OFFICE OF INSPECTION AND ENFORCEMENT
DIVISION OF INSPECTION PROGRAMS

Report: 50-315/85-28; 50-316/85-28

Docket: 50-315; 50-316

Licensee Nos: DPR-58; DPR-74

Licensee: American Electric Power Service Corporation
Indiana and Michigan Electric Company
Columbus, Ohio 43216

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

Inspection at: Donald C. Cook Site, Bridgman, Michigan

Inspection Conducted: August 19-28, 1985

Inspectors: James P Kearney — 9/23/85
J. P. Kearney, IE, Team Leader — Date

Scott Alexander McNeil — 9/23/85
S. A. McNeil, ORPB, IE — Date

R. W. Cooper II — 9/23/85
R. W. Cooper, II, ORPB, IE — Date

P. F. McKee — 9/23/85
P. F. McKee, Chief, Operating Reactors Program Branch, IE — Date

Inspection Summary

Areas Inspected: This special unannounced safety inspection involved 250 hours on site in the areas of plant operations and surveillance programs for the reactor trip system, auxiliary feedwater system, and the engineered safety feature actuation system channel functional tests.

Results: Five potential enforcement findings, referred to an unresolved items in the report, were identified during the inspection. These items will be followed up by the NRC Region III office.

DETAILS

1. Persons Contacted

Licensee

*K. Baker, Operations Superintendent
*P. Barrett, AEPSC - Nuclear Safety and Licensing
*A. Blind, Assistant Plant Manager - Maintenance
M. Camp, Operations Walkdown Coordinator
*G. Caple, Assistant Supervisor - Quality Control
N. Daavettila, Performance Engineer - Maintenance
*M. Evarts, AEPSC Nuclear Safety and Licensing
*J. Feinstein, AEPSC - Manager Nuclear Safety and Licensing
*L. Gibson, Technical Superintendent - Engineering
P. Helms, Control and Instrument Assistant Supervisor
R. Holder, Performance Engineer-Control and Instrument
*M. Horvath, Quality Assurance Supervisor
T. Johnson, Performance Engineer-Maintenance
*R. Kroeger, Quality Assurance Manager
C. Miles, Control and Instrumentation Supervisor
*C. Murphy, Production Supervisor
*R. Simms, Shift Technical Advisor
*W. Smith Jr., Plant Manager
R. Stevens, Performance Engineer-Operations
*B. Svensson, Assistant Plant Manager-Operations
M. Thornburg, Instrument Maintenance Supervisor
T. Turner, Performance Engineer-Control and Instrument
G. Wallace, Performance Engineer-Control and Instrument

NRC

*W. Guildemond, Region III
J. Heller, Resident Inspector
*B. Jorgensen, Senior Resident Inspector
*P. McKee, IE
*C. Norelius, Region III
*C. Wolfsen, Resident Inspector

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* Attended exit interview

2. Review of Plant Operations

a. Operational Safety Verification

The control room was inspected periodically to verify compliance with minimum staffing requirements, access control, adherence to approved

procedures, and compliance with limiting conditions for operation (LCOs). Reviews were made of plant operator logs, tagging requests, standing orders, and bypass logs. Two shift turnovers were also observed.

No violations or deviations were identified.

b. Station Tours

The inspectors toured accessible areas of the plant including the control room, Unit 2 switchgear room, and the Unit 2 auxiliary feedwater (AFW) system. During these tours, observations were made relative to equipment condition, fire and safety hazards, use of procedures, radiological controls and conditions, housekeeping, and ongoing surveillance activities.

Combustible material including plywood and yellow polyethylene sheeting was found stored in the passageway between the Unit 1 and Unit 2 control rooms. The licensee removed the materials when notified by the inspectors.

c. System Walkdown

The inspectors conducted a walkdown of the Unit 2 turbine driven AFW pump train of the AFW System to observe equipment conditions and valve positions.

No violations or deviations were identified.

