INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
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November 11, 1985
AEP:NRC:0958

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
IE INSPECTION REPORT No. 50-315/85030(DRS); 50-316/85030(DRS)

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:

This letter and its attachment are in response to Mr. J. J. Harrison's letter dated October 17, 1985, which forwarded the subject inspection reports of the routine safety inspection conducted by your staff at the D. C. Cook Nuclear Plant from September 9 through 11, 1985. The Notice of Violation attached to Mr. Harrison's letter identified one violation regarding the implementation of corrective actions to correct the deficiencies identified in 10 CFR 21 reports. The response to this violation is addressed in the attachment to this letter.

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

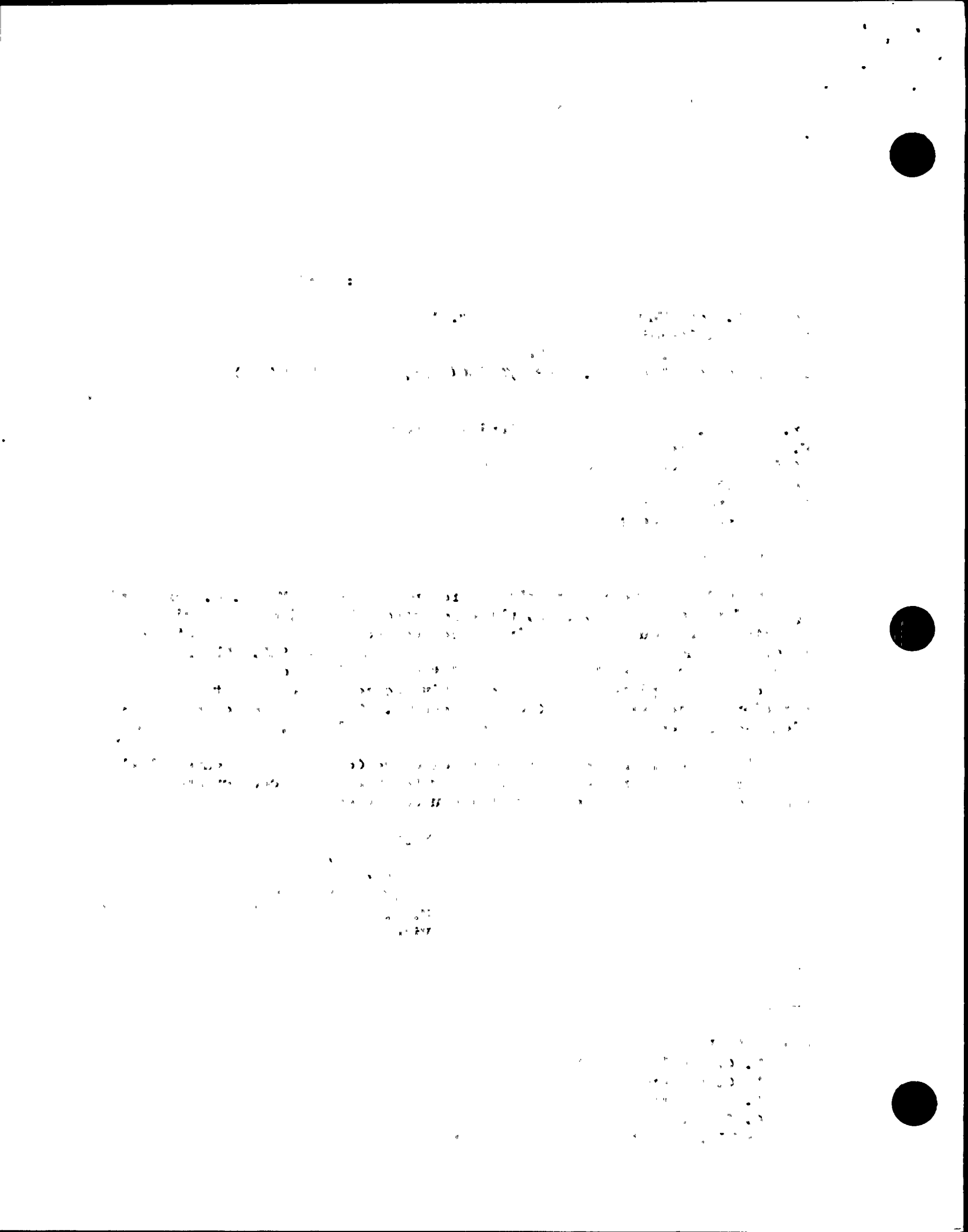
RBK 11/11/85

cm

Attachment

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

NOV 12 1985



ATTACHMENT TO AEP:NRC:0958

Indiana & Michigan Electric Company (IMECo) takes exception to the first three examples cited under the Notice of Violation for the reasons discussed below. We believe that in three of the four examples listed to support this violation, appropriate compensatory actions were taken as soon as practicable. The following is a discussion for each example in the violation to show what actions were implemented in response to the concerns raised by Westinghouse Electric Corporation and Brown Boveri Electric Corporation. Most of the information contained in the supporting documentation for the first three examples was verbally provided to the NRC Inspector during the inspection.

