

RESPOND TO A RCP MALFUNCTION

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K/A REFERENCE: 015/17AA1.07 (3.5/3.4)  
(NUREG-1122) 015/17 AA1.22 (4.0/4.2)  
015/17 AA2.01 (3.0/3.5)  
015/17AA2.10 (3.7/3.7)

ALTERNATE PATH JPM  YES  NO

**PERFORMANCE CHECKLIST:**

**SATISFACTORY** - Properly performed critical step(s) and/or in sequence (if applicable)

**UNSATISFACTORY** - Improperly performed critical step(s) and/or out of sequence (if applicable)

Procedure adequately addresses task elements.  
Enter identifier here: AOP-1B, Rev. 11

Other document adequately describes necessary task elements.  
Enter identifier here: \_\_\_\_\_

Task elements described as attached.

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**DESIRED MODE OF EVALUATION:**

**APPLICABLE EVALUATION SETTING:**

SIMULATE/WALKTHROUGH  DISCUSSION \_\_\_\_\_ PERFORM  IN-PLANT \_\_\_\_\_ CONTROL ROOM

VALIDATED TIME FOR COMPLETION: 15 MINUTES

**RESPOND TO A RCP MALFUNCTION**

EXAMINEE \_\_\_\_\_ EVALUATOR \_\_\_\_\_

START TIME \_\_\_\_\_ FINISH TIME \_\_\_\_\_

PERFORMANCE  SAT  UNSAT

JOB TITLE:  AOT  COT  SRO  STA

**TOOLS/EQUIPMENT/REFERENCES:**

AOP-1B, Rev. 11, "Reactor Coolant Pump Malfunction."

**TASK STANDARDS:**

Diagnose "1A" RCP seal failure, adjust seal injection flow, recognize plant trip criteria (RCP Vibration) has been reached, and take appropriate action in accordance with AOP-1B, "Reactor Coolant Pump Malfunction".

**SIMULATOR INFORMATION:**

These simulator codes cause an RCP 1A #1 seal failure with 5 gpm leakage.

TIME	FAIL	COMPONENT	OPTION	VALUE	RAMP	DELAY	ACT	COND
ALL MODES	IC-1	U1 100% U2 100%						
MODE I	SYS MAL	RCP1A	----	5	----	----	D	----

After candidate adjusts HC-142 to obtain Lab Seal DP > 20 inches as cued by the examiner, insert ANN CVC2, 1 (RCP High Vibration Alarm ) SET ZRCPVBSV (1) = 18 to bring in the RCP Hi Vibration Alarm ARB 1C04 1C 1-5.

**NOTE:** *If this JPM is performed on the simulator, the JPM administrator should only give cues that are not indicated on the simulator. If simulator indication is sufficient to indicate the completion of a step, the JPM administrator should not have to give a cue to the trainee to continue the evolution.*

**NOTE:** *Only this page needs to be retained in examinee's record if completed satisfactorily. If unsatisfactory performance is demonstrated, the entire JPM should be retained.*

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**READ AND PROVIDE TO THE EXAMINEE**

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**THIS SECTION IS READ ONCE FOR THE ENTIRE PACKAGE OF JPMS. IT IS NOT REQUIRED TO REVIEW THIS SECTION FOR EVERY JPM BEING PERFORMED IN THE PACKAGE. THE INITIAL CONDITIONS AND INITIATING CUE(S)/TASKS TO BE PERFORMED SHOULD BE READ AND THEN PROVIDED TO THE EXAMINEE.**

After I read you the initial conditions and initiating cue(s)/task to be performed for this JPM and provide you a copy of the same, you may review and begin. Once you have completed the task, indicate completion by handing back this form to the evaluator unless otherwise told.

You may use any approved reference materials normally available including logs. Make all written reports, oral reports, and log entries as if the evolution is actually being performed.

EOP Immediate Actions are required to be performed from memory. After completing immediate action steps without using the procedure, you may then use any approved reference materials.

For all two and three-way communications, make your report to me, the JPM evaluator. I will reply to your reports with the statement, "acknowledge." All actions in the plant are to be simulated and all actions in the simulator will be performed. Ensure you make it clear to me, the evaluator, of all actions you are taking so that credit may be given for completing each step of the task.

**DURING THE JPM, ENSURE PROPER SAFETY PRECAUTIONS, FME, AND/OR RADIOLOGICAL CONCERNS AS APPLICABLE ARE FOLLOWED.**

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**INITIAL CONDITIONS:**

You are the Unit 1 Control Operator.

Unit 1 Alarms:

- 1) "1P-1A RCP No. 1 Seal Water Flow High or Low" 1C03 1D 3-2 (or as indicated on simulator.)
- 2) "1P-1A or B RCP Labyrinth Seal  $\Delta$ P Low" 1C03 1D 2-1 (or as indicated on simulator.)

Alarm Response Book has been referenced.

**INITIATING CUE(S) / TASK TO BE PERFORMED (SIMULATED):**

The DSS/DOS directs you to respond to the RCP malfunction per AOP-1B.

