

INDIANA & MICHIGAN ELECTRIC COMPANY

DONALD C. COOK NUCLEAR PLANT

PROCEDURE COVER SHEET

MAINTENANCE DEPARTMENT
CONTROLLED DOCUMENT
COPY NO. _____

Procedure No. **1MHP2140.082.001

Revision No. 0

TITLE MAINTENANCE PROCEDURE FOR REPOWERING AN RHR PUMP

SCOPE OF REVISION



SIGNATURES	REVISION NUMBER			
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PREPARED BY	<i>[Signature]</i>			
DEPARTMENT HEAD APPROVAL	<i>[Signature]</i>			
INTERFACING DEPARTMENT HEAD CONCURRENCE	N/A			
QUALITY ASSURANCE SUPERVISOR APPROVAL	<i>[Signature]</i>			
PLANT NUCLEAR SAFETY COMMITTEE	<i>[Signature]</i>			
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INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT

1.0 TITLE: Maintenance Procedure for Repowering an RHR Pump

2.0 OBJECTIVE

2.1 This procedure provides instructions for the installation of a temporary power feed to either a disabled Unit 1 East or West RHR pump from a power source in Unit 2. It is intended for use when the power and/or control cables for both RHR pumps have been fire damaged resulting in a loss of operability of the RHR system.

3.0 REFERENCES

- 3.1 Equipment Control - Clearance Permit System - PMI-2110.
- 3.2 Radiation Protection Manual, Section 5.F and Procedure No. THP.6010.RAD.406 Radiation Work Permit.
- 3.3 Plant Safety Manual, General Safety G.9.
- 3.4 Maintenance Procedure 12MHP5021.082.006.
- 3.5 Temporary Modifications, PMI-2140.
- 3.6 A.E.P. High Voltage Cable Splicing & Terminating Procedures and Training Manual.
- 3.7 I&M Electric Company Guide to High Voltage DC Testing of Cables.
- 3.8 10CFR50, Appendix R, Section III, L.5.
- 3.9 Control of Special Tools and Measuring and Test Equipment, MHI-5060.

4.0 PRECAUTIONS

- 4.1 Calibrated tools or measuring and test equipment shall not be used in a manner that would invalidate its calibration.
- 4.2 If temporary cable routes break a fire barrier's integrity (i.e., prevents a fire door's full closure) a fire watch shall be posted until the fire barrier is returned to normal.

5.0 LIMITATIONS

- 5.1 Subsections and steps within Section 7.0 should be accomplished in the sequence shown, unless specified otherwise in the body of the procedure. Steps which are performed out of sequence shall be indicated by a short explanation of why it was performed out of sequence and initialed by the Maintenance Supervisor assigned the work.
- 5.2 The Maintenance Supervisor assigned the work is responsible for ensuring that the controlled copy of this procedure is the latest revision and includes all applicable approved change sheets.
- 5.3 The Maintenance Supervisor assigned the work is responsible for ensuring that the controlled copy of this procedure is maintained at the work site, if not in a radiological controlled area, and that required data is entered in the controlled copy. If the work to be performed is in a radiological controlled area, the controlled copy shall be maintained in the Supervisor's office and a controlled working copy shall be available at the job site.

NOTE: When a controlled working copy is being used at the work site, data should be entered as best as practical.

- 5.4 The Maintenance Supervisor assigned the work is responsible for initialing all steps which are performed out of sequence. All steps which will not be performed based on the scope of work, will be indicated by "N/A" in the appropriate sign off blank, and initialed by the Supervisor with a brief explanation of why the step was not performed.
- 5.5 Attachments No. 2 or 3 must be completed for Lifted Leads or Electrical Jumpers, per PMI-2140. Multiple copies of these attachments may be used.
- 5.6 Steps in the procedure which require a verification by the Maint. Supv. may be performed by a qualified individual designated by the Supervisor, provided that individual is independent of the work being performed.
- 5.7 It is assumed that the equipment required by this procedure is available. Additionally, use of equipment required from the opposite (unaffected) unit should not impair safe continued operation or shutdown of that unit.



