

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

November 5, 1985

IE BULLETIN NO. 85-02: UNDERVOLTAGE TRIP ATTACHMENTS OF WESTINGHOUSE DB-50
TYPE REACTOR TRIP BREAKERS

Addressees:

All power reactor licensees and applicants.

Purpose:

The purposes of this bulletin are: to inform all power reactor licensees and applicants of recent reactor trip breaker reliability problems, to assure that licensees of currently operating Westinghouse power reactor facilities that have not yet installed the automatic shunt trip modification are performing undervoltage trip attachment (UVTA) force margin testing of the reactor trip breakers (RTBs), and to clarify the "OPERABILITY" requirements related to RTBs.

Description of Circumstances

On October 29, 1985, at 13:57 EST the D. C. Cook Nuclear Station Unit No. 2 tripped from approximately 80% of full power. The reactor trip was triggered by a spurious indicated low flow condition in loop 2. The trip signal originated from the reactor coolant pump breaker contacts. Following the reactor trip condition it was immediately discovered that the reactor trip breaker associated with Train "A" reactor protection system (RPS) did not open, and the trip function was accomplished by only the "B" train RTB (which subsequently on November 3, 1985 failed to pass the UVTA force margin test). Two of four safety-related feedwater isolation valves did not close because the actuation signal to close should have originated from contacts in the failed Train "A" circuit breaker. The remaining two feedwater isolation valves did operate properly because the train "B" reactor trip circuit breaker opened and triggered the isolation action to these two valves. Also, the feedwater regulating valve in each loop was closed by the "B" train RTB signal.

Subsequent action by the licensee included quarantining the failed Train "A" reactor trip breaker. This was facilitated by opening the circuit breakers to the motor-generators.

Investigation into the event by the licensee and Westinghouse attributed the failure of the Train "A" reactor trip breaker to a faulty undervoltage trip attachment (UVTA) which did not provide enough lifting force to the breaker trip bar. The breaker is identified as the Westinghouse type DB-50.

Subsequent to the October 29, 1985 incident, all RTBs at the DC Cook station were tested. UVTA trip force margin testing of the Unit 2 "B" breaker on November 3, 1985 identified degradation of the margin below the 20 ounce specified margin (i.e., the requirement for the UVTA is to exert 50 ounces of force, 30 ounces to move the trip bar and 20 ounces for margin). The significance of the degradation of the UVTA attachment of the "B" breaker, in conjunction with the failure of the "A" breaker to trip on October 29, 1985 renews concern for common mode failures that could potentially lead to an ATWS event.

Background:

As a result of the February 22 and 25, 1983 Salem anticipated transients without scram (ATWS) events, the NRC issued IE Bulletin 83-01 and formed a task force to assess the generic implications of these events. On March 11, 1983, Southern California Edison reported that three GE-manufactured RTBs on San Gnofre Unit 2 and one on Unit 3 failed to open during testing of the UVTA. As a result of these failures, the NRC issued IE Bulletin 83-04.

The task force's actions resulted in the issuance of NUREG-1000, "Generic Implications of the ATWS Events at the Salem Nuclear Power Plant" and Generic Letter 83-28, delineating the procedural and plant changes required. Findings in NUREG-1000 were based, in part, on assurances that improved maintenance of the breakers would improve the reliability of the UVTAs to an acceptable level for the short term, after which the longer term corrective actions would be implemented.

The longer term corrective actions were directed by NRC Generic Letter 83-28. These actions had two major aspects related to the RTB/UVTAs: (1) the installation of a plant modification that provides for the automatic activation of the shunt trip coil of the RTB for any automatic reactor trip signal, and (2) reliability improvements in the RTB/UVTA based upon UVTA life testing by the vendor. The life test formed the basis for a UVTA replacement interval of 1250 cycles and a lubrication interval of 200 cycles.

The recent failures at D. C. Cook Unit 2 involved RTBs that were refurbished by the vendor only 4 months previously, including the installation of new UVTAs. The Unit 2 RTB "A" (that failed on October 29, 1985) had experienced only about 75 operations on the UVTA. The Unit 2 RTB "B" (that failed on November 3, 1985) had experienced about half as many operations on the UVTA. In this short time, both UVTAs suffered a serious reduction of their trip output force.

The Westinghouse specification for the DB-50 breaker specifies a minimum total force output of the UVTA to be 50 ounces. This total force output provides a force margin of 20 ounces above the maximum force required to trip the breaker. The UVTA trip force margin is measured by temporarily hanging a weight on the trip bar of the breaker and actuating (i.e., de-energizing) the UVTA. Many plants include a force margin test as part of the 18-month surveillance actions. If the weight is less than the UVTA margin, the UVTA will consistently trip the breaker. If the weight is greater than the UVTA margin, the UVTA will consistently not trip the breaker. If the weight approximates the UVTA margin, the UVTA

will not be consistent in its ability to trip the breaker during the test. At D.C. Cook, three tests at each weight were used to assure valid test results. Testing of RTB "A" indicated that the UVTA force margin had fallen to 5 ounces or less. Testing of the RTB "B" indicated that the UVTA force margin was no longer as great as 20 ounces. If the UVTA does not have adequate margin, it is unacceptable and requires replacement or maintenance.

