsequent to this finding, the licensee performed a review and determined that IMO-54 was not required to perform a safety function and therefore, removed it from the EQ program.

No further NRC concerns were identified.

e. (Closed) Open Item (50-315/86015-05(DRS); 50-316/86015-05(DRS)):

The licensee's program was found to identify and define requirements of equipment in harsh environments through EQ lists and SCEW sheets. In a review of the licensee's procedure, the NRC inspector did not find a clear definition of a mild environment, as opposed to a harsh environment.

During this inspection, the inspector reviewed specification DDC-NE-106-QCN, Revision 0, dated May 9, 1988. The licensee provided a clear definition of mild and harsh environments in this document.

No further NRC concerns were identified.

f. (Closed) Open Item (50-315/86015-09(DRS); 50-316/86015-09(DRS)):

This item addressed the qualification of triaxial cables which were based on a Brand Rex EQ test report for coaxial cables.

The triaxial and coaxial cables were of the same type number (RG11) and constructed with identical materials. The inspector was concerned that the licensee had not established similarity between the coaxial and triaxial cables.

During this inspection, the inspector reviewed the licensee's files EQ 134 and EQ 138, and concluded that the licensee has established similarity between the cables.

No further NRC concerns were identified.

g. (Closed) Open Item (50-315/86015-10(DRS); 50-316/86015-10(DRS)):

This item addressed Raychem splices and the need for the licensee to perform a review to determine the acceptability of insulation resistance values measured during the EQ test.

During this inspection, the inspector reviewed the licensee's Engineering Control Procedure, "Instrument Cable IR", E.C.P. 1-2-00-15, and determined that the licensee performed a review of insulation resistance values and found them to be acceptable for plant application.

No further NRC concerns were identified.

h. (Closed) Open Item (50-315/86015-14(DRS); 50-316/86015-14(DRS)):

This item addressed the inspector's concern that an unqualified lubricant could inadvertently be used in EQ applications for electric motors because there was no reference contained in the EQ file regarding lubricants. The licensee agreed to identify the qualified lubricant in the appropriate EQ files for electric motors.

During this inspection, the inspector reviewed the licensee's Surveillance/Maintenance and Replacement Specification DDC-QA-105-QCN. This specification identified the required lubrication inspection or replacement interval, and provided specific references to the qualified lubricant to be used.

No further NRC concerns were identified.

i. (Closed) Open Item (50-315/86015-15(DRS); 50-316/86015-15(DRS)):

This item addressed the licensee's review of the Main Steam Line Break (MSLB) effect on the environmental qualification of equipment. The licensee indicated that thermal environments were more severe than previously described under the MSLB analyses. The licensee stated that a new analysis would be performed to determine the affect on EQ equipment.

During this inspection, the inspector reviewed an Impell Report entitled "MSLB Environmental Analysis, Donald C. Cook Units 1 and 2". The results of this report concluded that the environmental qualification of the subject electrical equipment was not affected with the exception of a Continental cable found to have a surface temperature 13°F in excess of its qualification temperature. The licensee conducted an EQ test per IEEE-323-1974 and determined that the cable in question is qualified for the environment in which it is located.

No further NRC concerns were identified.

j. (Closed) Unresolved Item (50-315/86033-01(DRS)):

This item concerned a loose conduit connection at the Limitorque housing for valve FMO-231. The licensee issued Job Order 004736 to tighten the connection but found that the fitting needed to be replaced because of damaged threads.

During this inspection the inspector reviewed Job Order 004736 which documented the replacement of the conduit connection associated with FMO-231.

No further NRC concerns were identified.

