INDIANA & MICHIGAN ELECTRIC COMPANY

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November 6, 1985
AEP:NRC:~~0962~~

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
RESPONSE TO CONFIRMATORY ACTION LETTER
REGARDING RPS TRIP BREAKER

Mr. James G. Keppler, Regional Administrator
U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

At 1357 hours on October 29, 1985, the 'A' reactor trip breaker on Donald C. Cook Plant Unit 2 failed to open on receipt of a valid trip signal from the reactor protection system. The in-series 'B' reactor trip breaker functioned correctly and the reactor was shut down properly on receipt of the trip signal. Post-trip review shows that the shutdown was in all other respects normal. The plant reacted to the trip signal in the manner expected. Immediately following the unit trip, the Cook Plant Manager, in a series of telephone discussions with Mr. C. W. Hehl of your staff, agreed to several restrictions being placed on startup of both Cook Plant units, including the physical isolation of certain equipment pending further evaluation. These and other restrictions were detailed in your Confirmatory Action Letter (CAL) dated October 30, 1985.

The purpose of this letter is twofold:

(1) To present an outline of the actions taken subsequent to the October 29, 1985 breaker failure and the status of all items listed in the October 30, 1985 CAL or separately discussed and agreed to with members of the NRC staff.

(2) To request your concurrence for restart of D. C. Cook Units 1 and 2, thereby removing the one remaining constraint contained in the CAL.

Outline of actions taken subsequent to the October 29, 1985 breaker failure:

- Immediately following the October 29, 1985 Unit 2 trip, representatives from AEPSC, NRC Region III, NRR-Washington, and Westinghouse traveled to the plant site. From that point, actions of a troubleshooting, testing, or evaluative nature were jointly discussed and concurred on by all parties prior to proceeding.

- Subsequent inspection and testing of the Unit 2 'A' reactor trip breaker showed that the breaker mechanism was operating consistently but that there was a not yet fully understood degradation in performance of the under-voltage trip attachment (UVTA). That UVTA has been impounded for further tests and evaluation, which will be the subject of separate correspondence. The 'A' breaker has also been impounded for possible use in further testing.

- On October 31, 1985, preparations were begun to install the diverse (shunt) trip feature on Unit 2 reactor trip and bypass breakers. This was scheduled to be installed in the next Unit 2 refueling outage. (This shunt trip attachment was previously installed on Unit 1). Physical installation of the modification was begun on November 1, 1985 with the concurrence of the Region III representative on site, and has subsequently been completed.

- The full inspection and functional tests of the Plant's 18-month surveillance procedure were initiated for 8 reactor trip breakers (2 active, 2 bypass for each unit, one of which was the "spare" designated for Unit 2 'A' position). The first five breakers tested passed the tests with no difficulty.

  One action in this surveillance procedure, which occurs prior to any functional testing of the trip feature, is lubrication of the UVTA linkages. On the sixth breaker tested (original position: Unit 2 reactor trip breaker 'B' position), it was decided to functionally test the trip feature, with the specified 20 oz. trip force margin test weight attached, prior to lubricating the UVTA. This breaker first failed to trip, then tripped 4 times, with less than smooth, rapid action of the UVTA observed during the tripping sequence. The conclusion drawn was that performance of this UVTA was marginal exactly at the specified acceptance criteria (20 oz. weight attached). This UVTA has also been impounded for further inspection and testing. The 7th and 8th breakers were tested without additional lubrication and successfully passed their tests. The 6th (with new UVTA), the 7th, and 8th breakers then successfully passed the entire 18-month surveillance procedure (which includes lubrication of the UVTA linkages).

- Post-trip review showed that the original trip initiator was a spurious indication of loss of flow due to false open indication of the No. 2 reactor coolant pump (RCP) breaker. Subsequent

testing showed that the 'A' reactor trip breaker UVTA had received a valid trip signal from the protection system (voltage had in fact been removed from the UVTA coil) and that the protective system would in fact generate this trip signal on receipt of need-to-trip indications. Troubleshooting of the associated power supply (CRID-II) showed it to be operating properly. The conclusion reached (confirmation of the original hypothesis) was that the trip signal was in reaction to a momentary dip in the output voltage of the CRID and the "loss of RCP" was the first reaction to this voltage dip.