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PERFORMANCE INFORMATION

**NOTE:** *CRITICAL STEPS ARE DENOTED WITH A "Y". FAILURE TO MEET THE STANDARDS FOR THIS ITEM CONSTITUTES FAILURE.*

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START TIME _____	STEP/SEQUENCE/CRITICAL			SAT _____
	1	1	N	UNSAT _____

**ELEMENT:** Monitor foldout page criteria.

**STANDARD:** Review foldout page criteria upon entry into procedure and recognize continuous applicability.

**CUE:** If asked, #1 & #2 combined seal leakoff is 7 gpm.

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL			SAT _____
	2	2	N	UNSAT _____

**ELEMENT:** Check RCP vibration alarm CLEAR (1C04 1C 1-5.)

**STANDARD:** RCP vibration alarm checked CLEAR.

**CUE:** RCP vibration alarm not lit (or as indicated on simulator.)

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL			SAT _____
	3	3	N	UNSAT _____

**ELEMENT:** Check RCP ITR-2001 alarm CLEAR (1C04 1C 3-10.)

**STANDARD:** RCP ITR-2001 alarm checked CLEAR.

**CUE:** RCP ITR-2001 alarms are not lit (or as indicated on simulator.)

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL	SAT
	4 4 N	UNSAT

**ELEMENT:** Check "P-1A OR B RCP UPPER OR LOWER SUMP OIL LEVEL HIGH-LOW" alarm CLEAR (1C04 1C 3-11.)

**STANDARD:** Alarm checked clear.

**CUE:** The alarm is not lit (or as indicated on simulator.)

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL	SAT
	5 5 Y	UNSAT

**ELEMENT:** Check RCP #1A Seal Leakage >0.8 gpm (1FR-175.)

**STANDARD:** RCP #1A seal leakage checked on 1FR-175. Recognizes #1A RCP seal leakage > .8 gpm.

**CUE:** RCP #1A seal leakage >0.8 gpm (or as indicated on simulator).

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL	SAT
	6 6 Y	UNSAT

**ELEMENT:** Check RCP #1A seal leakage <6 gpm (1FR-177.)

**STANDARD:** #1A RCP seal leakage checked on 1FR-177. Recognizes #1A RCP seal leakage > 6 gpm and proceeds to procedure Step RNO.

**CUE:** RCP #1A seal leakage flow pegged high (or as indicated on simulator.)

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL	SAT
	7 7 Y	UNSAT

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**ELEMENT:** Complete the following:  
1) Check if seal outlet temperature is rising (TI-181/TI-182).  
2) Check if RCP #2 seal leakage >2 gpm.  
a) RCDT level change >1 % in 3 1/2 minutes.  
b) Standpipe level high/low alarm (1C03 1D 1-2 or 1D 1-3)

**STANDARD:** Verifies RCP # 1A seal outlet temperature is **NOT** rising and RCP #2 seal leakage < 2 gpm by verifying with PAB AO that RCDT level is STABLE and no standpipe level alarms exist on 1C03.

**CUE:**  
1) Seal outlet temperature is 130 °F and steady (or as indicated on simulator.)  
2) No. 2 seal leakage <2 gpm (or as indicated on simulator.)  
a) **PAB AO reports that the RCDT level has not changed.**  
b) No RCP standpipe High/Low alarms are lit (or as indicated on simulator.)

**NOTE:** *This is a continuous action step.*

**COMMENTS:**

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	STEP/SEQUENCE/CRITICAL	SAT
	8 8 Y	UNSAT

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**ELEMENT:** Check RCP seal cooling.  
1) Labyrinth seal ΔP indicates >+20 inches (1PI-131).

**STANDARD:** RCP labyrinth seal ΔP checked > +20 inches. Recognizes ΔP < +20 inches. Proceeds to RNO.

**CUE:** Tell the examinee to adjust lab seal DP > 20 inches using HC-142.

**COMMENTS:**

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**NOTE:** CRITICAL STEPS ARE DENOTED WITH A "Y". FAILURE TO MEET THE STANDARDS FOR THIS ITEM CONSTITUTES FAILURE.

	STEP/SEQUENCE/CRITICAL	SAT
	9      9      Y	UNSAT _____
<b>ELEMENT:</b>	Adjust seal injection throttle valve, and charging flow control valves as necessary to establish a positive labyrinth seal DP. (1HC-142).	
<b>STANDARD:</b>	1) CO adjusts HC-142 to establish a positive labyrinth seal ΔP.	
<b>CUE:</b>	Positive labyrinth seal ΔP is indicated on 1PI-131 for 1A RCP (or as indicated on simulator).	
<b>NOTE:</b>	Booth operator will bring in the high RCP vibration alarm at this point immediately after 20 inches of lab seal DP has been established.	
<b>COMMENTS:</b>		

