INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
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December 21, 1984
AEP:NRC:0838E

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DRP-58 and DPR-74
GENERIC LETTER 83-28, REQUIRED ACTION BASED ON GENERIC IMPLICATIONS OF SALEM ATWS EVENTS

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

In our November 4, 1983 letter AEP:NRC:0838A paragraph 4.3 we indicated that plant-specific design information related to the D.C. Cook Plant Shunt Trip Attachment, would be submitted after receipt of the Westinghouse generic design package. The NRC Safety Evaluation Report (SER) dated August 10, 1983 stated that the Westinghouse generic design was conceptually acceptable, contingent upon the resolution of thirteen plant specific items addressed in the Attachment to the SER. Replies to each of the thirteen items are included in the Enclosure to this letter. The replies include plant-specific design information for the Shunt Trip Attachment.

Pursuant to discussions with your staff in this matter, please be advised that we are intending to install the attached Shunt Trip Attachments on both Units 1 and 2 during their upcoming refueling outages. These outages are scheduled to begin in March, 1985 for Unit No. 1 and November, 1985 for Unit No. 2. Since your approval of these changes is required, prior to installation, we respectfully request that your prompt attention be given to this matter so that the change can be implemented on a timely basis.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

/tc

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
G. Bruchmann
R. C. Callen
G. Charnoff
NRC Resident Inspector - Bridgman

A055 1/1 Aperture Card Dist Drawing To: D. Wigginton

GENERIC LETTER 83-28: REQUIRED ACTION BASED ON GENERIC IMPLICATIONS OF SALEM ATWS EVENTS

RESPONSES TO THIRTEEN ITEMS OF
PLANT SPECIFIC DESIGN INFORMATION
REQUIRED FOR WESTINGHOUSE PLANTS
INCORPORATING THE AUTOMATIC SHUNT TRIP MODIFICATION
AS REFERENCED IN THE 7/10/84
LETTER FROM DARRELL G. EISENHUT TO
J. J. SHEPPARD, CHAIRMAN WESTINGHOUSE OWNER'S GROUP

D. C. COOK NUCLEAR PLANT

ATTACHMENTS:

A. ELECTRICAL ELEMENTARY DIAGRAM.
B. AREAS OF CHANGE TO TECHNICAL SPECIFICATIONS UNITS 1 AND UNIT 2 (FORMAL REQUEST FOR T/S CHANGES WILL BE SUBMITTED BY SEPARATE LETTER).

1) Provide the electrical schematic/elementary diagrams for the reactor trip and bypass breakers showing the undervoltage and shunt coil actuation circuits as well as the breaker control (e.g. closing) circuits, and circuits providing breaker status information/alarms to the control room.

RESPONSE

Attachment A to this submittal is an electrical elementary drawing showing the undervoltage and shunt coil actuation circuits as well as the control circuit for one reactor trip breaker and its bypass breaker. In addition, circuits providing breaker status information/alarms to the control room, for the reactor trip and bypass breaker shown, are included.

The redundant reactor trip breaker, its bypass breaker, and the status information/alarms to the control room are similar to that shown on Attachment A.

2) Identify the power sources for the shunt trip coils. Verify that they are Class 1E and that all components providing power to the shunt trip circuitry are Class 1E and that any faults within non-Class 1E circuitry will not degrade the shunt trip function. Describe the annunciation/indication provided in the control room upon loss of power to the shunt trip circuits. Also describe the overvoltage protection and/or alarms provided to prevent or alert the operator(s) to an overvoltage condition that could affect both the UV coil and the parallel shunt trip actuation relay."

RESPONSE

The control circuit of each reactor trip circuit breaker is fed from its train associated Class 1E 250 VDC battery system. Faults within the circuit breaker closing circuit, which is also fed from this source, will be isolated from the shunt trip circuitry by coordinating fuses.