3. Surveillance Activities

The inspectors reviewed the licensee's surveillance programs for the reactor trip system (RTS), the AFW system, and the engineered safety feature actuation system (ESFAS) channel functional tests. The inspectors also witnessed the performance of surveillance procedure 2 THP 4030 STP.145, "Reactor Logic Train 'A' and 'B' and Reactor Trip Breakers 'A' and 'B'," revision 4. The following concerns were identified on Unit 2; however, many were also applicable to Unit 1.

a. The inspectors found that the channel functional test (CFT) for the RTS safety injection input from ESF required by Technical Specification (TS) 4.3.1.1.1, Table 4.3-1, Item #19 was being performed for each train every other month (e.g., train A: May 21, 1985 and July 16, 1985; train B: June 18, 1985 and Aug. 15, 1985) vice every month as required. The licensee was informed of this finding at 2:20 p.m. on August 22, 1985 and immediately declared the train A instrument inoperable. The licensee demonstrated the instrument was operable by the performance of procedure 2 THP 4030 STP.145 within the six hour Action Statement requirement of the LCO associated with TS 4.3.1.1.1. The inspectors observed the performance of this surveillance procedure. Further inspector

review revealed that procedure 2 THP 4030 STP.145 was also used to perform the logic and relay portions of the CFTs for the following TS line items:

TS Surveillance		Applicable Modes
TS 4.3.1.1.1, Table 4.3-1 (RTS instrumentation) Items		
#16	"Undervoltage - Reactor Coolant Pumps"	1
#17	"Underfrequency - Reactor Coolant Pumps"	1
#19	"Safety Injection Input from ESF"	1,2
TS 4.3.2.1, Table 4.3-2 (ESFAS instrumentation) Items		
#1a	"Safety Injection-Manual Initiation"	1,2,3,4
#2a	"Containment Spray - Manual Initiation"	1,2,3,4
#3a1	"Manual Phase A Containment Isolation"	1,2,3,4
#3b1	"Manual Phase B Containment Isolation"	1,2,3,4
#3c1	"Manual Containment Purge and Exhaust Isolation"	1,2,3,4
#4a	"Manual Steam Line Isolation"	1,2,3
#4d	"Steam Line Isolation - Steam Flow in Two Steam Lines High Coincident with Tavg Low-Low"	1,2,3
#5a	"Turbine Trip/Feedwater Isolation - Steam Generator Water Level High-High"	1,2,3
#6a	"Motor Driven AFW Pumps - Steam Generator Water Level Low-Low"	1,2,3
#7a	"Turbine Driven AFW Pumps-Steam Generator Water Level Low-Low"	1,2,3
#7b	"Reactor Coolant Pump Bus Undervoltage"	1,2,3

These TS surveillances also are required to be performed every month for each train while in the applicable modes of operation. This procedure was only performed for a particular train every other month. Therefore, the erroneous frequency of performance of this procedure resulted in numerous instances where the surveillances to demonstrate the operability of the RTS and ESFAS channels (listed above) were not performed at the required frequency while Unit 2 was in either modes 1, 2, or 3 and during many startups.

b. The potential existed for failing to demonstrate the operability of the reactor trip breakers at the proper frequency. TS 4.3.1.1.1, Table 4.3-1, Item #2 requires that the reactor trip breakers be demonstrated operable monthly by performing a CFT for each train (A or B) on an alternating month basis. Procedure 2 THP 4030 STP.144, "Reactor Trip Breakers Surveillance Test," revision 0, was used to satisfy this TS requirement and did not differentiate between the A and B trains. The Nuclear Test Schedule system scheduled this procedure to be done every month; however, did not specify which train (A or B) was due. The determination of which train to test was left up to the Control and Instrument (C&I) technician

performing the test or the C&I surveillance test scheduler. In fact, the inspectors found that train A was tested for two consecutive months (July 17, 1984 and August 14, 1984) without testing train B until September 11, 1984. This frequency didn't exceed the maximum allowable interval of two months (±25%) because both trains A and B were tested during the performance of the startup test procedure 2 THP 4030 STP.180, "SU(1) Instrumentation Checks Prior to Start-up," revision 2, on June 30, 1984. Although the surveillance interval was not exceeded, the inspectors were concerned that the potential did exist for a TS violation.

c. Unit 2 TS 3.3.2.1 requires that the ESFAS channels and interlocks shown in Table 3.3-3 be operable with trip setpoints consistent with the values shown in Table 3.3-4. Item 6.b of Table 3.3-3 requires that the motor-driven auxiliary feedwater pump (MDAFP) 4 KV bus loss of voltage automatic start actuation channels be operable when in modes 1, 2, or 3. To demonstrate operability, the voltage and time delay relay setpoints must be shown to be within the allowable values of 3196, + 18, - 36 volts with a 2 ± 0.2 second delay as stated in Item 6.b. of Table 3.3-4. TS 4.3.2.1.3 requires that this function be demonstrated operable by the performance of a channel calibration every 18 months.

