

INDIANA & MICHIGAN
ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT

PROCEDURE COVER SHEET

Procedure No. 2-OHP 4021.002.005

Revision No. 2

TITLE DRAINING REACTOR COOLANT SYSTEM

SCOPE OF REVISION

Revision 1 - Revised and rewritten to standardize format. Addressed Change Sheets 1 through 6.

Revision 2 - Minor revisions due to shift review. Deleted Data Signoff Sheet 5.2 Addressed Procedure Change Sheets 1 and 2.

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SIGNATURES	REVISION NUMBER		
	ORIGINAL	Rev. 1	Rev. 2

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INDIANA & MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR PLANT

DRAINING REACTOR COOLANT SYSTEM

1.0 OBJECTIVE

- 1.1 To lower the reactor coolant level in the Reactor Coolant System prior to removing the reactor vessel head or performing maintenance work requiring a reduced water level.

2.0 REFERENCES

- 2.1 Technical Specifications, Appendix A, Section 3.9.1.
- 2.2 AEP Flow Diagrams:
- 2.2.1 2-OP-5128-4, Reactor Coolant System.
 - 2.2.2 2-OP-5128A-10, Reactor Coolant System.
 - 2.2.3 2-OP-5129-3, CVCS Reactor Letdown and Charging.
 - 2.2.4 12-OP-5137A-5, WDS Vents and Drains.
 - 2.2.5 2-OP-5143-3, Emergency Core Cooling.
- 2.3 Plant Operating Procedure, 2-OHP 4021.017.002, Placing in Service and Operation of Residual Heat Removal Loop.

3.0 INITIAL CONDITIONS

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- 3.1 If reactor vessel head is to be unbolted, verify Keff less than or equal to 0.95 and Tav_g less than or equal to 140°F. If in cold shutdown, verify Keff less than 0.99 and Tav_g less than or equal to 200°F.
- 3.2 The Residual Heat Removal System is in operation, maintaining reactor coolant system temperature.
- 3.3 The reactor coolant drain tank and a minimum of one of the drain tank pumps is operable. The discharge of the reactor coolant drain tank pump is lined up to selected CVCS HUT tanks through CS-460.

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- 3.4 There is sufficient capacity in the CVCS holdup tanks to receive coolant released from the Reactor Coolant System when the pressurizer and the reactor vessel head are drained. _____
- 3.5 The pressurizer backup and variable heater breakers must be tagged open. _____
- 3.6 The pressurizer is open to the pressurizer relief tank through a power operated relief valve. _____
- 3.7 A nitrogen blanket of 5 psig is being maintained in the pressurizer from the pressurizer relief tank through the relief valve discharge line. _____
- 3.8 A temporary tygon hose is connected to valve 2-RC-116-L3 for level indication. The tygon hose is looped so the top of the loop is at least ten (10) feet above the intended level indication desired and attached to manual vent 2-WD-238 on the pressurizer relief tank. The blank flange on the PRT vent (2-WD-238) requires being replaced by a flange with a piping tee on it with temporary valves on the two (2) free ends. One end is to connect to the level tygon hose. The other is to be connected to a tygon hose that is routed to the instrument room purge exhaust suction valve. Ensure there are no loop seals or kinks in the tygon hose to be used for level indication. _____
- 3.9 Pressurizer level is in the indicating range or filled solid. _____
- 3.10 The reactor head vent is connected to the pressurizer relief tank via installed vent spool piece. _____
- 3.11 Shut and tag shut primary water to boric acid blender 12-PW-263. Verify CLOSED and hang a clearance on primary water to chemical mixing tank 2-PW-256 and primary water flush to emergency boration line 2-PW-265. This helps to avoid an inadvertent dilution while at half loop. _____
- 3.12 If a tygon hose is to be used for level indication, the closed circuit television monitor must be connected and functioning properly. _____