Currently, loss of power to the shunt trip circuits is indicated in the control room by the red and green reactor trip breaker position lights. These lights are powered from the same fused 250 VDC branch circuit used for closing and shunt tripping the breakers. The green light being lit indicates that the breaker is open and power is available for closing the breaker. The red light being lit indicates that the breaker is closed. Since the red light and an "a" auxiliary contact of the breaker are connected in series with the shunt trip coil, the red light being lit also indicates that power is available to the shunt trip coil and that there is circuit continuity in the shunt trip coil (Att. A). This provides an indication that the shunt trip coil is ready to perform its function when required. In addition to the breaker's position lights as indication of power availability to the shunt trip coils, an auxiliary relay will be installed that will monitor the 250 VDC branch circuits voltage and will annunciate in the control room upon loss of voltage to the shunt trip coil circuit.

The UV coil and the parallel shunt trip actuation relay are powered from the reactor protection solid state protection system logic voltage supply. The logic voltage is provided by a regulated 48VDC power supply which has an overvoltage protection adjustment. If the output voltage attempts to go above the voltage adjust setting, the overvoltage circuitry will operate the power supply output circuit breaker and remove the load, including the UV coil and the parallel shunt trip actuation relay, which will cause the reactor trip breaker to open.

3) Verify that the relays added for the automatic shunt trip function are within the capacity of their associated power supplies and that the relay contacts are adequately sized to accomplish the shunt trip function. If the added relays are other than the Potter & Brumfield MDR series relays (P/N 2383A38 or P/N 955655) recommended by Westinghouse, provide a description of the relays and their design specifications.

RESPONSE

The relays being added for the automatic shunt trip function will be Potter & Brumfield MDR series relays, Westinghouse P/N 955655.

The power supplies that the relays will be connected to have an output current rating of 7.3 amps. The relays coil current is approximately 300 milliamperes; therefore, the addition of the relay to the power supply load will be minimal.

The relay contacts used to accomplish the shunt trip function will be applied in accordance with the design provided to us by Westinghouse.

4) State whether the test procedure/sequence used to independently verify operability of the undervoltage and shunt trip devices in response to an automatic reactor trip signal is identical to the test procedure proposed by the WOG. Identify any differences between the WOG test procedure and the test procedure to be used and provide the rationale/justification for these differences.

RESPONSE

The test procedure/sequence, recommended by the Westinghouse Owner's Group, to independently verify operability of the undervoltage and shunt trip devices in response to an automatic reactor trip signal, will be incorporated into plant test procedures associated with the testing of the reactor trip breakers.

5) Verify that the circuitry used to implement the automatic shunt trip function is Class 1E (safety related), and that the procurement, installation, operation, testing, and maintenance of this circuitry will be in accordance with the quality assurance criteria set forth in Appendix B to 10CFR Part 50.

RESPONSE

The circuitry used to implement the automatic shunt trip function is Class 1E. The automatic shunt trip function will be procured, installed, operated, tested and maintained in accordance with the quality assurance criteria set forth in Appendix B to 10CFR Part 50.

6) Verify that the shunt trip attachments and associated circuitry are/will be seismically qualified (i.e., be demonstrated to be operable during and after a seismic event) in accordance with the provisions of Regulatory Guide 1.100, Revision 1 which endorses IEEE Standard 344, and that all non-safety related circuitry/components in physical proximity to or associated with the automatic shunt trip function will not degrade this function during or after a seismic event.

RESPONSE

In accordance with a Westinghouse proposal to supply seismically qualified shunt trip attachments and seismically qualified shunt trip panels, containing the shunt trip actuation relays and test pushbuttons, and our issuance of a purchase order accepting their proposal, the components supplied by Westinghouse will be seismically qualified in accordance with IEEE-344-1975 as specified in their WCAP-8587.

Non-safety related circuitry such as the reactor trip breaker closing circuit and reactor trip breaker monitoring circuitry is mounted with sufficient rigidity to insure freedom from interference with the automatic shunt trip function during or after a seismic event.

7) Verify that the components used to accomplish the automatic shunt trip function are designed for the environment where they are located.

RESPONSE

Westinghouse preliminary test information indicates that the environmental tests performed on the components used to accomplish the automatic shunt trip function, included conditions of 120^{O}F at 35% relative humidity and 82^{O}F at 95% relative humidity with the components performing their intended functions. We believe the concern over the high temperatures relates to its effect on aging. The test environment envelopes the warm weather operating conditions to which the components will be subjected. The winter weather lower ambient conditions have no detrimental effect on aging and do not effect the components operation. The lubricants used on the shunt trip attachment and its components are not of the liquid type; therefore they are not effected by lower temperatures. These components are designed for the environment in which they are located.