Procedure 12 THP 6030 IMP.250, "4KV Diesel Start, 4KV ESS Bus Undervoltage, 34.5 KV Bus Undervoltage, and 600 Volt Bus Undervoltage Relay Calibration," revision 6, was used to perform the channel calibration described above. This procedure verified the proper voltage setpoint, but did not check the setpoint of the 2 second time delay relay. Failure to check the time delay relay setpoint violated T.S. 4.3.2.1.3. As a result, Unit 2 operated above mode 4 without demonstrating the operability of both Unit 2 MDAFP 4KV bus loss of voltage automatic start actuation channels. Since ESFAS automatic start of the unit's two MDAFPs cannot be ensured, the operability of both pumps was not adequately demonstrated. This resulted in plant operation above mode 4 while outside of the LCO stated in TS 3.7.1.2.

The licensee was informed of this condition and began implementing the actions required by TS 3.0.3 at 4:00 p.m. on August 23, 1985. At this time, Unit 2 was in mode 1 and Unit 1 was shutdown. The licensee commenced drafting and approving a temporary procedure for calibrating the subject time delay relays. This surveillance test procedure was performed by the licensee on Unit 2 and completed satisfactorily at 8:45 p.m. on August 23, 1985. The Unit 2 time delay relays were declared operable, and the NRC was notified.

d. TS 1.9 states, "... the channel calibration shall encompass the entire channel including the sensor and alarm and/or trip functions...." For several channel calibrations, the licensee was not performing a check of the related sensors. Three specific examples were:

(1) TS 4.3.1.1.1, Table 4.3-1, Items 7 and 8 and TS 4.3.2.1.1, Table 4.3-2, Item 4.d require the calibration of the unit's four $\Delta T/T_{avg}$ Protection Set Channels at 18 month intervals. This is performed to demonstrate the operability of the over-temperature ΔT and the overpower ΔT RTS channels and the operability of the ESFAS channels for the steam line isolation-high steam flow in two steam line channels concident with T_{avg} low-low. TS 3.3.1.1 and TS 3.3.2.1 require that these RTS channels be operable above mode 3 and that these ESFAS channels be operable above mode 4, respectively. Procedures 2 THP 6030 IMP.194 through IMP.197 ($\Delta T/T_{avg}$ Protection Set Calibrations) used a calibration method that disconnected the leads to the reactor coolant system resistance temperature detectors (RTDs) and applied a test signal to the output leads downstream of the RTDs. These tests did not check the actual sensors, the RTDs, that generate the source signals used by the downstream circuitry. This was the only method of calibration used on these channels since preoperational testing was completed.

(2) TS 4.6.4.2.b.1. requires calibration of electric hydrogen recombiner instrumentation at 18 month intervals to demonstrate the operability of the hydrogen recombiner system. TS 3.6.4.2 requires that two independent containment hydrogen recombiner systems be operable above mode 3. Procedure 12 THP 6030 IMP.140, "Electric Hydrogen Recombiner Instrumentation Calibration," revision 3, used a calibration methodology that disconnected thermocouple leads and applied test signals to the output leads to calibrate the downstream temperature indicators. This test did not check the actual sensors, the thermocouples, that generate the source signal received by the downstream circuitry and indicators. The licensee has used this methodology since the calibration was first performed on each unit's respective systems.

(3) TS 4.4.6.1.c requires that the containment humidity monitor, if being used, be calibrated at least once per 18 months to verify the operability of the leakage detection systems. The leakage detection systems are required to be operable above mode 5. Procedure 12 THP 6030 IMP.050, "Containment Humidity Detector Calibration," revision 2, did not check the sensor, the humidity detector.

Because of the conditional nature of the surveillance requirement (i.e., "if being used"), the licensee's failure to calibrate the humidity monitor may have never resulted in the licensee's entering the action statement associated with leakage detection system operability. On the other hand, continued failure to include a check of the humidity monitor as part of the calibration may lead

to a situation where the licensee determines that the leakage detection systems are operable when, in fact, they would be considered inoperable by TS 3.4.6.1.