6.0 INITIAL CONDITIONS

NOTE: Temporary power may be obtained from one of the U2 RHR or CTS pumps, or from a U2 4KV breaker, as applicable, after consulting the IAG and corporate engineering support teams. If used, the pump must be returned to operable status (for U-2) within 72 hours (Modes 1, 2, & 3 for RHR; Modes 1, 2, 3, & 4 for CTS) per Tech. Spec. Section 3.5.2 and 3.6.2.1, respectively.

- 6.1 Maint. Mech. Indicate which Unit 1 pump is to be repowered, and which Unit 2 pump-breaker or supply 4KV breaker, as applicable, will be used for the power supply.
- Unit 1 pump _____
- Unit 2 pump-breaker _____
- Unit 2 Supply 4KV breaker _____
- _____
Performed By Date
- 6.2 Maint. Mech./ Enter Job Order Number.
- _____
J.O. #
- 6.3 Maint. Mech. Obtain the necessary Clearance Permit(s) and record the Clearance Permit number(s).
- _____
Clearance Permit #
- 6.4 Maint. Mech. Notify the Unit Supervisor that work is to be started.
- _____
Unit 1 Supervisor Date
- _____
Unit 2 Supervisor Date
- 6.5 Maint. Mech. Verify that all materials which are known to be required are available prior to starting the work. See Attachment No. 1 for a list of required materials.
- _____
Verified By Date

7.0 DETAILS

7.1 DISCONNECTING POWER - UNIT 1 MOTOR

- 7.1.1 Maint. Mech. Verify the breaker for the Unit 1 pump has been racked out and tagged and the motor is de-energized. See Step 6.1.
 1 E RHR Pump (1-PP-35E) = Breaker T11D6
 1 W RHR Pump (1-PP-35W) = Breaker T11A4
- 7.1.2 Maint. Mech. Verify grounds are installed on the existing power feed. Disconnect the power cable from the U-1 RHR pump motor and breaker. Apply Temporary Modification I.D. Tags. Enter data and sign-off Attachment No. 2.
- 7.1.3 Maint. Mech. Disconnect the flex conduit and remove it from the terminal box.

7.2 TEMPORARY POWER SUPPLY - UNIT 2

NOTE: Subsection 7.2.1 should be used if temporary power is to be obtained from a Unit 2 RHR or CTS pump. Subsection 7.2.2 should be used if temporary power is to be obtained from a Unit 2 4KV breaker.

7.2.1 RHR OR CTS PUMP MOTOR - UNIT 2

- 7.2.1.1 Maint. Mech. Verify the breaker for the unaffected Unit 2 pump has been racked out and tagged, and the motor is de-energized. See Step 6.1.
 2 E RHR Pump (2-PP-35E) = Breaker T21D6
 2 W RHR Pump (2-PP-35W) = Breaker T21A4
 2 E CTS Pump (2-PP-9E) = Breaker T21D4
 2 W CTS Pump (2-PP-9W) = Breaker T21A3
- 7.2.1.2 Maint. Mech. Verify grounds have been installed on the breaker/cable. Disconnect the power cable at the U-2 breaker.
- 7.2.1.3 NOTE: Mark the cables to ensure proper phasing when the cables are re-terminated.
- Maint. Mech. Disconnect the existing power cable from the selected U-2 RHR or CTS pump motor, as applicable. Apply Temporary Modification I.D. Tags. Enter data and sign-off on Attachment No. 2.
- 7.2.1.4 Maint. Supv. Verify the power feeds for the U-1 and U-2 pump motors have been lifted correctly and temporary I.D. tags have been applied. Sign-off on Attachment No. 2.