4.0 PRECAUTIONS

- 4.1 The applicable Radiation Protection procedures for handling radioactive liquids and for venting vapors and gasses must be observed.
- 4.2 The water level in the reactor vessel must be below the vessel flange before the head is unbolted for removal. The reactor flange elevation is 621 feet, 1½ inches. The elevation of ¼ loop is 614 feet, 0 inches. For RCP seal work and/or steam generator manway removal, the level must be brought to the center line of the hot and cold legs. This is commonly referred to as half loop. The level should be at half loop for a period of eight hours after the PRT and tygon level instrumentation is vented to atmosphere before allowing manways to be removed.
- 4.3 The pressurizer relief tank level must be reduced to less than 5% to allow nitrogen flow to the pressurizer through the open power operated relief valve.
- 4.4 Maintain reactor coolant system temperature greater than 60°F to ensure the reactor head temperature remains greater than 60°F until tension is relieved from the reactor head studs per Westinghouse refueling procedure.
- 4.5 Do not drain Reactor Coolant System below center line of the loops (614' 0") when nuclear fuel is in the vessel or while on RHR.
- 4.6 Anytime draining of the RCS is in progress, careful observation of the RHR System is required. The pump amperage is the first indication of cavitation or loss of suction.

5.0 DATA/SIGNOFF SHEETS

- 5.1 Data/Signoff Sheet 5.1, Draining Reactor Coolant Valve Lineup.

6.0 INSTRUCTIONS

PERFORMED
BY _____

- 6.1 Complete the attached Data/Signoff Sheet 5.1, Draining Reactor Coolant Valve Lineup. _____
- 6.2 Start low pressure letdown from the Reactor Coolant System via the Residual Heat Removal System following 2-OHP 4021.017.002, Placing In Service and Operation of Residual Heat Removal Loop. _____

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- 6.3 Monitor pressurizer relief tank pressure while draining the system. Maintain a positive nitrogen pressure not to exceed 5 psig. _____
- 6.4 Close reactor coolant drain tank vents to vent header 2-DCR-201 and 2-DCR-203. This is to prevent getting water into vent header when draining Reactor Coolant System. _____
- 6.5 Open loop drain isolation valves 2-RC-113-L1, 2-RC-113-L2, 2-RC-113-L3, and 2-RC-113-L4. _____
- 6.6 Loop drains flushing - These steps are to be done in sequence so the loop drains are flushed clean of crud. Open the drain valves wide to allow full flow to the reactor coolant drain tank. Valve off if necessary to control reactor coolant drain tank level and then reopen to obtain the required flushing time. _____
- 6.6.1 Open 2-RC-114-L1 and allow full flow for a minimum of two (2) minutes. _____
- 6.6.2 Open 2-RC-114-L4 and allow full flow for a minimum of three (3) minutes. _____
- 6.6.3 Open 2-RC-114-L2 and allow full flow for a minimum of two (2) minutes. _____
- 6.6.4 Open 2-RC-114-L3 and allow full flow for a minimum of three (3) minutes. _____
- 6.7 After completion of step 6.6, the four (4) loop drains should be used as system drains. These drains and the low pressure letdown of step 6.2 of this procedure can be used in any combination to control the drainage from the system.

NOTE

When using loop drains, station an operator at the Waste Disposal System panel to observe reactor coolant drain tank level so that drainage can be controlled to prevent flooding the reactor coolant drain tank.

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- 6.8 When pressurizer level is reduced to 5% indicated, open the reactor head vent valves 2-RC-132 and 2-RC-133. Reactor coolant will now flow through the connected sightglass to the pressurizer relief tank. Monitor this tank level while draining this way and maintain the level less than 5%. _____
- 6.9 When reactor coolant stops flowing through the flow indicator connected to the head vent valve, close all drains.
- 6.10 Place temporary refueling water level indicator in service (tygon hose) by opening valves 2-RC-113-L3, 2-RC-116-L3, 1-WD-238, and temporary valve on tygon hose. Refer to Precaution 4.3. _____
- 6.11 Continue draining the Reactor Coolant System by either or both methods of step 6.7 of this procedure. Do not use the loop 3 drain for this because it will cause a false level indication.
- 6.12 As the indicated level approaches half loop, slow down the drainage and stop it when the level is reached.
- 6.13 While maintaining level at half loop perform the following steps:
- 6.13.1 Close the temporary valve on the level tygon at the PRT vent. _____
- 6.13.2 Remove N₂ supply from PRT by closing 1-GCR-301. _____
- 6.13.3 Slowly vent PRT to instrument room purge exhaust by cracking or throttling temporary valve. _____
- 6.13.4 When PRT is fully vented, slowly throttle open temporary valve on the tygon level hose. _____
- 6.14 Close RC-116-L3. _____
- 6.15 Close temporary valve on tygon level hose at PRT. Then disconnect the tygon hose from the valve and have it run up alongside #3 RCP to a height greater than the reactor flange (greater than 622' elevation). _____