The failure to perform surveillance testing at the required frequency (item 3.a) and the failure to perform adequate surveillance tests (item 3.c and 3.d) will remain unresolved pending followup by the Region III office (50-315/85-28-01; 50-316/85-28-01).

e. TS 1.9 requires that a channel calibration include the CFT. Procedure PMI 6030, "Instrument and Control; Maintenance and Calibration," revision 4, section 3.2.8.19.1, states that whenever a reactor protection instrument maintenance procedure (e.g., calibration) is completed, the reactor protection channel shall not be declared operable until a CFT has been completed by performing the applicable reactor protection surveillance test procedure (STP). The inspector found that procedure 2 THP 6030 IMP.231 "Power Range Nuclear Instrumentation Calibration," revision 5, was performed for all four power range channels on January 21, 1985. The associated CFTs to verify these channels operable were apparently not performed until February 12, 1985. From January 21, 1985 to February 12, 1985 Unit 2 operated in mode 1 above 85% rated thermal power (RTP). TS 3.3.1.1, Table 3.3-1, Item 2 states that an inoperable power range neutron flux channel must be placed in the tripped condition within 1 hour. In addition, with less than four channels operable, thermal power must be restricted to ≤75% of RTP and the neutron flux setpoint reduced of ≤85% of RTP within four hours; or, the quadrant power tilt ratio must be monitored at least once per 12 hours.

The apparent failure to demonstrate power range neutron flux channel operability after calibration while operating in mode 1 shall remain unresolved pending followup by the NRC Region III office (50-315/85-28-02; 50-316/85-28-02).

f. The master surveillance test requirements matrix, contained in PMI 4030, "Technical Specifications," revision 8, was incomplete and in some instances did not list the proper surveillance procedures. For example, PMI 4030 did not list 2 THP 4030 STP.145 as the CFT procedure for items 16, 17, and 19 of Table 4.3-1 (RTS instrumentation) and items 1.a, 2.a, 3.a.1, 3.b.1, 3.c.1, 4.a, 5.a, 6.a, 7.a, and 7.b of Table 4.3-2 (ESFAS instrumentation).

4. TS 6.8.3 allows temporary changes to procedures to be made provided that the intent of the original procedure is not altered; the change is approved by the two members of plant management, at least one of whom holds a senior reactor operator license; the change is documented, reviewed, and approved by the plant manager within 14 days of implementation.

Contrary to the above, Control and Instrument (C&I) technicians made changes to STPs without obtaining review and approval by plant management before implementation or plant manager review and approval within 14 days. The inspectors found 11 STPs where changes were made without the proper review and approval. Interviews with C&I technicians revealed that it was a common practice in the C&I department to modify a procedure without writing a temporary change to the procedure. In addition, C&I supervisors failed to initiate corrective action to revise these STPs during their review of completed surveillance tests.

The failure to adequately review temporary procedure changes and the failure to determine the implications of such changes on the validity of previous surveillance tests will remain unresolved pending followup by the Region III office (50-315/85-28-03; 50-316/85-28-03).

5. TS 6.8.1.a states that written procedures shall be established, implemented, and maintained for applicable procedures recommended in Appendix A of Regulatory Guide (RG) 1.33, November 1972. RG 1.33, section H.2 requires specific procedures for surveillance tests, inspections, and calibrations.

Procedure 12 THP 6030 IMP.062, "Protection System Bistable Adjustment/ Replacement Procedure," revision 0, states that when performing an STP, a bistable found to be out of specification may be adjusted using the STP to bring the trip and reset values within specification. In addition, the person performing the initial STP review for channel operability shall review the data for all adjusted bistables to determine if portions of the system calibration are required to be performed. This review is to be recorded on the "Signoff Sheet" of this procedure. The "Signoff Sheet" is to be filed with STP records. Also, the out of specification information on the applicable bistables is to be recorded and tracked on the"Bistable Reguiring Adjustment" sheet. Any bistable requiring adjustment twice is to be replaced.

The inspector found that seven bistables were adjusted during July 1985 in the following STPs:

2 THP 4030 STP.107	"Overtemperature and Overpower Protection Set IV Surveillance Test (monthly)"
2 THP 4030 STP.111	"Pressurizer Pressure Protection Set I Surveillance Test"
2 THP 4030 STP.112	"Pressurizer Pressure Protection Set III Surveillance Test"
2 THP 4030 STP.117	"Steam Generator Level Protection Set III Surveillance Test"
2 THP 4030 STP.119	"Steam Generator 1 and 2 Mismatch Protection Channel Set I Surveillance Test"

Interviews with C&I Supervisors and a review of records revealed that neither the "Signoff Sheets" nor the "Bistable Requiring Adjustment" records

were performed. The failure to adequately implement procedure 12 THP 6030 IMP.062 shall remain unresolved pending followup by the NRC Region III office (50-315/85-28-04; 50-316/85-28-04).

6. On January 13, 1985 at 7:45 p.m. Unit 2 quadrant power tilt was determined to be greater than 1.02 (actual value was 1.023). This put the unit in the action statement for TS 3.2.4. The power range neutron flux-high trip and reset setpoints were required to be lowered at least 3% power for every 1% of indicated quadrant power tilt above 1.0 within 6 hours.