7.2.2 4KV BREAKER - UNIT 2

- 7.2.2.1 Maint. Mech. Verify the appropriate Unit 2 4KV breaker has been racked out and tagged. See Step 6.1.
- 7.2.2.2 Maint. Mech. Verify grounds have been installed on the breaker/cable, as applicable.
- 7.2.2.3 NOTE: Mark cables to ensure proper phasing when the cables are re-terminated.
- Maint. Mech. Disconnect the existing power cable from the breaker, if applicable. Apply Temporary Modification I.D. Tags. Enter data and signoff on Attachment No. 2, if applicable.
- 7.2.2.4 Maint. Supv. Verify the power feed for the U-1 RHR motor and the U-2 4KV breaker (if applicable) have been properly lifted and Temporary I.D. Tags have been applied. Sign-off on Attachment No. 2, as applicable.

7.3 CONNECTING POWER

- 7.3.1 Maint. Mech. Route the jumper cable assembly between the U-2 motor or the selected supply 4KV breaker, as applicable, and the U-1 motor.
- 7.3.2 Maint. Mech. NOTE: Preferred routing is overhead in the hallway as opposed to laying the cable on the floor.
- Connect the temporary power cable to the motor end of the Unit 2 pump power cable or to the selected supply 4KV breaker, as applicable, using the appropriate section(s) of Maint. Procedure 12MHP5021.082.006. Route the cable thru the hole where the flex conduit was removed. Use the mica board and cable ties to support the cable inside the box.
- 7.3.3 Maint. Mech. Protect the pump end of the temporary power cable and perform a hi-pot test of the new power cable assembly. Record test instrument data below.

Test Instrument I.D. #	Calib. Date/Due Date
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7.3.4 Maint. Mech. Connect the temporary power cable to the U-1 pump using appropriate sections of Maintenance Procedure 12MHP5021.082.006.

7.3.5 Maint. Mech. NOTE: Existing clearances may have to be released and appropriate clearances hung to perform the rotational check.

Connect the temporary power cable to the U-2 breaker, using appropriate section of Maintenance Procedure 12MHP5021.082.006, and bump for rotation. Apply Temporary Modification I.D. Tags. Swap leads at the breaker, if required, to achieve proper rotation. Mark the cables to ensure proper phasing when the breaker is returned to normal service. Enter data and sign-off on Attachment No. 3.

7.3.6 Maint. Supv. Verify the temporary power cable is properly installed and temporary I.D. tags are attached. Sign-off on Attachment No. 3.

7.3.7 Maint. Mech. Notify the Control Room/Shift Supervisor that the new RHR pump power cable has been installed and tested and that the pump is functional.

Performed By

Date

S.S.

Date

8.0 RESTORATION

8.1 UNIT 1 PUMP

8.1.1 Maint. Mech.

Perform a visual inspection of the power feed(s) to the motor(s). If any damage is noted, proceed directly to step 8.1.3.

Observations _____

8.1.2 Maint. Mech.

Perform a hi-pot on the power cable(s).
Record the current measured and instrument data.

1-E RHR _____
1-W RHR _____

Test Instrument I.D. # Calib. Date/Due Date

An acceptable value is two (2) microamps or less. If the current is greater than two microamps, contact Maint. Supv. for resolution. If the hi-pot is acceptable, proceed directly to Step 8.1.6.

8.1.3 Maint. Mech.

Remove the damaged cable and pull new cable per Maintenance Procedure
**12MHP5021.082.004.

8.1.4 Maint. Mech.

Install lugs on the new cable per Maintenance Procedure 12MHP5021.082.006.

8.1.5 Maint. Mech.

Perform a hi-pot on the new power cable.

Test Instrument I.D. # Calib. Date/Due Date

8.1.6 Maint. Mech.

Verify the appropriate U-2 breaker has been racked out and tagged, and the U-1 pump motor is de-energized.

8.1.7 Maint. Mech.

Verify grounds have been installed on the breaker/temporary power cable. Determine the temporary power cable from the motor. Enter data and sign-off on Attachment No. 3.

8.1.8 Maint. Mech.

Terminate the permanent power cable at the U-1 motor and its associated breaker per Maintenance Procedure 12MHP5021.082.006.