4. Licensee's Corrective Actions Concerning the Auditability of the EQ Files

The licensee's EQ files were not auditable to the extent that the inspector was able to verify that the equipment was qualified and met the specified performance requirements. For example:

a. The EQ file records did not contain a positive statement concerning the level of qualification for each component (e.g., 10 CFR 50.49, DOR Guidelines, NUREG 0588, etc.).

b. Many System Component Evaluation Worksheets (SCEWs) did not have completed information with respect to the manufacturer model number. These columns stated "N/A".

c. Signatures recorded on the transmittal sheets indicated that the appropriate cognizant engineers had reviewed each file; however, there were no documented details of this review to confirm that the engineers had found sufficient information in the files to satisfy all the requirements of the DOR Guidelines.

d. Specific references to documents contained in the EQ files were not found on the SCEW sheets.

e. Supplemental files were not referenced on the SCEW sheets, and could not be easily identified.

f. The EQ files for Conax electrical penetration assemblies (600 volt and below), Haveg Kapton insulated penetration feedthrough extension wires, and Brand Rex triaxial cable types RG 11/u did not contain adequate documentation to demonstrate that each item of electrical equipment would meet its functional performance requirements during an accident.

10 CFR 50.49, Paragraph (j), requires that a record of the qualification, including documentation, be maintained in an auditable form for the entire period that the item is installed in the plant to permit verification that the item is qualified and meets performance requirements. The licensee's failure to have auditable EQ files in place prior to the November 30, 1985 deadlines is considered a violation of 10 CFR 50.49. This is a Severity Level IV violation (Supplement I) (50-315/89031-01(DRS); 50-316/89032-01(DRS)).

During this inspection, the inspector reviewed the licensee's corrective actions regarding the condition of the EQ files and found them to be acceptable. The inspector reviewed EQ files for selected EQ equipment and verified that the files contained positive statements concerning the qualification of EQ equipment, specific references to related EQ documentation, evidence of review and approval by EQ personnel, and completed SCEW sheet information.

In addition, the inspector reviewed Engineering Control Procedure, "Instrument Cable IR", E.C.P. 1-2-00-15. This procedure documented the licensee's calculations concerning the affects of the insulation resistance test values on the plant circuits. The results concluded that the EQ test insulation resistance values would not result in degradation of the circuits associated with Conax electrical penetrations, Haveg Kapton feedthroughs, and Brand Rex triaxial cables.

The inspection showed that the licensee implemented corrective actions to correct the identified violation and prevent recurrence. Consequently, no reply to this violation is required.

No further NRC concerns were identified.

5. Licensee Event Report (LER) 50-316/88010, Environmental Qualification of Electrical Cables for the Reactor Head Vent Valves and Pressurizer Steam Space Vent Valves

This LER identified configuration discrepancies regarding the conduit installation for the Reactor Head Vent Valves, and the Pressurizer Vent Valves in Unit 2. The D. C. Cook Quality Assurance (QA) group discovered that the conduits were installed such that the Kapton cables routed inside the conduits could become submerged in the event of an accident. This configuration was contrary to the design drawings which required the conduit to be sloped downward, from the vent valves to the junction boxes, to avoid the accumulation of moisture. In addition, the licensee identified that the electrical junction boxes associated with the limit switch PORV's did not have the required drain holes installed. The licensee took immediate corrective action upon discovery of the discrepancies in Unit 2 and shut down Unit 1 to determine if similar deficiencies existed. All discrepancies identified in both units were corrected prior to restart.

The NRC inspectors concluded that this represented a violation of 10 CFR 50.49 requirements (50-315/89032-02(DRS); 50-316/89032-02(DRS)). However, this violation meets the tests of 10 CFR Part 2, Appendix C, Section V.G.1; consequently, a Notice of Violation will not be issued, and this matter is considered closed.

6. Licensee Event Report (LER) 50-316/89-011, Inoperable Reactor Vessel Level Instrumentation System (RVLIS) due to Misinterpretation of EQ Submergence Requirements/Miscommunication of Design Specifications

As a result of a Quality Assurance surveillance during the Unit 2 refueling outage, the licensee identified that the outer Raychem heat shrink tubing was not installed on the Unit 1 or Unit 2 RVLIS resistance temperature detector (RTD) cable splices. There are 14 cable splice junction boxes in each unit, and four cable splices in each box. The licensee performed an engineering evaluation and determined that during an accident, the absence of the heat shrink tubing could cause errors in excess of the system design. The errors would result in misleading level indications in the control room. Further review conducted by the licensee identified additional concerns in that it was discovered that two boxes and one cable in Unit 2 were located below flood level and could have been submerged in the event of an accident. The splices and cables were not qualified for submerged conditions.