The root cause of the lost force margin is not known at this time; laboratory failure analysis of the failed UVTAs is being arranged. It is believed that re-lubrication may temporarily restore some of the lost force.

NRC preliminary information is that 9 Westinghouse PWRs have not yet implemented the automatic shunt trip modification. As shown in the attachment, only 3 of these plants are currently operating; namely: Kewaunee, Beaver Valley Unit 1, and Turkey Point Unit 4.

REQUIRED ACTIONS FOR LICENSEES OF CURRENTLY OPERATING WESTINGHOUSE PWR FACILITIES THAT HAVE NOT YET IMPLEMENTED THE ACTUATION OF RTB SHUNT TRIP COIL ON ALL AUTOMATIC REACTOR-TRIP SIGNALS

1. Perform a test of the UVTA of each RTB that is in service to determine that adequate force margin exists, as soon as practical, but not to exceed 7 days of receipt of this bulletin. With a weight of 20 ounces attached to the trip bar, the UVTA by itself must trip the RTB three times in succession. This test shall be performed with the UVTA and breaker in "as found" conditions, prior to any lubrication or other maintenance. Any occurrence of a force margin less than 20 ounces defines an unacceptable UVTA.
2. Modify the monthly test procedure for the Reactor Protection System to add conducting the UVTA force margin test, prior to any lubrication or adjustment of the UVTA, for each RTB that is in service. This test is normally conducted on one RTB each month, i.e., two months between tests on the same RTB. If an RTB fails the UVTA force margin test, the redundant RTB is to be similarly tested within 8 hours. This procedural modification should be in place for the next such test after receipt of this bulletin and remain in force, until the automatic shunt trip modification is fully implemented.
3. Provide written instructions to the plant operating staff, within 7 days of receipt of this bulletin, requiring that:
 - (a) The content of this bulletin be reviewed by each licensed operator at the start of his/her next duty shift.
 - (b) A reactor trip breaker shall be declared INOPERABLE, if the UVTA either does not successfully pass the force margin test or otherwise may not be capable of performing its intended safety function.
 - (c) Plant operation with either RTB INOPERABLE shall continue only as provided for in the plant Technical Specifications.

(d) The NRC is to be notified via the emergency notification system within 4 hours of any RTB being declared inoperable.

4. Provide a written report to the NRC within 30 days of receipt of this bulletin, which discusses the specific actions taken pursuant to this bulletin and the results thereof.

Should a licensee determine that any action requested by this bulletin jeopardizes overall plant safety, the NRC should be notified of that fact and provided with appropriate justification for not implementing the requested action. Such notification shall be made within 7 days of receipt of this bulletin.

The written reports shall be submitted to the appropriate Regional Administrator under oath or affirmation under provisions of Section 182a, Atomic Energy Act of 1954, as amended. Also, the original copy of the cover letters and a copy of the reports shall be transmitted to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC 20555 for reproduction and distribution.

This request for information was approved by the Office of Management and Budget under a blanket clearance number 3150-0011. Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D. C. 20503.

If you have any questions regarding this matter, please contact the Regional Administrator of the appropriate NRC Regional Office of one of the technical contacts listed below.


James M. Taylor, Director
Office of Inspection and Enforcement

Technical Contacts: J. T. Beard, NRR
(301) 492-7465

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(301) 492-4755

Attachments:

1. Facilities Without Automatic Shunt Trip Installed
2. List of Recently Issued IE Bulletins

FACILITIES WITHOUT AUTOMATIC SHUNT TRIP INSTALLED

FACILITY

REMARKS

1. Kewaunee

Install in February 1986

2. Beaver Valley

Install in May 1986

3. Turkey Point 4

Install in January 1986

4. Sequoyah 2

Currently S/D; install Spring 1986
startup

5. Sequoyah 1

Currently S/D; will install before
startup

6. North Anna 1

Currently S/D; will install before
startup

7. Byron 1

Currently S/D; will install before
startup

8. Zion 2

Currently S/D; will install before
startup

9. Cook 2

Will install prior to startup

LIST OF RECENTLY ISSUED IE BULLETINS

Bulletin No.	Subject	Date of Issue	Issued to
85-01	Steam Binding of Auxiliary Feedwater Pumps	10/30/85	All nuclear power facility licensees and CP holders.
84-03	Refueling Cavity Water Seal	8/24/84	All power reactor facilities holding an OL or CP except Fort St. Vrain
84-02	Failures Of General Electric Type HFA Relays In Use In Class 1E Safety System	3/12/84	All power reactor facilities holding an OL or CP
84-01	Cracks In Boiling Water Reactor Mark I Containment Vent Headers	2/3/84	All BWR facilities with Mark I containment and currently in cold shutdown with an OL for Action and All other BWRs with an OL or CP for information
83-08	Electrical Circuit Breakers With An Undervoltage Trip Feature In Use In Safety-Related Applications Other Than The Reactor Trip System	12/28/83	All power reactor facilities holding an OL or CP
83-07 Sup. 2	Apparently Fraudulent Products Sold By Ray Miller, Inc.	12/09/83	Same as IEB 83-07
83-07 Sup. 1	Apparently Fraudulent Products Sold By Ray Miller, Inc.	10/26/83	Same as IEB 83-07

OL = Operating License
CP = Construction Permit