8.1.9 Maint. Mech.

NOTE: Existing clearances may have to be released and appropriate clearances hung to perform this step.

Bump the motor for rotation. Swap leads as required for proper operation. Sign-off on Attachment No. 2.

8.1.10 Maint. Supv.

Verify power feed has been properly restored to the U-1 motor and temporary I.D. tags have been removed. Sign-off on Attachment No. 2.



8.1.11 Maint. Mech. Notify the Shift Supervisor and Unit Supervisor that the Unit 1 RHR Pump has been tested and is functional.

Performed By _____ Date _____

S.S. _____ Date _____

8.2 UNIT 2 PUMP (AS APPLICABLE)

8.2.1 Maint. Mech. Verify the appropriate U-2 breaker has been racked out and tagged and that the power cable is de-energized.

8.2.2 Maint. Mech. Verify grounds have been installed on the breaker/power cable. Disconnect the jumper cable from the motor end of the power cable and remove temporary I.D. tags. Complete Attachment No. 3 and sign-off.

8.2.3 Maint. Supv. Verify the jumper has been properly removed. Sign-off on Attachment No. 3.

8.2.4 Maint. Mech. Terminate the power cable at the motor (if applicable) per Maintenance Procedure 12MHP5021.082.006. If leads were swapped at the breaker, return them to their normal position. (See Step 7.3.5).

8.2.5 Maint. Mech. NOTE: Existing clearances may have to be released and appropriate clearances hung to perform this step.

Bump the motor for rotation. Swap leads as required for proper operation. Sign-off Attachment No. 2.

8.2.6 Maint. Supv. Verify the temporary power cable has been removed and the permanent cable is re-terminated at the motor, and all temporary I.D. tags have been removed. Sign-off on Attachments No. 2 and No. 3.



8.2.7 Maint. Mech. Notify the Shift Supervisor and Unit Supervisor that the U-2 RHR Pump has been tested and is functional.

Performed By Date

S.S. Date

8.3 U-2 4KV BREAKER (AS APPLICABLE)

8.3.1 Maint. Mech. Verify the appropriate U-2 breaker has been racked out and tagged and that the power cable is de-energized.

8.3.2 Maint. Mech. Verify grounds have been installed on the breaker/power cable. Disconnect the jumper cable from the breaker end of the power cable and remove temporary I.D. tags. Complete Attachment No. 3 and sign-off.

8.3.3 Maint. Supv. Verify the jumper has been properly removed. Sign-off on Attachment No. 3.

8.3.4 Maint. Mech. Terminate the power cable at the breaker per Maintenance Procedure 12MHP5021.082.006. If leads were swapped at the breaker, return them to their normal position. (See Step 7.2.2.3).

8.3.5 Maint. Supv. Verify the temporary power cable has been removed and the permanent cable is re-terminated at the breaker, and all temporary I.D. tags have been removed. Sign-off on Attachments No. 2 and No. 3.

8.3.6 Maint. Mech. Notify the Shift Supervisor and Unit Supervisor that the U-2 4KV breaker's power feed has been restored and may be released for clearance.

8.4 RETURN TEMPORARY POWER SUPPLY MATERIALS TO STORAGE CABINET

8.4.1 Maint. Mech. Return all temporary power supply cable and tools to the storage cabinet.

8.4.2 Maint. Supv. NOTE: Attachment No. 1 is a listing of the required materials.

Verify all required materials are in the storage cabinet.



9.0 ACCEPTANCE CRITERIA

- 9.1 Interim acceptance will be achieved upon installation of the temporary power supply to the U-1 RHR Pump, provided work is completed per this procedure and the affected U-1 pump is functional with a U-2 power supply.
- 9.2 Final acceptance will be achieved upon restoration of normal power supply to both Unit RHR pumps per this procedure, and both pumps are functional, or restoration of normal power supply to the U-1 RHR pump per this procedure with satisfactory operational check if a supply 4KV breaker was used for temporary power.
- 9.3 In the event that jumpers are not removed and/or lifted leads are not restored, a PNSRC evaluation shall be performed and the signoff completed on the appropriate attachment(s).