- Investigation of activities in progress at the time of the reactor trip revealed that troubleshooting of an Eberline SPING unit, whose instrument and controls are powered from CRID II, was in progress. Reconstruction of the actions of the technician conducting the troubleshooting failed to identify any action that would have affected the CRID II output voltage. However, subsequent troubleshooting of this SPING unit revealed a failed electrical component (photohelic cell) which gave indication of prior, intermittent failure before its final failure. This was discovered by "bumping" the SPING unit, an action that very conceivably could have occurred during the technician's troubleshooting activities. This photohelic cell is powered directly off the CRID II, and failure in the manner observed, even intermittently, would very likely have resulted in an unnoticeable, momentary dip in the CRID II output voltage, thereby initiating the trip signal. Although there is no positive evidence that the photohelic cell shorted or otherwise affected the CRID II output voltage, we believe that this was the cause.

- Activities to date and startup surveillance testing will thoroughly exercise the reactor protection system, giving assurance that it is functioning properly.

- The Controls and Instrumentation Supervisor has cautioned all technicians and supervisors on the potential impact of accidental shorting or component failure in equipment powered from CRID bus inverters. Prior to troubleshooting these types of loads, efforts will be made to isolate the component from the CRID bus inverters.

Response to and/or current status of the CAL items are as follows:

1. "Conduct a thorough review to determine if a trip signal actually was received by the reactor protection system (RPS)."

   Response: We have confirmed that the RPS actually received a trip signal, the initiator being a spurious indication of loss of No. 2-2 RCP flow (breaker open). We believe that the cause of the spurious indication was a momentary dip in CRID II output voltage, which in turn was caused by failure of a component (photohelic cell in the Eberline

SPING unit) powered directly from CRID II. Further, we have confirmed that the RPS functioned, and continues to function, properly.

2. "Determine why the reactor trip breaker failed to trip."

Response: Our investigation has determined that the breaker failed to trip due to failure of the UVTA device to function properly. The Unit 2 'A' reactor trip breaker has been replaced with a spare breaker which has been thoroughly inspected and tested per prescribed procedures. The UVTA which failed has been impounded, and the original 'A' breaker has been set aside, both for further investigation. Although we have not confirmed the exact cause of the degraded performance of the UVTA, we suspect that the problem may be related to lubrication of the UVTA linkage. The replacement (spare) breaker and the other seven trip/bypass breakers have been subjected to the Plant's 18-month surveillance, which includes lubrication of the UVTA per the manufacturer's instructions.

3. "Determine why two of the four steam generator feedwater isolation valves failed to close as anticipated following the trip."

Response: Post-trip review confirmed that the two steam generator feedwater isolation valves which did not close following the trip functioned as designed. These valves are train-oriented and interlocked with opening of the associated reactor trip breaker. Since the associated reactor trip breaker ('A') did not open, the valves, as designed, were not signalled to close. The associated feedwater regulating valves closed as designed.

4. "Maintain all affected equipment related to the affected Reactor Protection System train, to include inverter power sources, in the "as found" condition. Therefore, take no action such as removing or tripping the reactor trip breaker which would destroy or cause to be lost, (other than necessary to protect the health and safety of the public) any evidence which would be needed to investigate or reconstruct this event."

Response: We have complied with these constraints. During the investigation, except in the case of the impounded UVTA's, these constraints were lifted as agreed upon to proceed with the investigation.

5. "Review operator actions taken immediately following recognition of the failure to trip and determine if these actions were in accordance with your procedures and policies."

   Response: Our review concluded that operator actions immediately following recognition of the failure of one of the two series reactor trip breakers to trip were in accordance with Plant procedures and policies. Further, actions taken were conservative and decided upon with the intention of preserving, undisturbed, any information that might be extracted from the 'A' breaker in its untripped (closed) state. Copies of relevant plant procedures and other information as requested were provided to the NRC for independent review.