8) Describe the physical separation provided between the circuits used to manually initiate the shunt trip attachments of the redundant reactor trip breakers. If physical separation is not maintained between these circuits, demonstrate that faults within these circuits cannot degrade both redundant trains.

RESPONSE

The control switches used to manually initiate the shunt trip attachments of the reactor trip breakers are located on control room panels. A control switch and its associated wiring for one train of reactor trip breakers is separated from the other switch by an adequate barrier. Field cabling from the control room panels to the reactor trip switchgear is routed as Train oriented circuits; therefore, redundant circuits are physically separated by the separation criteria at time of license.

Wiring of the shunt trip attachments, auxiliary relays, and their associated terminal blocks and test panels at the reactor trip switchgear, is separated by a metal barrier.

9) Verify that the operability of the control room manual reactor trip switch contacts and wiring will be adequately tested prior to startup after each refueling outage. Verify that the test procedure used will not involve installing jumpers, lifting leads, or pulling fuses and identify any deviations from the WOG procedure. Permanently installed test connections (i.e., to allow connection of a voltmeter) are acceptable.

RESPONSE

Control room manual reactor trip switch contacts and wiring will be tested prior to startup after each refueling outage to verify operability. The test procedure used will not involve installing jumpers, lifting leads, or pulling fuses.

Permanent test points, designated TP5 and TP6 on Attachment A, will be connected at each reactor trip breaker and permanent test points, designated TP7 and TP8 on Attachment A, will be connected at each reactor trip bypass breaker. The test points will provide a means of connecting a voltmeter across the combination of the shunt trip coil and the series connected "a" auxiliary switch of the breaker. With the breaker tripped, the normally open contacts of each switch located in the control room used to energize the shunt trip coil, will be tested to verify operability by individually operating each switch and verifying that the connected voltmeter registers a voltage change.

To complete the above test, the red breaker position indicating light bulb must be removed to allow the connected voltmeter to register a noticeable change in voltage. At the completion of this test, the bulb will be reinserted and verified to be operable.

The normally closed contacts of each control room switch used to open the undervoltage coil circuit of each reactor trip breaker and each bypass breaker will be tested to verify operability in a similar manner. By utilizing a permanently connected voltmeter, which monitors the undervoltage coil circuit voltage, and is part of the solid state reactor protection system, each of the control room switches used to open the undervoltage coil circuit will be operated and verified to register a change in voltage.

We believe these tests comply with the input presented by the Westinghouse Owner's Group (WOG) in their discussion of the thirteen issues generated by the NRC's safety evaluation report on the generic design. We do not know of any other procedure being developed by the WOG in connection with the control room manual reactor trip switch contacts and wiring testing.

10) Verify that each bypass breaker will be tested to demonstrate its operability prior to placing it into service for reactor trip breaker testing.

RESPONSE

The reactor trip bypass breakers are currently tested, to demonstrate operability, prior to plant startup if testing was not performed in the previous seven days. The test includes both manual and automatic trip initiation.

The reactor trip breakers monthly surveillance test does not currently require bypass breaker testing. The monthly surveillance test will be revised to include a manual trip initiation only, via a test trip pushbutton located at the bypass breaker with the bypass breaker in its test position, prior to testing of the main reactor trip breaker to demonstrate bypass breaker operability through the shunt trip attachment.

11) Verify that the test procedure used to determine reactor trip breaker operability will also demonstrate proper operation of the associated control room indication/annunciation.

RESPONSE

The monthly and startup surveillance test procedures used to determine reactor trip breaker operability will also verify proper operation of control room indication/annunciation.

12) Verify that the response time of the automatic shunt trip feature will be tested periodically and shown to be less than or equal to that assumed in the FSAR analyses or that specified in the technical specifications.

RESPONSE

The response time of the automatic shunt trip feature will be tested periodically, in the monthly and startup surveillance test procedures, to demonstrate that the response time of the main reactor trip breakers is less than or equal to that assumed in the FSAR analyses.

13) Propose technical specification changes to require periodic testing of the undervoltage and shunt trip functions and the manual reactor trip switch contacts and wiring.

