

JAN 24 1986

MEMORANDUM FOR: C. J. Heltemes, Jr., Director  
Office for Analysis and Evaluation  
of Operational Data

FROM: Harold R. Denton, Director  
Office of Nuclear Reactor Regulation

SUBJECT: ABNORMAL OCCURRENCE REPORT TO CONGRESS  
FOR FOURTH QUARTER CY 1985

We have reviewed your memorandum of December 27, 1985, containing the first draft of proposed events to be included in the Fourth Quarter CY 1985 Abnormal Occurrence (AO) Report to Congress. We concur with the slate of events proposed as Abnormal Occurrences. We have prepared input for Appendix B of the report as requested. This input is provided in Enclosure 1. Enclosure 2 contains the information you requested regarding license suspensions, orders, and new generic safety issues.

Please contact Gary Holahan (27415) of the Operating Reactors Assessment Staff if you have any questions.

Original Signed by  
H. R. Denton

Harold R. Denton, Director  
Office of Nuclear Reactor Regulation

Enclosures:  
As stated

cc: P. Bobe

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congress*

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

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A handwritten signature in dark ink, appearing to read "H. R. Denton", is positioned above the typed name.

Harold R. Denton, Director  
Office of Nuclear Reactor Regulation

Enclosures:  
As stated

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## ENCLOSURE 1

### UPDATING MATERIAL (APPENDIX B OF AO REPORT)

#### AO 83-3 Failure of Automatic Reactor Trip System

This abnormal occurrence was originally reported in NUREG-0090, Vol. 6, No. 1, "Report to Congress on Abnormal Occurrences: January-March 1983". The report was updated and closed out in NUREG-0090, Vol. 6, No. 3, "Report to Congress on Abnormal Occurrences: July-September 1983". This AO is reopened as a result of several recent reactor trip breaker failures and is updated as follows:

On October 29, 1985, the D. C. Cook Nuclear Station Unit No. 2 tripped from approximately 80% of full power on a spurious indicated low flow condition. Immediately following the reactor trip, it was discovered that the Train "A" reactor trip breaker (RTB) did not open, and that the trip function was carried out by only the "B" train RTB. Subsequent action by the licensee included quarantine of the failed train "A" reactor trip breaker. The NRC dispatched an Augmented Incident Response Team to the site for further investigation.

All of the reactor trip breakers at D. C. Cook Nuclear Station Unit 2 were Westinghouse type DB-50 and had been refurbished at Westinghouse in July 1985. On November 3, 1985, the "B" train RTB (which had successfully tripped the reactor on October 29th) failed to pass the undervoltage trip attachment (UVTA) force margin test. Unlike D. C. Cook Nuclear Station Unit 1, neither RTB had the automatic shunt trip installed. The Westinghouse specification for the DB-50 RTB specifies a minimum trip force margin of 20 ounces above the maximum force required to trip the breaker. Testing of the "A" train RTB indicated that the UVTA force margin had dropped to 5 ounces or less. Testing of the "B" train RTB indicated that the UVTA force margin was no longer as great as 20 ounces. The root cause of the lost force margin is being determined. Preliminary investigation indicates that the loss may be due to lack of proper lubrication combined with assembly deficiencies in the UVTA itself.

On November 5, 1985, the NRC staff issued IE Bulletin No. 85-02 to all power reactor licensees and applicants describing the D. C. Cook event. The bulletin required that 9 Westinghouse PWR facilities which had not yet installed the automatic shunt trip coil must: a.) perform the UVTA force margin test within 7 days, b.) incorporate the UVTA force margin test into the normal RTB testing performed each month, c.) declare a RTB inoperable if it fails to pass the force margin test and notify the NRC within 4 hours of such a failure, and d.) provide a written report to the NRC discussing specific actions taken pursuant to the bulletin.

Of the 9 Westinghouse PWR facilities required to be tested, only the Kewaunee Nuclear Power Plant has reported RTBs failing the UVTA force margin test. On November 7, 1985, Kewaunee reported that both a "B" train RTB Bypass breaker and an "A" train RTB failed to trip with a 20 ounce weight attached to the trip bar. All of the 9 Westinghouse PWR facilities without the automatic shunt trip coil are scheduled to install the device prior to startup or by May 1986.

