



PRIORITY ROUTING			
First		Second	
✓ RA	has	RC	
✓ DRA	has	EIC	
orig + ✓ DRP	has	SGA	
✓ DRS	has	OI	
DNMS		PAO	
DRMA			
FILE <u>has</u>			

Public IE-01  
Illinois Power Company  
Clinton Power Station  
P.O. Box 678  
Clinton, IL 61727  
Tel 217 935-6220  
Fax 217 935-4632  
Wayne D. Romberg  
Assistant Vice President - Nuclear

U-602805  
4F.190

August 1, 1997

Docket No. 50-461

Mr. A. Bill Beach  
Regional Administrator, Region III  
U. S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, Illinois 60532-4351

Subject: Revision to Update on Westinghouse 4160-Volt  
Circuit Breakers at Clinton Power Station

Dear Mr. Beach:

Attached are copies of changes to pages of Illinois Power letter U-602803, dated August 1, 1997. These changes are based on a conversation between myself and J. Grobe of your staff. The changes made are marked with a revision bar in the right hand margin. Please insert these pages in place of the original pages of the letter.

Sincerely yours,

Wayne D. Romberg  
Assistant Vice President

MRS/krk

Enclosure

cc: J. L. Caldwell, USNRC, Region III  
G. C. Wright, USNRC, Region III  
M. A. Ring, USNRC, Region III  
NRC Resident Office, V-690  
Document Control Desk, USNRC  
Dave Zemel, T-31Z



100083  
9708140383 970801  
PDR ADOCK 05000461  
P PDR

AUG 07 1997

- A sample of electrical, mechanical, and control and instrumentation procedures will be reviewed for conformance with vendor instructions. This will be completed by August 1, 1998.
- Westinghouse 4160-volt safety-related circuit breakers will be inspected after switching operations to ensure they have operated completely and the charging springs are charged. This inspection will be performed within one shift of a switching evolution and on each circuit breaker prior to startup from the current outage. Operating procedures will be revised to initiate this inspection. These procedure changes will be completed prior to startup.
- The failed safety-related Westinghouse circuit breaker will not be placed back in service unless the cause of the failure can be determined.
- An independent circuit breaker expert will assist in determining the cause of the Westinghouse safety-related circuit breaker failure.

#### Westinghouse Safety-Related Circuit Breaker Failure To Trip

On July 22, 1997, a Westinghouse 4160-volt safety-related circuit breaker failed to open when required. Failure of this circuit breaker during plant operation would not have caused the plant to trip off line. Inspection of the circuit breaker while it remained in the cubicle revealed it was in an intermediate position (photographs of the circuit breaker in the intermediate position are enclosed). In this position the circuit breaker is still able to carry electrical load. In order to remove the circuit breaker from the cubicle, it was fully closed and was successfully opened from that position.

The cause of the circuit breaker to operate to the intermediate position could not be conclusively determined. The circuit breaker was inspected onsite by Westinghouse and Illinois Power personnel and dismantled offsite by Cutler-Hammer (the current manufacturer of the circuit breaker).

Illinois Power analyzed the as found intermediate position of the circuit breaker and determined the possible deficiencies that could cause the circuit breaker to be in this position. The possible deficiencies that would cause the circuit breaker to be in the intermediate position when operating in either the closed or open directions are: bent or misaligned operating linkages, degraded lubricant, binding of operating mechanism, debris preventing circuit breaker operation, weak closing or opening springs, malfunction of the trip latch.

During the offsite dismantling of the circuit breaker the possible causes of the circuit breaker being in the intermediate position after a trip signal was received (i.e. failure in the opening direction) were investigated. The operating linkages were checked for misalignment or physical damage. No damage of these linkages was noted. The puffer tube assembly was found slightly out of alignment. The puffer tube assembly was readjusted with no affect on circuit breaker operation. The lubricated portions of the operating mechanism were inspected for degraded lubricant. Some dry, sticky lubricant was found on the pivot points for the circuit breaker's contact operating rods. However,

these pivot points have fairly loose tolerances and still operated freely. Inspection of the circuit breaker bearing lubricant disclosed that the lubricant was in like-new condition. Extensive examination and testing of the operating mechanism was conducted. No binding or abnormal operation was observed. No debris was found during the inspection which could have caused the circuit breaker to fail to operate. The spring strength and alignment were checked with no abnormalities noted.