RESPONSE

Attachment B to this submittal is the informal proposed Technical Specification changes. The changes proposed (D.C. Cook Unit 1 page 3/4 3-12, 3/4 3-13 and D.C. Cook Unit 2 Page 3/4 3-11, 3/4 3-12) indicate that both the undervoltage and shunt trip functions will be tested, at the time intervals specified under Channel Functional Test, in accordance with plant test procedures which will include the test procedure proposed by the Westinghouse Owners Group (WOG). Confirming operability of the manual reactor trip switch contacts and wiring will be accomplished in the plant test procedure used for Manual Reactor Trip in Table 4-3-1 of the proposed Technical Specifications.

Page 3/4 3-5 of D.C. Cook Unit 2 Technical Specifications is also attached and proposes increasing the length of time, from one hour to two hours, that one channel may be bypassed for monthly surveillance testing per Specification 4.3.1.1. This is being proposed due to the additional steps of the WOG test procedure, bypass breaker testing, and response time testing of the automatic shunt trip feature being incorporated into the monthly surveillance test procedure. This change will also make the Unit 2 specification more like the Standard Technical Specifications for Westinghouse Presurized Water Reactors; NUREG-0452, Revision 4. Unit 1 technical Specifications currently allow one channel to be bypassed for up to two hours for surveillance testing.

A formal request for these technical specification changes will be submitted by separate letter.

ATTACHMENT B TO AEP:NRC:0838E

PROPOSED CHANGES TO

TECHNICAL SPECIFICATIONS*

*NOTE: This Attachment B contains informal indications of Technical Specification change that we are anticipating. The actual formal Technical Specification change request will be made by separate letter.

TABLE 4.3-1

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. Manual Reactor Trip				
A. Shunt Trip Function	N.A.	N.A.	S/U (1)	N.A.
B. Undervoltage Trip Function	N.A.	N.A.	S/U (1)	N.A.
2. Power Range, Neutron Flux	S	D(2),M(3) and Q(6)	M	1,2
3. Power Range, Neutron Flux, High Positive Rate	N.A.	R(6)	M	1, 2
4. Power Range, Neutron Flux, High Negative Rate	N.A.	R(6)	M	1, 2
5. Intermediate Range, Neutron Flux	S	R(6)	S/U(1)	1, 2 and *
6. Source Range, Neutron Flux	S	R(6)	M and S/U(1)	2(7), 3(7), 4 and
7. Overtemperature ΔT	S	R	M	1, 2
8. Overpower ΔT	S	R	M	1, 2
9. Pressurizer Pressure--Low	S	R	M	1, 2
10. Pressurizer Pressure--High	S	R	M	1, 2
11. Pressurizer Water Level--High	S	R	M	1, 2
12. Loss of Flow - Single Loop	S	R	M	1

TABLE 4.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
13. Loss of Flow - Two Loops	S	R	N.A.	1
14. Steam Generator Water Level--Low-Low	S	R	M	1, 2
15. Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level	S	R	M	1, 2
16. Undervoltage - Reactor Coolant Pumps	N.A.	R	M	1
17. Underfrequency - Reactor Coolant Pumps	N.A.	R	M	1
18. Turbine Trip				
A. Low Fluid Oil Pressure	N.A.	N.A.	S/U(1)	1, 2
B. Turbine Stop Valve Closure	N.A.	N.A.	S/U(1)	1, 2
19. Safety Injection Input from ESF	N.A.	N.A.	M(4)	1, 2
20. Reactor Coolant Pump Breaker Position Trip	N.A.	N.A.	R	N.A
21. Reactor Trip Breaker				
A. Shunt Trip Function	N.A.	N.A.	M(5)and S/U(1)	1,2*
B. Undervoltage Trip Function	N.A.	N.A.	M(5)and S/U(1)	1,2*
22. Automatic Trip Logic	N.A.	N.A.	M(5)	1,2*

TABLE 4.3-1 (Continued)

NOTATION

* - With the reactor trip system breakers closed and the control rod drive system capable of rod withdrawal.

(1) - If not performed in previous 7 days.

(2) - Heat balance only, above 15% of RATED THERMAL POWER.