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BY _____

6.16 While monitoring the level, slowly open RC-116-L3.
(Ensure it is not allowed to overflow.) _____

6.17 Reestablish level at half loop or where desired
for work to be performed. _____

6.18 Maintain level at half loop for eight hours pre-
ferred (a minimum of 4 hours). _____

6.19 Declare RCS at half loop. _____

PROCEDURE
VERIFIED COMPLETE BY _____ DATE _____

REVIEWED BY _____ DATE _____
SRO

7.0 FINAL CONDITIONS

7.1 Reactor coolant level is at the desired level re-
quired for system maintenance. This level can be
anywhere down to the center line of the loops.

LATEST REV. CHECKED _____

DRAINING REACTOR COOLANT VALVE LINEUP

<u>VALVE NUMBER</u>	<u>DESCRIPTION</u>	<u>VALVE POSITION</u>	<u>PERFORMED BY</u>
2-NRV-163	Pressurizer Spray Loop 3	CL	_____
2-NRV-164	Pressurizer Spray Loop 4	CL	_____
2-GCR-301	N ₂ to Pressurizer Relief Tank	OP	_____
2-RRV-103	Pressurizer Relief Tank Vent	CL	_____
2-RC-118	Reactor Vessel Flange Leakoff (Outer)	CL	_____
2-RC-119	Reactor Vessel Flange Leakoff (Inner)	CL	_____
2-DRV-100	Reactor Vessel Flange Leakoff Isolation	CL	_____
2-RC-113 L1	Reactor Coolant Loop 1 Drain Valve	CL	_____
2-RC-113 L2	Reactor Coolant Loop 2 Drain Valve	CL	_____
2-RC-113 L3	Reactor Coolant Loop 3 Drain Valve	CL	_____
2-RC-113 L4	Reactor Coolant Loop 4 Drain Valve	CL	_____
2-RC-114 L1	Reactor Coolant Loop 1 Drain Isolation Valve	CL	_____
2-RC-114 L2	Reactor Coolant Loop 2 Drain Isolation Valve	CL	_____
2-RC-114 L3	Reactor Coolant Loop 3 Drain Isolation Valve	CL	_____
2-RC-114 L4	Reactor Coolant Loop 4 Drain Isolation Valve	CL	_____

OP - Open
CL - Closed

DRAINING REACTOR COOLANT VALVE LINEUP

<u>VALVE NUMBER</u>	<u>DESCRIPTION</u>	<u>VALVE POSITION</u>	<u>PERFORMED BY</u>
2-RC-116 L3	Refueling Water Level Indicator Isolation	CL	_____
2-NRV-153	P.O. Relief to Pressurizer Relief Tank	OP	_____
2-NRV-152	P.O. Relief to Pressurizer Relief Tank	OP	_____
2-NRV-151	P.O. Relief to Pressurizer Relief Tank	OP	_____
2-RC-121	R.V. Head Vent to Pressurizer Relief Tank	OP	_____
2-RC-137	R.V. Head Vent to Pressurizer Relief Tank	OP	_____
2-RC-138	R.V. Vent to R.V. Level Instrumentation	OP	_____
2-RC-132	Sightglass Inlet Isolation	CL	_____
2-RC-133	Sightglass Outlet Isolation	OP	_____
	Temporary valve for PRT Vent to Instrument Room Purge Exhaust	CL	_____

DATA/SIGNOFF SHEET

VERIFIED COMPLETE BY _____ DATE _____

REVIEWED BY _____ DATE _____
SRO

OP - Open
CL - Closed