6. "Develop troubleshooting plans and procedures, and provide these to the NRC site team for their review and concurrence prior to initiating any trouble shooting of the effected equipment."

   Response: Troubleshooting plans and procedures have been completed for on-site equipment and activities in accordance with this direction. Proposal of and agreement on off-site testing of the impounded UVTA's will be the subject of separate correspondence.

7. "Submit a formal report of your findings and conclusions to the NRC Region III Office within 30 days."

   Response: We will comply with this direction.

8. "We further understand that startup of both Units 1 and 2 will not occur until authorization to restart is obtained from the Regional Administrator or his designee."

   Response: The request for NRC concurrence to start up (subsequently defined, for clarity, as concurrence to enter Mode 2 in the startup sequence) is the purpose of this submittal.

During the course of events from October 30 through November 4, 1985, there were numerous discussions with NRC representatives in which information requests were made of the Plant. We believe that, with one exception (described below), we have provided all requested procedures, plans, data, and information. We understand, however, that your review of this very sizable amount of information may result in further requests for more information. We will provide any further information on request. The information not previously provided is that which Mr. W. L. Forney of your

staff requested in regard to "Westinghouse repair procedures, test procedures, replacement part documentation, etc..." for refurbishment/testing done on our DB-50 breakers off-site. This information is forthcoming and should be available to the Resident Inspector shortly.

We understand that your receipt of this information constrains further off-site testing of the isolated UVTA's but is not a constraint on your concurrence with the request to restart the D. C. Cook units.

We believe that the investigations and actions taken to date provide assurance that:

- The RPS functioned and continues to function correctly, conservatively, and as designed.

- The reactor trip and bypass breakers on both D. C. Cook units have been thoroughly inspected and tested and can be relied upon to function as required for the following reasons:

  -- Replacement of the suspect UVTA's with the new thoroughly tested UVTA's.

  -- Confirmation that the performance characteristics of the breakers themselves were consistent throughout the sequence of testing.

  -- Installation and functional testing of shunt trip attachments.

  -- Performance of the 18-month surveillances as required by the Technical Specifications prior to startup.

  -- Careful evaluation in concurrence with Westinghouse Electric Corporation, the manufacturer of the breaker, of the event to ensure that the root cause could be isolated to the UVTA.

  -- Implementation in Unit 2 of the Unit 1 Technical Specification testing requirements for shunt trip attachments.

  -- Increase from bi-monthly (as currently required) to monthly of the Technical Specification active testing requirement of the trip breaker.

Consideration has been given to interim, additional measures which can be implemented to maintain confidence in the reliability of the UVTA devices. We are prepared to modify our program for lubrication of the UVTA's based on the results of the UVTA testing to be done by Westinghouse. We believe it to be prudent to review the data that will be available within a month from the off-site testing of the UVTA's prior to implementing such modifications.

Additional actions initiated on-site include:

- o A synopsis of the events is being prepared for distribution to all Cook Plant reactor operators. Included will be a refresher of procedures and actions available or required in response to this event. This action will be completed prior to entering Mode 2 on either unit.

- o A feature of the diverse (shunt) trip modification is a control room annunciator which signals loss of power available to the shunt trip coil. The associated annunciator response procedure is being modified to require that the affected breaker be declared inoperable on receipt and confirmation of the validity of this signal, which imposes the current "6-hour to hot standby" action statement of the Technical Specifications (for an inoperable reactor trip breaker) upon loss of power to the shunt trip coil. This action will be completed prior to entering Mode 2 on either unit and will be specifically covered in operator training conducted in conjunction with the modification.

- o We will implement the Technical Specification requirements on the newly installed shunt trip on Unit 2 in the same manner currently imposed on Unit 1.

Based on the above, we believe there is assurance that the RPS and the reactor trip breakers will function as designed on receipt of a trip signal. Further, plant procedures and personnel are prepared to properly and adequately address this type of occurrence. We therefore request your concurrence to proceed with the startup and operation of D. C. Cook Units 1 and 2.

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

RBK
11/6/85

MPA/cm

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