

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No.: 50-315/89028(DRS); 50-316/89028(DRS)

Docket Nos.: 50-315; 50-316

Licenses No. DPR-58; DPR-74

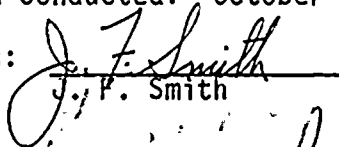
Licensee: Indiana Michigan Power Company  
1 Riverside Plaza  
Columbus, OH 43216

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

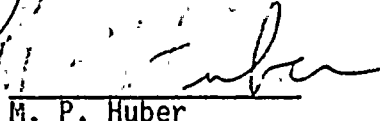
Inspection At: D. C. Cook Site, Bridgman, MI

Inspection Conducted: October 16-20, 24-26, and December 4, 1989

Inspectors:


  
J. F. Smith

12-14-89  
Date

  
M. P. Huber

12/14/89  
Date

Approved By:

  
D. H. Danielson, Chief  
Materials and Processes Section

12/19/89  
Date

Inspection Summary

Inspection on October 16-20, 24-26, and December 4, 1989 (Reports No. 50-315/89028(DRS); 50-316/89028(DRS))

Areas Inspected: Routine announced safety inspection of maintenance and inservice testing (IST) of pumps and valves. The areas covered included actions taken in response to IE Bulletin 85-03 (25573) and implementation of IST (73756) including a review of administrative procedures, performance of testing, and recording of trends.

Results: Within the areas inspected, one apparent violation of Technical Specification 3.7.1.2 due to the inoperability of the Unit 2 Turbine Driven Auxiliary Feedwater Pump was identified. Based on the results of the inspection, the NRC inspectors noted the following:

- Review of the IST program indicated that there was an effective and logical progression of work through the system and that a knowledgeable staff was dedicated to the programs.
- Actions taken to address MOV testing and switch settings methodologies were good.
- The failure to properly evaluate the significance of the incorrect process flow reading and the failure to adequately correct the flow reading anomaly are considered to have contributed considerably to the apparent violation.



## DETAILS

### 1. Persons Contacted

#### a. American Electric Power Service Corporation (AEP)

- \*A. A. Blind, Plant Manager
- \*B. A. Svenson, Licensing Coordinator
- \*K. R. Baker, Assistant Plant Manager, Production
- \*J. B. Droste, Engineering Supervisor
- \*J. L. St. Amand, Performance Supervisor
- \*R. P. Beilman, Maintenance Superintendent
- \*J. R. Sampson, Operations Superintendent
- \*J. E. Rutkowski, Assistant Plant Manager, Technical Support
- \*L. Gibson, Assistant Plant Manager, Projects

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

- \*B. L. Jorgensen, Senior Resident Inspector

\*Denotes those present for the exit meeting on December 4, 1989.

The NRC inspectors also contacted other licensee personnel during the course of the inspection.

### 2. Licensee Action on Previous Inspection Findings

(Open) Open Item (50-315/87023-02; 50-316/87023-02): Review of NDE Program for CCW welds.

A through-wall crack on the 14" diameter Component Cooling Water (CCW) return line from Unit 2 RHR heat exchanger originally caused inspection of the system which disclosed 14 through-wall cracks and six subsurface cracks on Unit 2. The CCW system is a safety-related system and is made from ASTM A106, Grade B. The causes of the failure were investigated by both Gelles Laboratories, Inc., and Westinghouse Electric Company, Inc. Based on the results of these investigations, the licensee repaired most of the defects but left some partial penetration cracks to facilitate monitoring future growth. Toward this end, the licensee was reported to be developing an NDE Program. The review of this program was identified as the open item in the original report.

The NRC inspectors reviewed the corrective action and the inspection data completed by the licensee to date but found no NDE Program. The inspectors noted that only a single re-examination of the identified cracks had been performed. After reviewing the work status with the NRC inspectors, the licensee plans to evaluate the merits of performing additional inspection on the cracks before closing the program. Pending completion of a finalized NDE Program for CCW welds, this item remains open.

3. Licensee Action on IE Bulletins.

(Open) TI 2515/73 and IE Bulletin (IEB) 85-03 and Supplement 1 to IEB 85-03 (50-315/85003-BB; 50-316/85003-BB): Motor Operated Valve (MOV) Common Mode Failure During Plant Transients Due to Improper Switch Settings.