	STEP/SEQUENCE/CRITICAL	SAT
	10      10      Y	UNSAT _____
<b>ELEMENT:</b>	Recognizes/acknowledges RCP High Vibration Alarm and recognizes foldout page criteria.	
<b>STANDARD:</b>	<ul style="list-style-type: none"> <li>- Recognizes foldout page criteria is met (verifies actual 1A RCP vibration is &gt; 15 on PPCS page)</li> <li>- Proceeds to step 18 of AOP-1B</li> <li>- May reference ARB 1C04 1C 1-5</li> </ul>	
<b>CUE:</b>		
<b>NOTE:</b>	Examiner should go to step 17 of this JPM (page 10) Examinee may continue with JPM step 11 if foldout page criteria is not recognized. (otherwise step 11 -16 will be N/A)	
<b>COMMENTS:</b>		

	STEP/SEQUENCE/CRITICAL	SAT
	11      11      N	UNSAT _____
<b>ELEMENT:</b>	Check thermal barrier cooling normal: 1) Thermal barrier outlet AOV open (1CV-761A & B) on 1C03. 2) RCP cooling water low flow alarm clear (1C03 1D 1-4 & 1-5).	
<b>STANDARD:</b>	Thermal barrier checked as above.	
<b>CUE:</b>	1) 1CV-761A and 1CV-761B red lights on, green lights off (or as indicated on simulator.) 2) RCP cooling water Low Flow alarm is not lit (or as indicated on simulator.)	
<b>COMMENTS:</b>		

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	STEP/SEQUENCE/CRITICAL			SAT
	12	12	N	UNSAT
<b>ELEMENT:</b>	Check RCP component cooling return temperature alarm clear (1C03 1D 2-4)			
<b>STANDARD:</b>	RCP component cooling return temperature alarm checked clear on 1C03 1D 2-4.			
<b>CUE:</b>	Alarm is not lit (or as indicated on simulator).			
<b>COMMENTS:</b>				

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	STEP/SEQUENCE/CRITICAL			SAT
	13	13	N	UNSAT
<b>ELEMENT:</b>	Check Fire Protection and Smoke detector panel alarm CLEAR (C01 B 4-2.)			
<b>STANDARD:</b>	C01 B 4-2 alarm is checked clear.			
<b>CUE:</b>	Alarm is not lit (or as indicated on simulator.)			
<b>NOTE:</b>	<i>This is a continuous step.</i>			
<b>COMMENTS:</b>				

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	STEP/SEQUENCE/CRITICAL			SAT
	14	14	N	UNSAT
<b>ELEMENT:</b>	Check RCP No. 2 seal indications: 1) "1P-1A RCP Standpipe Level High" alarm CLEAR (1C03 1D 1-2.) 2) "1P-1B RCP Standpipe Level High" alarm CLEAR (1C03 1D 1-3.) 3) RCDT level stable (PAB AO must report). 4) RCP No. 1 seal leakage flow has remained stable (1FR-175 & 1FR-177.)			
<b>STANDARD:</b>	No. 2 seal indications checked as above.			
<b>CUE:</b>	1) Standpipe level alarm not lit (or as indicated on simulator.) 2) Standpipe level alarm not lit (or as indicated on simulator.) 3) <b>PAB AO reports Unit 1 RCDT level stable.</b> 4) Seal leakage has not changed (or as indicated on simulator.)			
<b>COMMENTS:</b>				

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	STEP/SEQUENCE/CRITICAL			SAT
	15	15	N	UNSAT
<b>ELEMENT:</b>	Check RCP seal injection temperatures normal:			
	1)	VCT high temperature alarm CLEAR (1C04 1C 3-7.)		
	2)	VCT outlet temperature <130 °F (1TI-140.)		
<b>STANDARD:</b>	Seal injection temperatures checked normal as above.			
<b>CUE:</b>	1)	VCT high temperature alarm not lit (or as indicated on simulator.)		
	2)	VCT outlet temperature is 115 °F (or as indicated on simulator.)		
<b>COMMENTS:</b>				

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	STEP/SEQUENCE/CRITICAL			SAT
	16	16	N	UNSAT
<b>ELEMENT:</b>	Determine RCP seal status returned within limits:			
	1)	RCP No. 1 seal leakage <6 gpm.		
<b>STANDARD:</b>	Determine RCP seal status has not returned to normal and reference RNO actions.			
<b>CUE:</b>	1)	RCP No. 1 seal leakage indication pegged high (or as indicated on simulator.)		
<b>COMMENTS:</b>				

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STEP/SEQUENCE/CRITICAL			SAT
17	17	Y	UNSAT

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**ELEMENT:** Perform Step 18 actions of AOP 1B.

- STANDARD:**
- Trip Reactor (see cue)
  - Trip 1A RCP
  - Check at least one RCP running
  - Shut associated spray valve (IRC-431A)
  - Check 1A RCP has been tripped for three minutes (see cue)
  - Shut affected RCP seal water return valve (1CV-270A)
  - Check RCP seal water bypass shut (1CV-386)
  - Return to procedure and step in effect (terminate JPM)

**CUE:** Once the examinee trips the reactor, inform him that the BOP will perform immediate actions of EOP-0, you are to continue with AOP 1B actions. If asked about the three minutes, inform examinee that three minutes has elapsed.

**COMMENTS:**

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**TERMINATION CUE:** This completes this JPM.

**COMPLETION TIME:** \_\_\_\_\_