10.0 DATA COLLECTION

- 10.1 Maint. Supv. Review entire procedure for completeness.

Maint. Supv. Date

- 10.2 Maint. Supt. Review of entire procedure.

Maint. Supt. Date

TOOLS AND HARDWARE

Fine Tip Screwdriver
Heavy Tip Screwdriver
3/8" Drive Socket Set
12" Extension
Straight Wrenches (1/8" - 3/4")
6" Crescent Wrench
10" Crescent Wrench
Medium Channel-lock
Large Channel-lock
Knife
Hammer
Punch
Chisel
Splicing Tape
Mica Board and Cable Ties

LIFTED WIRE FORM

MAINTENANCE DEPARTMENT
CONTROLLED DOCUMENT
COPY NO. _____

UNIT _____
LOCATION _____
EQUIPMENT AFFECTED _____
7.1.2 7.2.2.3
8.1.9 7.2.1.3
8.2.5

ITEM #	TERM. BLOCK &		CABLE #/COMPONENT DESCRIPTION	LIFTED		LANDED	
	TERMINAL #			BY	DATE	BY	DATE

7.2.1.4 THE ABOVE WIRES HAVE BEEN CORRECTLY LIFTED.
(7.2.2.4) ITEM # _____ VERIFIED BY _____ DATE _____

8.1.10 PARTIAL RESTORATION: THE FOLLOWING WIRES HAVE BEEN RESTORED TO
DESIGN CONFIGURATION.
ITEM # _____ VERIFIED BY _____ DATE _____

8.2.6 FINAL RESTORATION: ALL WIRES WHICH WERE LIFTED HAVE BEEN
(8.3.5) RESTORED TO DESIGN CONFIGURATION AND ALL TAGS
HAVE BEEN REMOVED.

VERIFIED BY _____ DATE _____

9.3 PNSRC REVIEW: NOT ALL THE LIFTED WIRES HAVE BEEN RESTORED AND A 10
CFR 50.59 SAFETY EVALUATION HAS BEEN PERFORMED AND
APPROVED BY THE PNSRC PER PMI-1040.

PNSRC REVIEW BY _____ PNSRC MIG _____ DATE _____

IF RESTORED, ATTACH THIS FORM TO THE PROCEDURE.
IF NOT, PLACE THIS FORM IN CONTROL ROOM BOOK.

ELECTRICAL JUMPER FORM

MAINTENANCE DEPARTMENT
CONTROLLED DOCUMENT
COPY NO. _____

UNIT _____
LOCATION _____
EQUIPMENT AFFECTED _____
7.3.5
8.1.7

[illegible]

7.3.6 THE ABOVE JUMPERS HAVE BEEN CORRECTLY INSTALLED.
ITEM # _____ VERIFIED BY _____ DATE _____

8.2.3 PARTIAL RESTORATION: THE FOLLOWING JUMPERS HAVE BEEN REMOVED.
(8.3.3)

ITEM #	VERIFIED BY	DATE
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8.2.6 FINAL RESTORATION: ALL JUMPERS WHICH WERE INSTALLED AND ALL TAGS
(8.3.6) HAVE BEEN REMOVED AND THE CIRCUIT RESTORED TO DESIGN CONFIGURATION.

VERIFIED BY _____ DATE _____

9.3 PNSRC REVIEW: NOT ALL THE JUMPERS HAVE BEEN REMOVED AND A 10 CFR
50.59 SAFETY EVALUATION HAS BEEN PERFORMED AND APPROVED
BY THE PNSRC PER PMI-1040.

PNSRC REVIEW BY _____ PNSRC MTG _____ DATE _____

IF RESTORED, ATTACH THIS FORM TO THE PROCEDURE.
IF NOT, PLACE THIS FORM IN CONTROL ROOM BOOK.