On June 5, 1985, one of the dc RTBs at the Rancho Seco Nuclear Power Generating Station failed to open when it's UVTA was actuated during a test. The RTBs at Rancho Seco are General Electric type AK-2-25 and had just been refurbished by GE-Atlanta and certified for service as safety-related RTBs by Babcock and Wilcox (B&W) Lynchburg. Although the UVTA had de-energized, its armature had not moved out of the energized position. Investigation revealed that the trip paddle had jammed against the armature, and as a result, the RTB would not trip. Subsequently, when the shunt trip coil was actuated, the trip paddle rotated to a position in which the armature could not engage the trip paddle when the UVTA is de-energized. Further investigation revealed that the clearance between the roller rivet and armature within the UVTA was significantly greater than the specified allowable range. This increased downward displacement was sufficient to allow the trip paddle to interfere with the armature. On July 17, 1985, an IE Information Notice 85-58 describing this problem was issued to all nuclear power facilities designed by Babcock and Wilcox and Combustion Engineering (CE) and holding an operating license or construction permit.

Recently, there have been two failures of the UVTAs in the GE AK-2-25 type RTBs at the Calvert Cliffs Nuclear Power Plant; one in February 1985 and one in July 1985. In the first failure, analysis revealed that several laminated sections that are part of the armature had slipped down and eliminated the air gap between the armature and the pole face. The physical contact between the laminations and pole face allowed the armature to be held down by residual magnetism after the dc power was removed, resulting in a slow response time, well above the licensee's acceptance criteria. In the second failure, laminations had moved down only slightly to make the air gap below tolerance, but physical contact with the pole face was not established. While this configuration did not affect the response time, it did affect the pickup and dropout voltages of the UVTA, causing them to be low.

On July 22, 1985, one of the GE AK-2-25 dc RTBs at the Oconee Nuclear Station Unit 1 failed to meet its required trip response time during on-line testing of an RPS channel while the unit was operating at 100% power. The failed UVTA was a new device installed on the RTB. A detailed inspection of the breaker showed a metal burr on the head of one of the mounting studs for the UVTA. The licensee concluded that the probable cause of the failure was that the armature of the UVTA brushed against the mounting stud as the armature moved toward the tripped position. It also was shown that the mounting stud heads of the new devices had square edges rather than round ones like on the older devices. According to the licensee, the possible reduced clearance between the armature and the mounting studs could have caused the contact, resulting in a slow response time. The licensee's review of previous RTB failures has indicated that another new UVTA installed in the same breaker had failed once before on April 29, 1985 because of mechanical binding. The cause of the previous failure, which also resulted in a slow trip response time, had been attributed to some particles, possibly paint chips or metal shavings, stuck in the pivot point of the UVTA.



In addition to the RTB failures discussed above, GE notified the NRC and affected facilities on September 13, 1985 of certain defects in the UV trip devices supplied for use on AK and AKR type low-voltage power circuit breakers. Subsequently, GE issued Service Advice Letter No. 300 on September 26, 1985 that outlines the actions to be taken with respect to those defects. One of the defects addressed by GE involved insufficient clearance between the armature and mounting stud, similar to the Oconee problem. The other defect involved improper painting of the mating surfaces of the armature and pole pieces in ac powered UV devices.

Information regarding the events at Calvert Cliffs, Oconee, and the GE notification letter was provided to all nuclear power facilities designed by B&W and CE and holding an operating license or construction permit in IE Information Notice: 85-58 Supplement 1 on November 19, 1985.

The specific and general issues associated with these RTB UVTA failures continue to be under active review by the nuclear industry and the NRC. However, unless significantly new issues are identified, this incident is closed for purposes of this report.

#### AO 85-87 Loss of Main and Auxiliary Feedwater Systems at Davis-Besse

This abnormal occurrence was originally reported in NUREG-0090, Vol. 8, No. 2, "Report to Congress of Abnormal Occurrences April - June 1985," and updated last in Vol. 8, No. 3. The item is further updated as follows:

Following completion of the NRC investigation of the June 9, 1985 incident, Toledo Edison Company embarked on a program of troubleshooting and analysis to identify the fundamental cause for each of the equipment malfunctions or failures and to formulate corrective actions to assure equipment reliability. These efforts were completed during the quarter.

Based upon the findings of the Incident Investigation Team reported in NUREG-1154, the NRC identified the concerns Toledo Edison Company should address for NRC review before resumption of operation of the plant can be approved. These concerns were identified to the licensee in a letter dated August 14, 1985. The licensee responded in a document submitted to the NRC on September 10, 1985, entitled, "Davis-Besse Course of Action." The staff has essentially completed its review of this document and is currently preparing a Safety Evaluation Report to address plant re-start. The Commissioners were briefed by the staff on December 18, 1985 regarding the status the staff's review regarding plant re-start.

