

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

August 31, 1987

**NRC INFORMATION NOTICE NO. 87-41: FAILURES OF CERTAIN BROWN BOVERI  
ELECTRIC CIRCUIT BREAKERS**

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

This information notice is provided to inform recipients of failures of certain Brown Boveri Electric (BBE) circuit breakers. It is expected that recipients will review the information for applicability and consider actions, if appropriate, to preclude similar problems from occurring at their facilities. Suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Concerns regarding BBE circuit breakers have been recently reported to the NRC. On April 20, 1987, Duquesne Light Company, the Beaver Valley Unit 2 licensee, notified the NRC in accordance with the reporting requirements of 10 CFR 50.55(e) of the failure of a BBE Type 5HK Class IE 4-KV circuit breaker. When the circuit breaker was racked onto the bus and 125-V DC control power was applied to the breaker's control circuit, the closing spring charged and the circuit breaker immediately closed and opened several times before the control power could be turned off. The licensee determined by field testing that the closing coil was not being energized.

Another problem with BBE circuit breakers occurred at River Bend and was reported in Licensee Event Report (LER) 87-004, dated March 6, 1987. On February 6, 1987, with the unit at full power, the Division I diesel generator 4.16-KV output circuit breaker (Gould-Brown Boveri Type 5HK) failed to close during a weekly surveillance test. The licensee's inspection of the output circuit breaker revealed that a mounting bolt had fallen out of the closing spring charging motor, rendering the motor inoperable. Further investigation revealed several other circuit breakers that contained loose or missing charging motor mounting bolts. The licensee also stated that the River Bend circuit breaker preventive maintenance program, which the licensee believes to be in accordance with the vendor's recommendations, did not detect this problem. The licensee believes the root cause of the problem to be insufficient torquing of the charging motor mounting bolts by the vendor.

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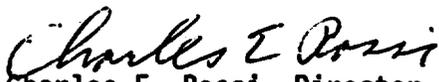
TDAR-11C

Discussion:

With regard to the repeated closing and opening of the breaker, this problem was also reported to the NRC in accordance with the reporting requirements of 10 CFR 50.55(e) by Philadelphia Electric Company, for Limerick Unit 1, in 1983. The circuit breakers involved were returned to BBE for analysis, and BBE transmitted its findings to the NRC in a letter dated April 20, 1983. BBE stated that the repeated closing and opening of the circuit breaker can be corrected by the addition of a light spring to the close latch in the circuit breaker operating mechanism. BBE also stated that, depending upon the year of manufacture, circuit breakers may or may not have been originally supplied with this spring. BBE recommended that these springs be installed in circuit breakers that were not originally supplied with one. This problem may also affect BBE Type 7.5HK, 15HK, and 38HK circuit breakers. Although information regarding this problem has been distributed by BBE and the Institute for Nuclear Power Operations (INPO), the Beaver Valley event indicates that this problem still exists. Licensees and applicants may wish to contact BBE to obtain additional information regarding this problem and appropriate corrective actions.

Failure of a circuit breaker to fully close on demand, inadvertent closure of a circuit breaker, or loose or missing closing spring charging motor mounting bolts could result in a circuit breaker not performing its intended function. This, in turn, could result in the loss of a power supply (such as a vital bus or a diesel generator).

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

  
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contact: Jack Ramsey, NRR  
(301) 492-9081

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
INFORMATION NOTICES 1987

Information Notice No.	Subject	Date of Issuance	Issued to
87-40	Backseating Valves Routinely to Prevent Packing Leakage	8/31/87	All nuclear power reactor facilities holding an OL or CP.
87-39	Control of Hot Particle Contamination at Nuclear Power Plants	8/21/87	All nuclear power reactor facilities and spent fuel storage facilities holding an NRC license or CP.
87-38	Inadequate or Inadvertent Blocking of Valve Movement	8/17/87	All nuclear power reactor facilities holding an OL or CP.
87-37	Compliance with the General License Provisions of 10 CFR Part 31	8/10/87	All persons specifically licensed to manufacture or to initially transfer devices containing radioactive material to general licensees, as defined in 10 CFR Part 31.
87-36	Significant Unexpected Erosion of Feedwater Lines	8/4/87	All nuclear power reactor facilities holding an OL or CP.
87-35	Reactor Trip Breaker, Westinghouse Model DS-416, Failed to Open on Manual Initiation from the Control Room	7/30/87	All nuclear power reactor facilities holding an OL or CP employing W DS-416 reactor trip breakers.
87-34	Single Failures in Auxiliary Feedwater Systems	7/24/87	All holders of an OL or a CP for pressurized water reactor facilities.
87-33	Applicability of 10 CFR Part 21 to Nonlicensees	7/24/87	All NRC licensees.

OL = Operating License  
CP = Construction Permit

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87-34	Single Failures in Auxiliary Feedwater Systems	7/24/87	All holders of an OL or a CP for pressurized water reactor facilities.
87-33	Applicability of 10 CFR Part 21 to Nonlicensees	7/24/87	All NRC licensees.
87-32	Deficiencies in the Testing of Nuclear-Grade Activated Charcoal.	7/10/87	All nuclear power reactor facilities holding an OL or CP.