(3) - Compare incore to excore axial imbalance above 15% of RATED THERMAL POWER. Recalibrate if absolute difference ≥ 3 percent.

(4) - Manual ESF functional input check every 18 months.

(5) - Each train tested every other month.

(6) - Neutron detectors may be excluded from CHANNEL CALIBRATION.

(7) - Below P-6 (BLOCK OF SOURCE RANGE REACTOR TRIP) setpoint.

TABLE 4.3-1

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. Manual Reactor Trip				
A. Shunt Trip Function	N.A.	N.A.	S/U (1)	N.A.
B. Undervoltage Trip Function	N.A.	N.A.	S/U (1)	N.A.
2. Power Range, Neutron Flux	S	D(2), M(3) and Q(6)	M	1, 2
3. Power Range, Neutron Flux, High Positive Rate	N.A.	R(6)	M	1, 2
4. Power Range, Neutron Flux, High Negative Rate	N.A.	R(6)	M	1, 2
5. Intermediate Range, Neutron Flux	S	R(6)	S/U(1)	1, 2 and *
6. Source Range, Neutron Flux	S	R(6)	M and S/U(1)	2(7), 3(7), 4 and
7. Overtemperature ΔT	S	R	M	1, 2
8. Overpower ΔT	S	R	M	1, 2
9. Pressurizer Pressure--Low	S	R	M	1, 2
10. Pressurizer Pressure--High	S	R	M	1, 2
11. Pressurizer Water Level--High	S	R	M	1, 2
12. Loss of Flow - Single Loop	S	R	M	1

TABLE 4.3-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
13. Loss of Flow - Two Loops	S	R	N.A.	1
14. Steam Generator Water Level-- Low-Low	S	R	M	1, 2
15. Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level	S	R	M	1, 2
16. Undervoltage - Reactor Coolant Pumps	N.A.	R	M	1
17. Underfrequency - Reactor Coolant Pumps	N.A.	R	M	1
18. Turbine Trip				
A. Low Fluid Oil Pressure	N.A.	N.A.	S/U(1)	1, 2
B. Turbine Stop Valve Closure	N.A.	N.A.	S/U(1)	1, 2
19. Safety Injection Input from ESF	N.A.	N.A.	M(4)	1, 2
20. Reactor Coolant Pump Breaker Position Trip	N.A.	N.A.	R	N.A.
21. Reactor Trip Breaker				
A. Shunt Trip Function	N.A.	N.A.	M(5)and S/U(1)	1,2*
B. Undervoltage Trip Function	N.A.	N.A.	M(5)	1,2*
22. Automatic Trip Logic	N.A.	N.A.	M(5)	1,2*

TABLE 4.3-1 (Continued)

NOTATION

* - With the reactor trip system breakers closed and the control rod drive system capable of rod withdrawal.

(1) - If not performed in previous 7 days.

(2) - Heat balance only, above 15% of RATED THERMAL POWER. Adjust channel if absolute difference > 2 percent.

(3) - Compare incore to excore axial offset above 15% of RATED THERMAL POWER. Recalibrate if absolute difference $\geq$ 3 percent.

(4) - Manual ESF functional input check every 18 months.

(5) - Each train tested every other month.

(6) - Neutron detectors may be excluded from CHANNEL CALIBRATION.

(7) - Below P-6 (BLOCK OF SOURCE RANGE REACTOR TRIP) setpoint.

TABLE 3.3-1 (Continued)

TABLE NOTATION

*With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal.

**The channel(s) associated with the protective functions derived from the out of service Reactor Coolant Loop shall be placed in the tripped condition.

#The provisions of Specification 3.0.4 are not applicable.

##High voltage to detector may be de-energized above P-6.

ACTION STATEMENTS

ACTION 1 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, be in HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 2 hour for surveillance testing per Specification 4.3.1.1.1.

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 1 hour.

b. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.1.1.1.

c. Either, THERMAL POWER is restricted to $\leq$ 75% of RATED THERMAL POWER and the Power Range, Neutron Flux trip setpoint is reduced to $\leq$ 85% of RATED THERMAL POWER within 4 hours; or, the QUADRANT POWER TILT RATIO is monitored at least once per 12 hours.

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement and with the THERMAL POWER level:

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