NRC Example No. 1

"Part 21 (315/82-01-PP; 316/82-01-PP): This Part 21 identifies a potential problem with low voltage circuit breakers equipped with solid state trip devices. D. C. Cook was notified of this problem by Brown Boveri Electric, Incorporated letter, dated December 10, 1982. It has been identified that Cook has 39 circuit breakers, of the type described, installed in Class 1E systems. As of September 11, 1985, corrective action to repair or replace the solid state devices has not been implemented."

Response to Example No. 1

Summary

IMECo reviewed the initial BBC letters and initiated corrective actions as noted below. Based on the extremely low failure rate of the subject equipment and the environmental conditions affecting it, the result of the initial engineering evaluation was that this issue did not constitute a substantial safety hazard. However, short- and long-term corrective actions were initiated, as described below. The initial letter from Brown Boveri Electric Corporation (BBC), dated December 10, 1982, (sent to us on January 10, 1983) notified us that we should test the suspected trip units, i.e., solid-state trip devices, with test sets capable of detecting a failing capacitor. At that time BBC's recommendation was to modify the type 504 test set, as required to detect the potentially failing capacitor. One test set was modified as of November 8, 1983, and a new type 504 test set was procured as of August 8, 1984. American Electric Power Service Corporation (AEPSC), upon receiving the BBC letter, initiated the review process immediately. The following is a chronological list of actions taken:

Chronological Detail

1) January 10, 1983 - Letter from A. Sittner (BBC) to J. Intrabartola (AEPSC) regarding a potential problem with the Sprague type 40D capacitor. Attached to this letter was BBC's potential-problem memo to Victor Stello, Jr., Director, NRC I&E, dated December 10, 1982.

BBC had received four solid-state trip units on November 11, 1982 which would not perform their trip function. BBC inspection determined that the power supply circuit filter capacitor (Sprague type 40D, 20mF, circuit I.D. C205) was not functioning properly. BBC inspection and analysis showed that in every case the capacitor was made ineffective by long-term degradation. Sprague analysis indicated that damage was caused by internal corrosion of the aluminum elements due to the attack by a halogenated compound such as those found in commercial solvents.

BBC records show that the Sprague 40D capacitor was discontinued August 17, 1976 and changed to a higher-grade Sprague type 137D. Affected solid-state trip units have serial numbers below 28300. The majority of the D. C. Cook solid-state trip devices have serial numbers below 28300. The exceptions are those units which have been added or replaced with new units.

"The ultimate failure condition of the capacitor is an open circuit. At this point the trip unit will not respond to an overcurrent condition (i.e. will not trip the breaker). During the initial stages of degradation, it may be possible to get nuisance operations for load currents below the pick up settings." (BBC letter dated December 10, 1982)

"This failure condition should be uncovered by routine testing of the trip unit with ITE type 504 test set; however, test sets with serial numbers below 260 may not be able to detect the condition." (BBC letter dated December 10, 1982)

BBC's only recommendation in the letter is that the suspect trip units be tested with a type 504 test set capable of detecting the failing capacitor. This recommendation was implemented shortly after November 8, 1983 when D. C. Cook Plant received the first modified type 504 test set from BBC.

2) January 21, 1983 - T. E. King memo to file. Memo states that corrective action consists of replacing the defective capacitor with acceptable replacement in each overcurrent trip device. Unresolved items discussed in the memo were 1) source of replacement capacitors, 2) seismic qualification, 3) who performs replacement work 4) urgency of replacement (memo mentions waiting until refueling outage), 5) identification of defective capacitors, 6) whether revision work on RGA#77848 corrected the problem, 7) whether ITE will supply schematic diagrams. The memo mentions that the immediate program would be to review the serial numbers of the trip devices at the plant. The memo states that BBC is to be contacted to answer the above unresolved items.

3) August 17, 1983 - Members of AEPSC's Electrical Generation Section met with BBC representatives Dal Dalastrom and Dan Hamme to discuss the design improvements of the new solid-state trip devices. Also discussed was the potential problem with the Sprague capacitor and the modification of the type 504 test sets.