During the offsite dismantling of the circuit breaker the possible causes of the circuit breaker being in the intermediate position after a close signal (i.e., failure in the closing direction) was also investigated. The operating linkages were checked for misalignment or physical damage. No damage of these linkages was noted. The puffer tube assembly was found slightly out of alignment. The puffer tube assembly was readjusted with no affect on circuit breaker operation. The lubricated portions of the operating mechanism were inspected for degraded lubricant. Some dry, sticky lubricant was found on the pivot points for the circuit breaker's contact operating rods. However, these pivot points have fairly loose tolerances and still operated freely. Inspection of the circuit breaker bearing lubricant disclosed that the lubricant was in like-new condition. Extensive examination and testing of the operating mechanism was conducted. No binding or abnormal operation was observed. No debris was found during the inspection which could have caused the circuit breaker to fail to operate. The spring strength and alignment were checked with no abnormalities noted. The trip latch was inspected for a condition which may have caused it to properly latch when attempting to close the circuit breaker. The inspection revealed that the trip latch was slightly out of specification but we could not make it fail to operate on several subsequent cycles.

During testing of the circuit breaker it was consistently demonstrated that if the circuit breaker was fully open or closed it would operate when required. Illinois Power believes that the circuit breaker was in the intermediate position when it was closed prior to the failure of the circuit breaker to open. A failure of the circuit breaker to completely close can be detected by a visual inspection of the circuit breaker local mechanical position indication.

The vendor analysis of the condition of the circuit breaker after testing and disassembly stated that the previous preventive maintenance activities performed on the circuit breaker were satisfactory to maintain the circuit breaker and should be continued. **The vendor also noted that, based on the condition of this circuit breaker, the other in-service Westinghouse circuit breakers will operate satisfactory on demand. No abnormalities were detected through tests or inspections that could have caused the circuit breaker to fail to open.** (Attached is a copy of the Westinghouse preliminary report).

In order to ensure that circuit breakers at Clinton Power Station will operate when required the Westinghouse 4160-volt safety-related circuit breakers will be inspected after switching operations and prior to startup from the current outage. This inspection will verify that the circuit breaker has operated completely to the expected position and that the charging springs are fully charged and will be performed within one shift of a switching evolution. Operating procedures will be revised to require notification of electrical maintenance to verify the mechanical indication of circuit breaker

position and charging springs. These procedure changes will be completed prior to startup. Electrical maintenance personnel will conduct, document, and track this inspection in accordance with the maintenance work request procedure. This inspection will continue to be performed by electrical maintenance technicians that have been specifically trained for this inspection. Also, the circuit breaker that failed on July 22, 1997 will not be placed back into service at Clinton Power Station unless the cause of the failure to open can be determined.

Illinois Power is continuing to pursue the cause of the failure of this circuit breaker. An independent circuit breaker expert will review the failure mode and inspection and test data to assist in cause determination.

As detailed in Illinois Power letter U-602787, dated July 16, 1997, Illinois Power plans to have installed new or refurbished Westinghouse 4160-volt safety-related circuit breakers in-service in all Division II circuit breaker cubicles before the start of a planned mid-cycle outage. This mid-cycle outage is scheduled for April 1998. Nine of the ten Division I Westinghouse 4160-volt safety-related circuit breakers will be replaced with new or refurbished circuit breakers by September 25, 1998. The remaining Westinghouse 4160-volt safety-related circuit breakers will be replaced with a new or refurbished circuit breaker during the next refueling outage. This outage is scheduled for the spring of 1999.

