James A. FitzPatrick Nuclear Power Plant P.O. Box 41 Lycoming, New York 13093 315 342-3840



William Fernandez II Resident Manager

October 5, 1989 JAFF-89-0713

United States Nuclear Regulatory Commission Decument Control Desk washington, D.C. 20555

REFERENCE: DOCKET NO. 50-333 LICENSEE EVENT REPORT: 88-014-01

Dear Sir:

Enclosed please find referenced Licensee Event Report in accordance with 10 CFR 50.73.

If there are any questions concerning this report, please contact Mr. W. Verne Childs at (315) 349-6071.

Very truly yours,

WILLIAM FERNANDEZ

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Enclosure

cc: USNRC, Region I (1) INPO Records Center, Atlanta, GA (1) American Nuclear Insurers (1) Internal Power Authority Distribution NRC Resident Inspector Document Control Center LER/OR File

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UPDATE REPORT - Previous Report Dated January 4, 1989

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Description of Event

On November 5, 1988, during an outage for refuel, maintenance, and modification, Residual Heat Removal Service Water (RHRSW) (Essential Service Water [BI]) pump 10-P-1D circuit breaker would not trip in response to an operator demand signal from the remote (main control room) location. RHRSW pump 10-P-1D is powered from Safety Division 2 4160 VAC bus 10600 (Class 1E medium voltage power system [EB]).

Attempts to trip the circuit breaker locally also failed until electrical maintenance personnel depressed the circuit breaker manual close button on the front of the circuit breaker. This caused the circuit breaker to trip and allowed it to be withdrawn (removed) from the housing for further investigation. It is believed that the circuit breaker tripped at this time because the earlier trip signal had released the trip latch but binding prevented movement of the trip mechanism linkage. Depressing the close button resulted in release of the energy stored in the closing springs and caused enough vibration to allow the trip linkage to overcome the friction of the binding parts and complete the trip actuation.

Inspection of the circuit breaker revealed a bent snap-ring (retaining ring) and two bent spacer washers (shims) in the bottom of the circuit breaker frame. The snap-ring and shims are part of the "prop-pin" assembly and are intended to establish the axial position of the proppin. The operating mechanism for the opening and closing of the circuit breaker main electrical contacts uses a linkage which is maintained in position by a "prop" at one point in the linkage. When the circuit breaker is tripped, the prop in the linkage is removed, the linkage collapses and a spring opens the main contacts. During closing of the circuit breaker main electrical contacts the prop-pin is supported by the prop making the linkage rigid and stored energy from the closing springs close the main contacts.

Based on finding the bent snap-ring and shims it appeared that the snap-ring and shims were installed so that the prop struck the snap-ring resulting in bending of the snap-ring. Once the snap-ring was bent, the shims were free to move on the prop-pin and the prop-pin could also move in the axial direction. It is believed that the shims probably moved to the end of the prop-pin resulting in binding between the prop-pin, shims, and the circuit breaker frame. As a result, the prop-pin did not move to allow the linkage to collapse and open the main contacts. It is also possible that the prop-pin moved in an axial direction (due to the loss of the snap-ring and shims) enough for the end of the prop-pin to catch in a cut-out hole in the frame. This would also result in restraining motion of the prop-pin so that the linkage could not collapse and open the main contacts.

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Since the failed circuit breaker was associated with RHRSW pump 10-P-1D (in Safety Division 2) while redundant RHRSW pumps 10-P-1A and 10-P-1C (in Safety Division 1) were operable, this failure by itself was not considered an event requiring submittal of a Licensee Event Report (LER) under 10 CFR 50.73.

During the repair of the circuit breaker for RHRSW pump 10-P-1D and investigation into possible causes of failure, it was noted that the circuit breaker had been refurbished by the manufacturer in 1987. A review of maintenance records revealed that 19 of 20 Class 1E 4160 VAC circuit breakers had been refurbished during 1987 or 1986. In addition, 32 of 32 Non-Class 1E 4160 VAC [EA] circuit breakers had also been refurbished during the same time intervals. Because the cause of the bent snap-ring and shims was believed to be the result of the prop striking the snap-ring and shims, inspection of the other circuit breakers (both Class 1E and Non-Class 1E) was initiated.

Prior to plant startup on November 20, 1988, 8 of 20 Class 1E 4160 VAC circuit breakers were inspected. No misalignment of the prop-pin was found, the failure of the RHRSW circuit breaker appeared to be an isolated event.

Following a plant shutdown on December 3, 1988 for turbine generator [TA] modification, work on additional circuit breaker inspections was continued. On December 5, 1988 inspection of Emergency Diesel Generator (EDG) A [EK] output circuit breaker revealed a very close tolerance between the prop and the snap-ring on the prop-pin. While it does not appear that the prop had contacted the snap-ring or shims, the number and location of the shims was changed to provide the clearance necessary to assure that the prop would not strike the snap-ring on either end of the prop-pin.