4) August 25, 1983 - Telephone conversation between T. E. King and R. L. Dudding (D. C. Cook - Maintenance). Discussed having the plant write the purchase orders to send the type 504 test sets back to BBC.

5) August 29, 1983 - T. E. King memo to R. L. Dudding, D. C. Cook. Memo discusses meeting with BBC representatives on modification of D. C. Cook type 504 test sets to detect defective capacitor. T. E. King recommended in this memo that the test sets be returned to the factory for modification and recalibration.

6) August 31, 1983 - Telephone conversation between T. E. King and Bill Leister (BBC). T. E. King requested quote on 1) the repair of existing solid-state trip devices and 2) the replacement of existing units with new units.

7) September 9, 1983 - W. J. Leister (BBC) letter to T. E. King. Memo summarizes August 17, 1983 meeting. BBC recommended the replacement of all D. C. Cook "red box" trip units with the new "grey box" trip units.

8) September 18, 1983 - Date of AEPSC purchase order to modify D. C. Cook type 504 test set serial number 20.

9) November 8, 1983 - D. C. Cook Plant received modified test set serial number 20. With a failing capacitor this test set will indicate bad readings on some or all of the pick-up and time-delay tests, depending on what state of decay the capacitor is in.

10) April 2, 1984 - Telephone conversation between T. E. King and R. L. Dudding (D. C. Cook - Maintenance). Discussed writing purchase order to buy new test set instead of modifying D. C. Cook test set with serial number 35. Mentioned leaving the old set at the BBC factory.

11) April 11, 1984 - Telephone conversation between T. E. King and plant storeroom on writing change order to cancel work on test set number 35.

12) May 2, 1984 - Date of AEPSC purchase order for new type 504 test set serial number 1071 with capability of detecting a failing capacitor.

13) August 8, 1984 - D. C. Cook Plant receiving new type 504 test set serial number 1071. With failing capacitor this test set will indicate bad readings on some or all of the pick-up and time-delay tests, depending on what state of decay the capacitor is in.

14) August 5, 1985 back to August 5, 1981 - A number of solid-state trip devices were purchased to add or replace existing units as follows:

P.O. 04040-041-5X dated 8/5/85 (1 unit)
P.O. 03006-041-5X dated 7/5/85 (2 units)
P.O. 03534-041-5X dated 7/2/85 (1 unit)
P.O. 03224-041-5X dated 6/26/85 (1 unit)
P.O. 01051-041-5X dated 4/10/85 (2 units)
P.O. 05911-821-4X dated 11/13/84 (1 unit)
P.O. 05912-821-4X dated 10/24/84 (1 unit)
P.O. 04242-821-4X dated 8/15/84 (1 unit)
P.O. 01333-821-4X dated 5/7/84 (1 unit)
P.O. 72446-040-1X dated 12/17/81 (1 unit)
P.O. 01671-041-1X dated 8/5/81 (1 unit)

NRC Example No. 2

"Part 21 (315/84-01-PP; 31684-01-PP): This Part 21 identifies a potential undetectable failure of a test switch in the solid-state protection system which could affect safeguards actuation. D. C. Cook was notified of this potential failure in a Westinghouse letter, dated January 17, 1984. As of September 11, 1985, corrective action to affect the wiring change, as recommended by Westinghouse, to correct the undetectable failure has not been implemented."

Response to Example No. 2

Summary

IMECo reviewed the initial Westinghouse letters and initiated corrective actions as noted below. Based on the extremely low failure rate of the subject equipment and the environmental conditions affecting it, the result of the initial engineering evaluation was that this issue did not constitute a substantial safety hazard. However, short- and long-term corrective actions were initiated, as described below.

AEPSC and D. C. Cook Plant responded on a timely basis to the Westinghouse letter dated August 16, 1982 detailing an interim test procedure which would detect a potential Solid State Protection System (SSPS) circuit failure. The appropriate test procedures were revised by September 5, 1982 per Action Request AR #466.

The additional step in the procedures is used to verify that the test contacts for the continuity proving lamp are shunted at the end of the SSPS output relay testing. Implementation of the Westinghouse-recommended procedure eliminated the potential for an SSPS circuit failure identified by Westinghouse in their letter dated August 16, 1982. This procedural revision was sufficient to detect the potential problem until D. C. Cook could make circuit modifications per Westinghouse recommendations which would eliminate the potential problem and the interim procedural step mentioned above.

Westinghouse recommended SSPS test circuit design changes in their memo dated March 29, 1984. RFC-12-2783 was initiated soon after to implement the recommended changes.