Shortly after the event of June 9, 1985, the licensee undertook steps to accelerate the installation of an electrically driven startup feedwater pump. This pump had previously been scheduled to be installed in the spring of 1986. The pump has now been installed, but is not yet fully operational.

AO 84-2 ("Through Wall Crack in Vent Header Inside BWR Containment Torus")

This event, discovered on February 3, 1984, at Hatch Unit 2, was originally reported in NUREG-0090, Vol. 7, No. 1 and closed out in NUREG-0090, Vol. 7, No. 4. In light of a recent similar event at Hatch Unit 1, the event write-up is updated as follows.

As discussed in a previous report, on February 3, 1985, a through wall crack was discovered in the vent header within the containment torus which degraded the containment pressure suppression capability of Georgia Power Company's Hatch Unit 2, a boiling water reactor (BWR) located in Appling County, Georgia. The cause of this crack was determined to be brittle fracture and was attributed to impingement of low temperature nitrogen onto the vent header. Recently, it was learned that Georgia Power Company had discovered yet another crack on December 15, 1984 during inservice inspection of selected welds. This time the crack was in the Unit 1 drywell inerting and purge line. In a recent meeting with the staff, the licensee stated that the likely cause of the crack was the growth of a pre-existing weld defect although cold nitrogen injection from the makeup system could not be ruled out as the primary cause.

The crack was discovered during inservice inspection (ISI) tests which used a magnetic particle inspection method. During this testing a linear through wall crack approximately 2-3/4 inches long was discovered in a weld located in the 18 inch nitrogen inerting and purge line between the drywell penetration and inboard containment isolation valve (ref. LER 84-25). The crack was located approximately two feet downstream from the point where a 2 inch nitrogen makeup line enters the 18 inch purge line. Cold nitrogen entering the purge line from the makeup line makes contact with the purge line in the area of the weld, the contour of which makes it a likely spot for a thermally induced failure to occur.

The crack has been ground out and the weld has been repaired and satisfactorily tested. The licensee's corrective actions included raising the nitrogen makeup low temperature alarm set point to 10°F from 0°F and revising the annunciator response procedures to terminate nitrogen makeup when the annunciator is actuated.

In meetings with the licensee, the staff has learned that the licensee performed only a visual inspection of the Unit 1 nitrogen inerting and purge line welds rather than the ultrasonic testing recommended by the reactor vendor as follow-up to the original Hatch Unit 2 vent header crack event. The visual inspections would not have discovered the crack found during the ISI. Therefore, the crack could have existed at the time vendor recommended inspections were implemented. In addition, the nitrogen makeup line was not considered by the licensee to be covered within the scope of the vendor's Service Information Letter (SIL) as a source of cold nitrogen (less than 40°F) into containment systems, because of: the use of relatively low flow rates; and the long run of bare piping inside the warm reactor building. The licensee did confirm, however, the makeup portion of the inerting system was in use for an 18 1/2-hour period in February 1984 when the ambient temperature did not get above 22°F. Makeup line nitrogen temperatures during this period were not known.

On December 31, 1985, the staff issued IE Information Notice 85-99 which describes the Unit 1 crack experience and the licensee's corrective actions. In addition, the staff has issued a letter to the BWR Regulatory Response Group (December 23, 1985) requesting a meeting to review the effectiveness of voluntary industry actions taken in response to the original vent header crack at Hatch Unit 2.



ENCLOSURE 2

ADDITIONAL INFORMATION REQUESTED FROM NRR REGARDING  
LICENSE SUSPENSIONS, ORDERS AND NEW SAFETY ISSUES

1. License Suspensions:

There have been no license suspensions for commercial nuclear power reactors during the Fourth Quarter CY 1985.

2. Orders Covering License Modifications for Safety Reasons:

There have been no orders covering license modifications for safety reasons issued during the Fourth Quarter CY 1985.

3. Identification of Those Generic Safety Concerns Approved by the Director of NRR in the Fourth Quarter CY 1985:

- a. Generic Issue 97, "Reactor Cavity and Uncontrolled Exposures."
- b. Generic Issue 111, "Stress Corrosion Cracking of Pressure Boundary Ferretic Steels in Selected Environments."
- c. Generic Issue 112, "Westinghouse RPS Surveillance Frequencies and Out-of-Service Times."
- d. Generic Issue 119, "Piping Review Committee Recommendations."