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Discussion:

With regard to the repeated closing and opening of the breaker, this problem was also reported to the NRC in accordance with the reporting requirements of 10 CFR 50.55(e) by Philadelphia Electric Company, for Limerick Unit 1, in 1983. The circuit breakers involved were returned to BBE for analysis, and BBE transmitted its findings to the NRC in a letter dated April 20, 1983. BBE stated that the repeated closing and opening of the circuit breaker can be corrected by the addition of a light spring to the close latch in the circuit breaker operating mechanism. BBE also stated that, depending upon the year of manufacture, circuit breakers may or may not have been originally supplied with this spring. BBE recommended that these springs be installed in circuit breakers that were not originally supplied with one. This problem may also affect BBE Type 7.5HK, 15HK, and 38HK circuit breakers. Although information regarding this problem has been distributed by BBE and the Institute for Nuclear Power Operations (INPO), the Beaver Valley event indicates that this problem still exists. Licensees and applicants may wish to contact BBE to obtain additional information regarding this problem and appropriate corrective actions.

Failure of a circuit breaker to fully close on demand, inadvertent closure of a circuit breaker, or loose or missing closing spring charging motor mounting bolts could result in a circuit breaker not performing its intended function. This, in turn, could result in the loss of a power supply (such as a vital bus or a diesel generator).

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JERamsey  
08/04/87

\*PPMB:ARM  
TechEd  
08/06/87

\*C/OGCB:DOEA:NRR  
CHBerlinger  
08/21/87

D/DOEA/NRR  
CERossi  
08/25/87

breaker preventive maintenance program, which the licensee believes to be in accordance with the vendor's recommendations, did not detect this problem. The licensee believes the root cause of the problem to be insufficient torquing of the charging motor mounting bolts by the vendor.

Discussion:

With regard to the repeated closing and opening of the breaker, this problem was also reported to the NRC in accordance with the reporting requirements of 10 CFR 50.55(e) by Philadelphia Electric Company, for Limerick Unit 1, in 1983. The circuit breakers involved were returned to BBE for analysis, and BBE transmitted its findings to the NRC in a letter dated April 20, 1983. BBE stated that the repeated closing and opening of the circuit breaker can be corrected by the addition of a light spring to the close latch in the circuit breaker operating mechanism. The addition of this spring forces the clearances in the close latch and associated linkages to be taken up in one direction. This reduces the shock from the latch and linkages so that when the closing springs drive the close latch roller, which is part of the cam assembly, at the end of the charging cycle, the latch is held and does not slip. BBE also stated that, depending upon the year of manufacture, circuit breakers may or may not have been originally supplied with this spring. BBE recommended that these springs be installed in circuit breakers that were not originally supplied with one. This problem may also affect BBE Type 7.5HK, 15HK, and 38HK circuit breakers. Although information regarding this problem has been distributed by BBE and the Institute for Nuclear Power Operations (INPO), the Beaver Valley event indicates that this problem still exists.

Failure of a circuit breaker to fully close on demand, inadvertent closure of a circuit breaker, or loose or missing closing spring charging motor mounting bolts could result in a circuit breaker not performing its intended function. This, in turn, could result in the loss of a power supply important to safety (such as a vital bus or a diesel generator).

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08/ /87

This reduces the shock from the latch and linkages so that when the close latch roller, which is part of the cam assembly, is driven by the closing springs at the end of the charging cycle against the close latch, the latch is held and does not slip. BBE also stated that, depending upon the year of manufacture, circuit breakers may or may not have been originally supplied with this light spring. BBE recommended that light springs be installed in circuit breakers that were not originally supplied with one. This problem may also affect BBE Type 7.5HK, 15HK, and 38HK circuit breakers.

Another potential problem with BBE circuit breakers occurred at River Bend and was reported in Licensee Event Report (LER) 87-004, dated March 6, 1987. On February 6, 1987, with the unit at full power, the Division I Diesel Generator 4.16KV output circuit breaker (Gould-Brown Boveri Type 5HK) failed to close during the performance of a weekly surveillance test. The licensees' inspection of the output circuit breaker revealed that a mounting bolt had fallen out of the closing spring charging motor, rendering the motor inoperable. Further investigation revealed several other circuit breakers that contained loose or missing charging motor mounting bolts. The licensee also stated that their circuit breaker preventive maintenance program, which they believe is in accordance with the vendor's recommendations, did not detect this problem.

Discussion:

Failure of a circuit breaker to fully close on demand, inadvertent closure of a circuit breaker, or loose or missing closing spring charging motor mounting bolts could result in a circuit breaker not performing its intended function. This could result in the loss of a power supply important to safety (such as a vital bus or a diesel generator).

Although information regarding the installation of a light spring has been distributed by BBE and INPO, the occurrence of this event indicates that this problem still exists. Therefore, it is recommended that licensees and applicants take steps to assure that the light spring is present in BBE circuit breakers, and that the closing spring charging motor mounting bolts are not loose or missing.

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