**Based on the opinion of the circuit breaker vendor that performed the tests and inspections, Illinois Power's review of the circuit breaker's condition, and compensatory actions Illinois Power is taking to ensure proper circuit breaker operation, there is reasonable assurance that the in-service safety-related Westinghouse 4160-volt circuit breakers will operate when required.**

#### Failure of Westinghouse 4160-Volt Circuit Breaker Due to Relay Mis-Wiring

In a separate event on July 22, 1997, during restoration from an electrical bus outage, two non-safety related Westinghouse 4160-volt circuit breakers failed to close on demand. The first failure of a Westinghouse non-safety related circuit breaker to close on demand was because a contact for a seal-in circuit in an undervoltage relay on the electrical bus was mis-wired. This caused the circuit breaker to not receive the signal to close. It is suspected that the seal-in circuit mis-wiring may have been caused by a lack of clarity in the design drawings. Removal of the contact from the seal-in circuit can be accomplished by either moving the contact out of the way, so it does not make contact when the relay actuates, or removing an internal jumper in the relay. The drawings for this circuit do not show that the contacts for the seal-in function are enabled. The drawings also do not describe the method to disable the seal-in function of the relay. The contact for this electrical bus undervoltage relay has been rewired (i.e. jumper removed) so the seal-in function is disabled. The applicable drawings will be revised to clearly indicate that the jumper should be removed to disable the seal-in function for these relays.

A review of the potential for the seal-in function of this relay to be enabled on safety-related and non-safety related electrical distribution systems was performed. There



are seven relays in the safety related electrical distribution system that could cause this problem. The results of this review disclosed that the safety-related electrical busses have had the internal jumper removed from the undervoltage relay to prevent the seal-in function from operating. The removal of this jumper is periodically verified for the safety-related relays during the performance of surveillance procedures. However, these surveillances are not performed on the non-safety related distribution system. This condition is self revealing after an undervoltage condition such as an electrical bus outage. Recent non-safety electrical bus outages have not disclosed any further instances of this condition. In addition, a maintenance work request has been issued to ensure the relay is properly configured relative to jumpers and contacts on all forty-six of the affected non-safety related relays. **Because the safety-related relays are periodically verified to not have the seal-in circuit activated this condition does not affect the associated safety-related Westinghouse circuit breakers.**

#### Failure of Westinghouse 4160-Volt Circuit Breaker Due to Latch Check Adjustment

The cause of the second failure of a non-safety related Westinghouse circuit breaker to close was that the contacts on the latch check switch, which provides a permissive to close the circuit breaker, did not make-up as required. This was caused by the latch check switch being out of adjustment. During preparation for the adjustment of the latch check switch it was discovered, with assistance from Westinghouse personnel, that the method used in the plant procedure to adjust the latch check switch was incorrect. This correct method was used to check and readjust the switch as necessary on both safety and non-safety related circuit breakers. However, prior to the procedure being revised in April 1997, the instructions in the procedure were correct and consistent with those in the vendor manual. Review of maintenance history showed that only one circuit breaker was checked for proper latch check switch adjustment using the deficient procedure. This circuit breaker was subsequently checked for proper latch check switch adjustment. Adjustment of this latch check switch was not required.

Because the latch check switch was found out of adjustment on the non-safety related circuit breaker, and CPS procedures are the same for safety-related circuit breakers, all of the safety-related circuit breakers that are needed to actively close to perform their safety function (twenty-two of twenty-four in-service safety-related circuit breakers) have been checked for proper latch check switch adjustment. Those that were not properly adjusted have been corrected. To date, the check of the adjustment of the latch check switches has revealed that twenty of twenty-eight checked (this includes some non-safety related circuit breakers) were out of adjustment. The procedure that checks this adjustment has been revised to reflect the correct method of performing this task and is normally performed during circuit breaker preventive maintenance activities. **Therefore, since this condition has been corrected on those circuit breakers that are needed to actively close to perform their safety function there is no impact on the ability of these circuit breakers to perform their safety function.**

Illinois Power is also taking actions to determine if there are additional problems with maintenance procedures that implement vendor instructions. Maintenance personnel will review the Westinghouse circuit breaker vendor maintenance instructions against the instructions in the maintenance procedure to determine if there are other instances where the circuit breaker maintenance procedures are not consistent with those in the vendor