Chronological Detail

1) August 16, 1982 - J. D. Campbell (Westinghouse) letter to W. G. Smith, Jr., D. C. Cook Plant Manager, outlining the potential problem associated with the Solid State Protection System (SSPS). Attached to this memo was Westinghouse's letter dated August 6, 1982 to Richard DeYoung, Director, NRC I&E.

   Westinghouse had identified a possible undetectable failure which could occur as a result of testing the output relays used in the SSPS as a result of a review of the schematic diagram. During the tests, contacts which shunt a continuity proving lamp are opened. Should the shunt contacts fail to reclose after the test, the proving lamp would remain as part of the circuit and could burn open if the SSPS is called upon to operate. In such an instance, the associated safeguards devices in the affected train would not actuate.

   Westinghouse recommended a minor revision to the SSPS test procedures for the Safeguards Test Cabinets, where operation of SSPS output relays is verified.

   "The procedure changes, described in Attachment III of the attached letter to the NRC, are recommended until Westinghouse completes a review of its consideration of design changes." (Westinghouse letter of August 16, 1982)

2) September 17, 1982 - L. P. DeMarco (AEPSC) memo to W. G. Smith, Jr. (D. C. Cook). Memo describes potential problem that may occur as a consequence of testing the output relays used in the SSPS. Memo recommends that the existing test procedures, 1THP4030.STP.045 and 2THP4030.STP.145, be revised where appropriate, to include the additional relay test and proving lamp surveillance until Westinghouse completes their full evaluation.

3) October 6, 1982 - D. C. Cook Plant completed their response to the Westinghouse letter of August 16, 1982 to W. G. Smith, Jr. The response was to revise 1THP4030.STP.045 and 2THP4030.STP.145 per Westinghouse's recommendations. Reference Technical Department Action Request AR #466.

4) March 29, 1984 - W. J. Johnson (Westinghouse) letter to W. G. Smith, Jr. (D. C. Cook) on the conceptual design changes to the SSPS test circuit. The letter states that the detailed changes should be issued by the end of April 1984. Attached to the letter was Technical Bulletin NSD-TB-84-01, dated March 20, 1984, which contained a schematic of the recommended design change applicable to D. C. Cook Units 1 and 2.

5) April 24, 1984 - W. J. Johnson (Westinghouse) letter to M. P. Alexich (AEPSC) detailing the actual wiring design change to SSPS test circuit. Reference Westinghouse FCN's AEPO-40512 and AMPO-40511. Memo correspondence number AEP-84-564.

6) May 18, 1984 - RFC-DC-12-2783 generated by AEPSC's Electrical Generation Section to revise the SSPS output relay test circuitry on trains A and B for both units as per Westinghouse FCN's AEPO-40512 and AMPO-40511. It is anticipated that these modifications will be implemented for both units during the 1987 refueling outages.

NRC Example No. 3

"Part 21 (315/84-02-PP; 316/84-02-PP): This Part 21 identified a significant deficiency in silicone controlled rectifier solid state trip devices. D. C. Cook was notified of this deficiency by Brown Boveri Electric, Incorporated letter, dated April 16, 1984. As of September 11, 1985, corrective action relative to the test procedure, as recommended by Brown Boveri, has not been implemented."

Response to Example No. 3

Summary

IMECo reviewed the initial BBC letters and initiated corrective actions as noted below. Based on the extremely low failure rate of the subject equipment and the environmental conditions affecting it, the result of the initial engineering evaluation was that this issue did not constitute a substantial safety hazard. However, short- and long-term corrective actions were initiated, as described below.

AEPSC received a letter from BBC dated April 24, 1984 (which transmitted the April 16, 1984 letter) describing a potential problem with the Silicone-Controlled Rectifiers (SCR) in the solid-state trip devices. Excessive leakage currents through the SCRs could cause improper operation of the trip devices. BBC recommended a special stress test to detect a bad SCR.

T. E. King's memo to W. G. Smith, Jr. on May 11, 1984 recommended that the special SCR stress test be incorporated into the plant procedures. The plant has scheduled the necessary changes to the plant procedures by January 1986, pending procurement of the necessary hardware and modification of the test equipment.

BBC considers the failure of the SCRs to be purely random. For safety-related breakers the probability that both train-related trip devices would fail coincidentally is extremely low.

Chronological Detail

1) April 24, 1984 - W. J. Leister (BBC) letter to T. E. King (AEPSC) regarding the potential problem with Silicone-Controlled

Rectifiers (SCRs) in the solid-state trip devices SS-13 and SS-14. Carbon copy went to Paul Ayers (AEPSC). Attached to the BBC letter to AEPSC was BBC's potential-problem letter from D. C. Duvall to Document Control Desk, NRC, dated April 16, 1984.