The licensee wrote an emergency job order (#16021) to lower the applicable trip and reset setpoints each by 9% power. From 10:30 p.m. to 11:27 p.m. the setpoints were reset and recorded as reset using the following CFT procedures for each power range channel:

2 THP 4030 STP.127	"Power Range Nuclear Instrumentation Protection Set I N-41," revision 4
2 THP 4030 STP.128	"Power Range Nuclear Instrumentation Protection Set II N-42," revision 4
2 THP 4030 STP.129	"Power Range Nuclear Instrumentation Protection Set III N-43," revision 4
2 THP 4030 STP.130	"Power Range Nuclear Instrumentation Protection Set IV N-44," revision 4

At 2:38 p.m. on January 14, 1985 the licensee commenced lowering reactor power at 15% per hour from 82% RTP to ≤50% RTP to comply with the action statement. The statement requires reactor power to be ≤50% RTP within 24 hours of exceeding the quadrant power tilt limit if the quadrant power tilt ratio has not been verified to be within its limit. The quadrant power tilt at 12:15 p.m. was 1.0223. At 4:32 p.m., the quadrant power tilt finally returned to within its limits at 1.006. The licensee attributed the cause of the out of limit condition to power range channel N-41 lower detector drift. No immediate corrective action for N-41 was taken. Power reduction was stopped at 4:33 p.m. and Unit 2 commenced raising power at 2% per hour to >90% RTP.

At 5:32 p.m., the CFTs for all four power range channels were commenced, without a job order, to reset the trip and reset setpoints of the neutron flux-high trip to 109% and 107%, respectively. The CFTs were completed at 6:30 p.m. The completed procedures showed that these trips were found to be at 109% and 107% and not at 100% and 98%, as was expected. This inconsistency was not noted by either the technicians involved, the SRO, or the Instrument Maintenance Supervisor reviewing the completed test.

The inspector interviewed the technicians involved in setting the neutron flux-high setpoints on January 13 and 14, 1985. The technicians involved with resetting the neutron flux-high setpoints on January 14 stated that they found them at 109% and 107% RTP. However, the technicians responsible for lowering these setpoints on January 13 stated that they correctly lowered the applicable setpoints.

On January 15, 1985 Unit 2 was operating at >90% RTP and continued to do so through January 21, 1985 when the licensee calibrated all 4 power range channels (see item 3.e).

The inspectors had the following concerns that will remain unresolved pending followup by the NRC Region III office (50-316/85-28-05):

a. The licensee's performance of the action to reduce trip and reset setpoints is in doubt.

b. Procedure PMI-6030 permits the adjustment of bistable setpoints through use of the associated STP (i.e., CFT) procedure if the bistable was found to be out of specification during the performance of the CFT. The neutron flux-high bistable setpoints were not found out of specification during the CFT. Rather, these setpoints were required to be adjusted because of a TS action statement and so, should have been reset utilizing the appropriate channel calibration procedures.

c. TS 3.2.4 also requires that the cause of the out-of-limit quadrant power tilt condition be identified and corrected prior to increasing thermal power. The cause was identified as power range channel N-41 drift, but the channel was not calibrated until 7 days after increasing power from 50% to >90% RTP. If power range N-41 was the cause of the quadrant power tilt being out of its limit, then the operability of N-41 is in question.

7. Unresolved and Open Items:

An unresolved item is a matter about which more information is required to determine whether it is an acceptable item, a deviation, or a violation. The following unresolved items will be followed up by the NRC Region III office:

Unresolved Item 50-315/85-28-01; 50-316/85-28-01. The failure to perform surveillance testing at the required frequency and the failure to perform adequate surveillance testing (Items 3.a, 3.c, and 3.d).

Unresolved Item 50-315/85-28-02; 50-316/85-28-02. The failure to conduct a channel functional test following a channel calibration (Item 3.e).

Unresolved Item 50-315/85-28-03; 50-316/85-28-03. The failure to adequately review temporary procedure changes and the implications of such changes on the validity of previous surveillance tests (Item 4).

Unresolved Item 50-315/85-28-04; 50-316/85-28-04. The failure to adequately implement procedure 12 THP 6030 IMP.062 (Item 5).

Unresolved Item 50-316/85-28-05. The determination of the sequence of events surrounding the period January 13-14, 1985 (Item 6).

8. Exit Interview

The findings of this inspection were discussed with the persons designated in paragraph 1 on August 28, 1985.