The licensee stated that the RVLIS is not required to be operable during an accident or a transient. In addition, Chapter 14, of the "Safety Analysis" does not require RVLIS to be operable to perform a safe shutdown of the plant. The licensee took immediate corrective action and corrected all discrepancies. The NRC inspectors concluded that this represented a violation of 10 CFR 50.49 requirements (50-315/89032-03(DRS); 50-316/89032-03(DRS)). However, this violation meets the tests of 10 CFR Part 2, Appendix C, Section V.G.1; consequently, a Notice of Violation will not be issued, and this matter is considered closed.

7. Water/Moisture Intrusion into 10 CFR 50.49 Equipment/Components

During this inspection, the inspector reviewed the actions taken by the licensee regarding water/moisture intrusion into EQ equipment. The licensee stated that moisture intrusion into EQ equipment is prevented by either the use of qualified seals, location of the EQ device above junction boxes, or the installation of drain holes at low points where moisture could accumulate. The criteria for the correct configuration of installed EQ equipment is given in DCC-QA-105-QCN, Revision 7. The NRC inspector performed a walkdown of selected EQ equipment located in LOCA/HELB areas. The equipment was inspected for signs of degradation due to moisture intrusion and for the acceptability of the installed configuration relative to the drainage of accumulated moisture. The NRC inspector identified that weepholes were not installed in EQ junction boxes located outside containment Unit 2. The licensee stated that the lack of weepholes would not affect the equipment due to the use of non-watertight junction boxes which would not hold water. The licensee stated that walkdowns had been performed in Unit 1 and inside containment in Unit 2, but the outside area of containment in Unit 2 had not yet been inspected. Subsequent to the NRC concerns the licensee installed weepholes in the EQ equipment.

The inspector also noted that Marathon and Penn Union terminal blocks were installed in junction boxes directly below top entry conduits. The inspector was concerned that the conduits could be a source of direct water spray onto the terminal blocks. The licensee stated that terminal blocks were only used in EQ applications outside of the containment. Terminal blocks inside containment had been replaced with qualified splices. The licensee performed a review of their EQ file and stated that the Marathon terminal block EQ test used a top entry conduit configuration and direct chemical spray during the test and that no anomalies were noted due to this configuration. The licensee further stated that the High Energy Line Break (HELB) outside of containment would last for a duration of 10 minutes and would not produce enough moisture in the conduit system which could spray onto the terminal blocks..

No further NRC concerns were identified.

8. Violations for Which a "Notice of Violation" Will Not Be Issued

The NRC uses the Notice of Violation as a standard method for formalizing the existence of a violation of a legally binding requirement. However, because the NRC wants to encourage and support licensee's initiatives for self-identification and correction of problems, the NRC will not generally issue a NOV for a violation that meets the tests of 10 CFR 2, Appendix C, Section V.G.1. These tests are: (1) the violation was identified by the licensee; (2) the violation would be categorized as Severity Level IV or V; (3) the violation was reported to the NRC, if required; (4) the violation will be corrected, including measures to prevent recurrence, within a reasonable time period; and (5) it was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation. In addition, Section V.A states that for isolated Severity Level V violations, an NOV normally will not be issued regardless of who identifies the violations provided the licensee has initiated appropriate corrective action before the report ends. Violations of a regulatory requirement identified during the inspection for which a NOV will not be issued are discussed in Paragraphs 5 and 6.

9. Exit Interview

The Region III inspector met with the licensee's representatives (denoted in Paragraph 1) during the interim exit on December 7, 1989, and discussed the findings by telephone at the conclusion of the inspection on December 21, 1989. The inspector summarized the purpose and findings of the inspection and the licensee acknowledged this information. The licensee did not identify any documents/processes reviewed during the inspection as proprietary.