In addition to adjustment of the axial position of the prop-pin in the circuit breaker for EDG A output, three other circuit breakers (associated with Non-Class 1E 4160 VAC loads) were found with close tolerances between the prop and the prop-pin snap-ring. In each case the number and location of the shims was changed to provide assurance that the prop would not strike the snap-ring.

Following plant startup and following the initial issue of this LER, discussions were held with personnel from the manufacturer's service facility where the circuit breakers had been refurbished. Based on these discussions, the circuit breaker for RHRSW pump 10P-1D was removed from service for additional inspections and tests. These inspections and tests were conducted at the manufacturer's service facility on March 30, and 31, 1989.

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During the inspections and tests it was determined that the misalignment which allowed the prop to strike the prop-pin snap-ring was a result of improper positioning of the linkage which positions the prop in relation to the snap-ring and shims on the prop-pin rather than a mispositioning of the prop-pin. Review of procedures and work practices used by maintenance personnel at the manufacturer's facility revealed the following:

- When circuit breakers were disassembled, personnel recorded the number and location of shims to ensure reassembly of the prop-pin with the same number of shims and in the same location as prior to disassembly.
- Scribe marks were applied to the crank shaft at points where linkage parts, which operate the prop, are attached. The scribe marks ensure that the linkage is attached in the same position during reassembly.
- Recording of the number of shims, their location, and the placing of scribe marks on the crank shaft were informal practices rather than requirements stated in procedures.
- During reassembly the number and location of prop-pin shims, as well as the location of the linkage attachments on the crank shaft, were based on the "as-found" (prior to disassembly) data and scribe marks rather than any qualitative set of measurements or observation of proper dimensional clearance requirements set forth in the procedures. In other words, the disassembly and reassembly practices and procedures could result in a circuit breaker that was misaligned prior to disassembly being reassembled with the same misalignment.

Additional inspection revealed that the position (location) of the linkage attachment on the crank shaft directly effects the clearance between the prop and prop-pin snap-ring and associated shims. Adjustment of the position of the linkage on the crank shaft resulted in approximately equal clearances between the prop and prop-pin snap-ring and shims on both the right and left ends of the prop-pin with an equal number of shims on each end.

Cause of Event

The cause of the event was a procedure deficiency. Investigation revealed that the procedures used by the manufacturer's service shop personnel did not provide specific guidance or inspection steps for verification that the linkage attached to the crank shaft is positioned to provide approximately equal right- and left-hand clearances between the prop and the prop-pin snap-ring and shims. In addition, procedures did not verify proper axial positioning of the prop-pin to assure no contact between the prop-pin snap-ring and the prop.

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Analysis of Event

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The failure of the circuit breaker for RHRSW pump 10-P-1D to trip on operator demand had no significant effect. The plant was in the cold condition and had been shutdown for 70 days. The EDG A output circuit breaker did not actually fail, however it appears that conditions for a future potential failure may have existed. From the nature of the actual and possible circuit breaker failures, it can be concluded that the procedure deficiency could result in common cause failures of more than one train of multiple train safety systems or cause failures within different systems at the same time. Since both of the Class 1E 4160 VAC electrical distribution systems are provided power from either the Non-Class 1E 4160 VAC power system [EA] or from EDGs [EK] and since all of the 4160 VAC circuit breakers are of the same type, a number of possible (but improbable) combinations of simultaneous common-cause failures could result.

Failure of any of the circuit breakers to close or open during plant operation would result in immediate investigation and initiation of corrective action because failures during plant operation would result in entry into a Technical Specification Limiting Condition of Operation (LCO). Entry into a Technical Specification LCO would either result in repair of the failure within the time period allowed by Technical Specifications or a plant shutdown would be required. In either case coincident failure of two or more circuit breakers would be improbable or have no significant effect due to the short time period of plant operation under the conditions allowed by the LCO or because the plant would be shutdown if the conditions and time limits of the LCO could not be met.

Corrective Action

Short-term corrective action:

- 1) The circuit breaker for RHRSW pump 10-P-1D was repaired.
- 2) Inspection of other circuit breakers was initiated and proper axial positioning of the prop-pin verified or corrected. This action has been completed on 32 of 32 Non-Class 1E circuit breakers and 20 of 20 Class 1E circuit breakers.
- 3) The manufacturer was informed of the apparent procedure deficiency and has stated that the procedures have been corrected.

Long-term corrective action:

 Verification of proper prop to prop-pin snap-ring clearance will be added to plant planned maintenance procedures for 4160 VAC circuit breakers.

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