BBC noted in the above memo that thirteen (13) trip devices were returned to BBC for evaluation. Six (6) were found to have no defect. Two (2) units were found to have leakage current values of very small magnitude which were considered acceptable. Three (3) units had leakage values such that they would not normally cause spurious tripping; however, they were of such a magnitude that they should be replaced. The last two (2) SCRs had leakage current values of substantial magnitude which would probably not cause in-service tripping, but could cause tripping during motor starting, switching, or other transient circuit conditions.

None of the trip devices returned to BBC were causing nuisance tripping. The type 504 test set did not detect the SCR leakage current condition. "If the SCRs were in a degraded state such that they were to cause regular tripping on load currents, then this condition would generally be detected by the 504 test set." (BBC letter of April 16, 1984)

Since the type 504 test set would not detect the SCR leakage condition, BBC recommended a special 400V stress test in the above memo. The test circuit is shown on drawing #611899 attached to BBC letter. The 400V test allows the measurement of the SCR leakage current which indicates the condition of the SCR.

"There are over 40,000 solid-state trip devices in service and the reported SCR failure rate is very low. An earlier review showed the SCR failure rate to be less than 0.1% per year for purely random reasons. Manufacturing and testing improvements since then have further reduced the failure rate." (BBC letter of April 16, 1984)

2) May 11, 1984 - T. E. King (AEPSC) memo to W. G. Smith, Jr. (D. C. Cook) recommending that the plant should incorporate the BBC stress test into the calibration procedure for the solid-state trip devices. Memo includes acceptance criteria on the amount of acceptable leakage current.

3) January 7, 1986 - Revisions to plant procedure, implementing recommendations in T. E. King's memo, are scheduled to be made by this date. By that time it is anticipated that procurement of the necessary hardware and modification to the test equipment will be completed. Due to the low probability of SCR failure and the nature of failure mechanism, AEPSC's Electrical Generation Section considers the January 1986 date of implementation to be adequate.

NRC Example No. 4

"Part 21 (315/81-01-PP; 316/81-01-PP): This Part 21 identifies a potential for adverse control and protection system interaction. A single random failure in the Volume Control Tank level control system, in the absence of operator action, could lead to a loss of redundancy in the high head safety injection system. D. C. Cook was notified of this potential deficiency by Westinghouse Electric Corporation letter, dated May 21, 1981. As of September 11, 1985, corrective action relative to a procedure revision to cause the operator to take defined corrective actions following a failure in the Volume Control Tank level control system had not been implemented."

Response to Example No. 4

Westinghouse Electric Corporation, in their notice AEP-81-29 dated May 21, 1981, stated: ". . . this item is not seen as one with serious safety implications,. . ." And in their conclusion Westinghouse recommended:

". . . that the plant procedures be reviewed to assure that the operator would be properly alerted to this situation and would take appropriate action necessary to assure an adequate water supply to the charging pumps."

Corrective Action Taken and Results Achieved

Upon receipt of Westinghouse notice AEP-81-29, AEPSC made an engineering evaluation of its impact. This evaluation included a study of the impact of previous changes made to the affected system by a design change. The finding of this evaluation indicated that based on that design change, i.e. enhancement of Volume Control Tank (VCT) level alarms, adequate hardware and procedures existed to prevent Centrifugal Charging Pump (CCP) damage that could result from failure of the VCT level control system. AEPSC thus concluded that no significant safety problem existed and generally concurred with the Westinghouse notice. No further action was taken at that time.

Recently, licenced plant operators have been trained in the problems associated with level instrumentation with shared reference legs. Training Lesson Plan RO-C-ES07, "Basic Control Systems," addresses this problem on a generic basis, while Lesson Plan RO-C-MS06 covers the specfic problem of the VCT level instrumentation.

The response procedures for annunciators which would indicate a failure of the VCT level control were reviewed. Procedures 1-OHP 4024.109 and 2-OHP 4024.209 were changed to direct operators on receipt of VCT level alarms to compare VCT level indicators and verify that these indicators are consistent with other system parameters. These changes provide protection for conditions of both single and dual indicator failure.

Corrective Action to be Taken to Avoid Further Noncompliance

Operating procedure revisions were instituted to avoid further noncompliance.

In addition, a design change under RFC DC-12-4042 was initiated on October 11, 1985 to provide additional VCT level instrumentation to further aid the operators.

Date When Full Compliance Will be Achieved

Full compliance was achieved on November 1, 1985, when the revisions to 1-OHP 4024.109 and 2-OHP 4024.209 were incorporated as discussed in Example 4.