Action Item a of the bulletin requests a review and documentation of the design basis for the operation of each valve addressed, including an evaluation of limiting differential pressure conditions; Action Items b through d require actions to assure that the MOV switch settings are set, tested, and maintained properly; and Action Item e requires a 180 day report of the results of Action Item a and a program to accomplish Action Items b through d.

Supplement 1 to IEB 85-03 was issued to clarify misunderstandings in IEB 85-03 and to clarify which valves are required to be included in the scope of the bulletin program.

In order to ensure that MOVs will operate as intended against designed operational conditions such as differential pressure, and meet the requirements of IEB 85-03, licensee's were to establish methodologies for setting MOV switches and establishing these settings on the valves. This type of program encompasses several organizational elements and coordination between these elements to ensure that the bulletin valves, as well as other plant valves, operate as intended. The different licensee organizations needed to ensure that the MOVs are adequately set and maintained include engineering, mechanical maintenance, electrical maintenance, and operations, as well as others.

The NRC inspectors discussed the licensee's program with plant personnel, reviewed maintenance and test procedures, and reviewed completed testing data to evaluate the licensee's MOV program to address IEB 85-03.

a. Program Evaluation

The licensee has reviewed and tested the valves included in the scope of their program submitted to the NRC. The NRC inspectors reviewed the completed test packages for a sample of the valves in the licensee's program and no problems were noted. MOV switch settings were verified to meet the licensee's switch setting configuration methodologies.

b. Thermal Overload Relay

Thermal overload switches used on MOVs at D. C. Cook do not utilize bypass features; however, the thermal overload switches applied to MOVs are not intended to protect the MOV motors. The thermal overloads were provided to protect the bus and sized to avoid possible spurious trips of motors in order to meet Regulatory Guide 1.106. This configuration was selected to allow the motor to perform its safety function and is an acceptable configuration.

c. Maintenance of Switch Settings

To some extent, this involves all programmatic activities that assure long term valve operability because wear and degradation can affect the adequacy of switch settings.

The NRC inspectors reviewed licensee procedures to determine the extent to which maintenance and surveillance activities were considering switch settings to ensure continued valve operability. Procedures reviewed included:

- 12MHP-SP-122, Revision 1, "Testing of Motor Operated Valves Using MOVATS Signature Acquisition System".
- 12MHP5021.001.006, Revision 4, "Disassembly Repair and Reassembly of Limitorque SMB Valve Operators".
- 12MHP5021.001.037, Revision 4, "Maintenance Procedure for Rotor and Torque Type Limit Switches on Limitorque Motor Operated Valves".
- 12MHP5030.012.001, Revision 0, "Preventive Maintenance Requirements for Limitorque Motor Operated Valves".
- 12MHP5030.012.002, Revision 0, "Testing of Limitorque Motor Operators with OATIS Data Acquisition System".

The procedures were detailed and should be adequate to ensure that problems noted with MOVs are addressed in an appropriate manner. The procedures incorporate the appropriate vendor information. Additionally, controls were established by the licensee to prevent changes to the MOVs and their switches without the review and approval of cognizant engineering personnel. The MOV program was developed to require review of MOV maintenance activities by cognizant personnel.

The licensee also has an extensive data base with current settings for safety-related valves to be used only with the approval of a maintenance engineer for setting valves or obtaining or recording information of valve specifics. These specifics include design data as well as actual torque switch settings. The use of this valve specific information in a controlled manner also aids in the maintenance of the MOV switch settings.

d. Motor Operated Valve Test and Analysis Applications

The NRC inspectors witnessed the performance of "OATIS", the licensee's motor operated valve analysis and test system, as provided by Impell Corporation. The system appeared to operate effectively, to provide the data necessary to properly set the electrical switches and to record the valves' operational performance. The personnel operating the equipment were well versed in its use but this would be expected inasmuch as they were members

of engineering management. Although they do not routinely operate the equipment, they are qualified to teach its operation.

4. Pump and Valve IST Program Implementation (73756)

The licensee's second ten-year IST program is based on the requirements of Section XI of the ASME Code, 1983 Edition through Summer of 1983 Addenda. The licensee's program was reviewed by NRC and a Safety Evaluation Report (SER) was issued on August 29, 1989. The SER found the licensee's IST program to be acceptable for implementation provided the omissions and inconsistencies identified in the SER were addressed.

a. Anomalies Identified in the SER

The NRC, with technical assistance from EG&G Idaho, Incorporated, identified concerns with the licensee's IST program, and noted them in the SER. The NRC inspectors reviewed the inconsistencies identified in the SER to ensure actions taken were adequate and complete. During discussions with the licensee, it was noted that some of the relief requests that were denied by the NRC in the SER were to be re-addressed by the NRC and AEP. Of those relief requests that were denied and were not to be re-addressed, the NRC inspectors verified that actions were being taken to ensure compliance with the SER. The licensee still was within the allowable time frame for completion of the action necessary to address the omissions and inconsistencies, but had taken significant steps towards program revision to comply with the SER.

b. Administrative Controls of IST

The NRC inspectors confirmed that administrative controls were in place to satisfy the requirements of the IST program and that specific IST duties had been assigned to personnel. The inspectors reviewed selected portions of administrative and technical documents for general content and for compliance with specific requirements of the D. C. Cook Nuclear Station Inservice Testing Program for Pumps and Valves and with the D. C. Cook program for MOVs prepared in response to NRC IEB 85-03. The documents listed below were included in this group.

- ° Inservice Inspection Check Valve Disassembly and Examination, 12THP5070 ISI.002, Revision 0, dated August 22, 1988.
- ° ISI Safety Valve and Safety Relief Valve Testing, 12THP5020 ISI.001, Revision 1, dated January 14, 1988.
- ° Turbine Driven Auxiliary Feedwater System Test, 2-OHP 4030.STP.017T, Revision 7, dated September 1, 1988.

c. Pump Program Implementation

The licensee's pump IST program implementation was inspected to verify compliance with Appendix B of 10 CFR 50; 10 CFR 50.55a(g); and Subsection IWP of Section XI of the ASME Code, 1983 Edition

through Summer 1983 Addenda. The inspection included a review of administrative controls, selected surveillance procedures, test results and documentation.

During the course of the review the NRC inspectors reviewed procedure 12THP5070PER.001, "Review of Inservice Testing of Pumps". This procedure defined the requirements of the licensee's program as it related to IST of pumps. Requirements for trending, operability determinations, review of test results, retest requests and methods of measuring the parameters specified by the Code were specified in the procedure.

The NRC inspectors also reviewed completed surveillance procedures to verify implementation of the licensee's IST program for pumps. Surveillances reviewed included:

- 1-OHP 4030.STP.017E, Revision 5, "East Motor Driven Auxiliary Feedwater System Test", performed October 15, 1989.
- 1-OHP 4030.STP.017T, Revision 6, "Turbine Driven Auxiliary Feedwater System Test", performed October 16, 1989.
- 2-OHP 4030.STP.002A, Revision 3, "Boric Acid Transfer Pump (#3 BAT) and Boration System Operability Test", performed October 16, 1989.
- 2-OHP 4030.STP.017E, Revision 4, "East Motor Driven Auxiliary Feedwater System Test", performed October 15, 1989.

The respective required action range values for the pumps were recorded in the licensee's Tech Data Book and transferred to the procedures for operability determinations. Instrument calibration data was recorded in the procedure to ensure current instrument calibration and traceability.

The NRC inspector verified that the acceptance criteria for the allowable range of test parameters were adequate and all surveillance data was within acceptable levels.

d. Performance of the Turbine-Driven Auxiliary Feed Pump (TDAFP) Operability Test

The NRC inspectors witnessed the routine inservice testing of the turbine-driven auxiliary feed system for Unit 2 (Procedure No. 2-OHP 4030.STP.017T). During the test, the inspectors observed that the pump flow indicated by the permanently mounted process flowmeter for the TDAFP deviated significantly from that indicated by the portable test instrument. Both instruments bore recent calibration stickers. A review of drawing No. OP2-5106A-16 disclosed that there were no flow routes which would explain the anomaly.

Both instruments operate by measuring differential pressure across an orifice. The licensee confirmed that both instruments were reading correctly when tested apart from the orifices. The test instrument orifice was then removed and inspected for proper dimensions and freedom from damage. The test orifice proved to be acceptable. The process orifice could not be removed for inspection without shutting down the plant, so no direct inspection of this component was done.

The process instrument was found to provide a design safety function as well as local flow indication. This safety function was a part of the original licensing basis for D. C. Cook. The TDAFP is designed to normally provide 700 gallons per minute to the steam generators at a minimum pressure of 1180 psig. In the event of a pipe break in a feed line to a single steam generator, when the flow exceeds 975 gallons per minute, the flow retention signal from the process flowmeter is designed to close the four flow retention valves (which are in parallel) to a preselected position to ensure an adequate flow of feedwater to the unaffected steam generators.

The licensee performed investigations to test the TDAFP flow indicators in Unit 1, to test the four Motor-Driven Auxiliary Feed Pumps (MDAFP) in the two units, to determine if the proper size flow orifice was originally purchased, and to determine if the operability of any of the equipment was compromised by the condition observed. The NRC inspectors witnessed the testing of the four motor-driven feed pumps. No irregularities were observed in the techniques nor in the results. The NRC resident inspector witnessed the testing of the Unit 1 TDAFP and concluded that it showed acceptable results.

The licensee developed data relating the indicated flow in the test instrument with that in the process instrument. The process instrument was found to read approximately 0.8 times the test instrument value. Knowing the diameter of the measured orifice in the test instrument and knowing how the differential pressures varied across these orifices when the same flow was passed through each of them, the licensee calculated the orifice in the process instrument to be 5.62". There are no records indicating that the orifice was measured when it was received. The licensee has also indicated that there is evidence that the 150 gallon per minute difference was identified ten years ago, but there is no evidence that any corrective action was ever initiated.

A record of the anomalous reading is provided in Condition Report (1)C/R No. 2-8-78-480, generated on August 31, 1978. The problem was investigated and the test orifice (FFX-253) and the process orifice (FFS-258) were "checked for proper installation, taps and their ID tabs were checked for orifice diameter and pipe diameter". The orifices were subsequently " . . . removed from their lines and inspected for possible damage or obstructions. The inspectors did not uncover any problems with either orifice". However, there is no indication that the orifices were measured. "Preventive Action"



identified in the Condition Report included statements that the licensee had been unable to account for the mismatch in the two flowmeters and indicated that the test orifice (FFX-253) shall be used in place of the process orifice (FFS-258) for flow measurement in future IST surveillance testing for the pump. The licensee also indicated that the abnormal reading of the process orifice would remain under investigation. The Preventive Action section did not include any mechanism to prevent future use of the switch in the defective process flow meter. Subsequent use of that switch in the flow retention system provided an inadequate source of signal for initiation of that system. Neither the design control process during initial construction nor subsequent preoperational testing discovered the inability of the flow retention system to meet its licensing basis.

In order to restore the operability of the flow retention system, the licensee adjusted the setpoint of the process flowmeter to operate at the signal produced by the existing orifice for the prescribed flow of 975 gallons per minute. After the adjustment was made, the NRC inspectors reviewed the data sheet for the setpoint shift and found that the as-found trip setpoint was high by 64.9% as compared with the as-left setpoint. In order to produce a signal which would trip at the as-found setting, the licensee's calculations indicate that the TDAFP actual flow would have had to exceed 1225 gpm. At this value, pump runout would occur in the event of an accident such as a feedwater or steam line break. In the event of TDAFP failure, the two remaining Unit 2 MDAFPs would be available, as well as all three AFWPs from Unit 1. The licensee has a procedure in place that allows cross connection of available AFWPs from one unit to another unit that has insufficient or unavailable AFW flow.

At the earliest outage of adequate time (but no later than the next refueling outage), the licensee plans to replace the present process orifice with one which complies with the dimensions and output of the design requirements. When this is accomplished, the setpoint of the flow meter will be adjusted so that all elements of the system function as originally designed.

In the event of a feedwater or steamline break, the failure of the process flowmeter to initiate the flow retention system would permit the turbine-driven auxiliary feed pump to run out. As a result, the pump is considered to be inoperable. This is an apparent violation of Technical Specification 3.7.1.2 which states, in part, "At least three independent steam generator auxiliary feedwater pumps and associated flow paths must be OPERABLE with . . . One feedwater pump capable of being powered from an OPERABLE steam supply system" (316/89028-01).

The means by which the violation occurred included (1) failure to receipt inspect the safety-related orifice plate at the time of its delivery, (2) failure to perform appropriate corrective action when anomalous gauge indication was first discovered in 1978 and at every monthly operability test since then, and (3) failure to record the

problem with the orifice upon discovery in 1978 in a manner that would prevent its use as the signal source for initiation of the automatic flow retention safety function.

5. Exit Interview

The NRC inspectors met with licensee representatives (denoted in Paragraph 1) on December 4, 1989, to discuss the scope and findings of the inspection. The licensee acknowledged the statements made by the inspectors with respect to items discussed in the report. In addition, a preliminary exit interview was conducted on October 26, 1989, with the licensee. The inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection and the licensee did not identify any such documents or processes as proprietary.