

## RO Question 15

The correct answer should be A. The answer should be changed from C to A.

The RCIC flowrate will not go to 400 gpm because the injection valve does not auto re-open unless level is below LL2 (105 inches). With the initial conditions stating that water level is 150 inches the injection valve will remain closed (since the initiation signal does not seal in) and therefore the injection flowrate will be zero gpm.

## From SD-16

The RCIC System is automatically initiated by a reactor vessel low water level signal (LL2). Four reactor water level trip units, two from ECCS Logic Division I and two from ECCS Logic Division II, are arranged in a one-out-of-two taken-twice logic. The setpoint for this automatic initiation is as follows:

Reactor Low Level Two Tech. Spec:  $\geq 101$ "; Actual: 105"

A RCIC initiation signal is indicated by the illuminated white light above the INITIATION SIGNAL/RESET pushbutton on RTGB P601. The only function of this seal-in relay, besides illuminating the P601 white light, is to connect the RGSC box signal convertor to the RCIC P601 flow controller and to ensure separation from the Turbine Test Speed Control circuitry. The initiating signal will automatically reset once the reactor water level trip units have reset, allowing any valves and components to be controlled manually, as required.



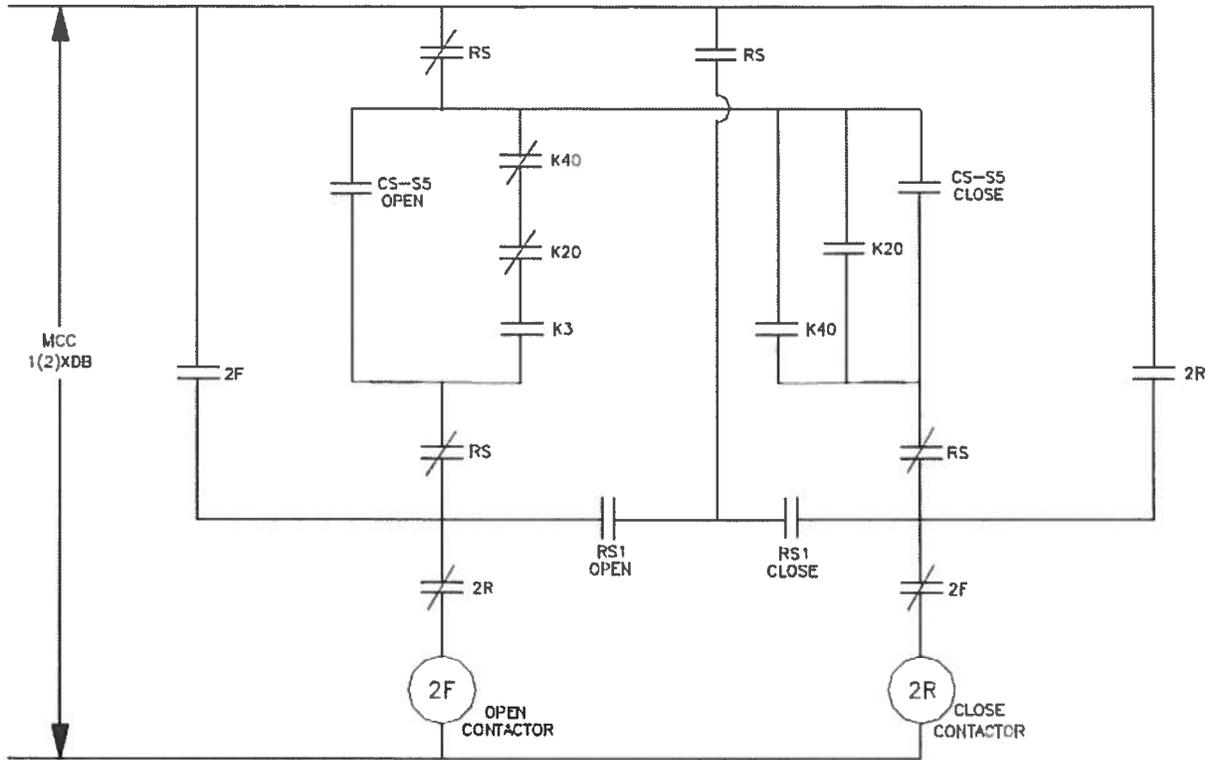
- Bypass to Condensate Storage Tank Valve, E51-F022, which is normally closed in the standby readiness mode, (open when doing a full flow test), receives a close signal.
- Condensate Storage Tank Suction Valve, E51-F010, receives an open signal if at least one of the two Suppression Pool Suction Valves, E51-F029 or F031, is not full open.
- RCIC Injection Valve, E51-F013, opens, provided the Turbine Trip and Throttle Valve, E51-V8, and the Turbine Steam Supply Valve, E51-F045, are not fully closed.
- Pump Discharge Valve, E51-F012, which is open in the standby readiness mode, receives an open signal.
- Supply Drain Pot Inboard Drain Valve, E51-F025, and Supply Drain Pot Outboard Drain Valve, E51-F026, close.
- Barometric Condenser Vacuum Pump, E51-C002-VAC-PMP, starts.
- Condensate Pump Discharge Inboard Drain Valve, E51-F004, and Condensate Pump Discharge Outboard Drain Valve, E51-F005, receive close signals, thus diverting flow to the RCIC Pump suction line.

Once the Turbine Steam Supply Valve, E51-F045, opens, the RCIC Turbine starts and accelerates as directed by the RCIC flow controller. Initial acceleration control is provided by the ramp generator which is initiated once the Turbine Steam Supply Valve leaves the full closed position. Upon sensing pump discharge pressure and low flow, the Minimum Flow Bypass to Suppression Pool Valve, E51-F019, automatically opens. As RCIC flow subsequently increases, the Minimum Flow Bypass to Suppression Pool Valve automatically closes and pump flow control is transferred from the ramp generator to the demanded flow rate of the pump flow controller.

Once RCIC is initiated, either automatically or by manual operator actions, the system will continue to operate until the pump is stopped by shutting off the steam supply to the turbine by one of the following:

- A reactor vessel high water level signal is received, or
- A trip signal is received (which includes a manual or automatic isolation signal), or
- The operator manually secures the system.

The power supply to the RCIC Initiation Logic is 125 Vdc Bus B. In the event of a loss of power to the Initiation Logic, Annunciator RCIC LOGIC BUS B PWR FAILURE (APP A-03 1-4) alarms, indicating a possible loss of the Initiation logic.



REF: LLS 0273 0103

RS-MCC NORM-LOCAL, SHOWN IN NORM

K3-ENERGIZED LL2

RS1-LOCAL CONTROL SWITCH

K20-ENERGIZED WHEN V8 FULL CLOSED

CS-S6-RTGB CONTROL SWITCH

K40-ENERGIZED WHEN F045 FULL CLOSED

NOTE: VALVE LIMIT SWITCHES  
STOP OPENING AND CLOSING

Above is the logic for the injection valve (F013). A close signal is generated if the V8 or F045 are full closed. The suction low pressure trip closes the V8, therefore the F013 will close. The open logic requires the F045 and the V8 to be open with reactor level at LL2 (105 inches). In the stem of the question the V8 is re-opened and the F045 is still open but there is no initiation signal present.

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Following a loss of feedwater, RCIC automatically initiated and subsequently tripped on low suction pressure.

Current plant status is:

Reactor water level is 150 inches

RCIC flow controller in Manual set at 200 gpm

Subsequently, the following actions are taken:

RCIC suction transferred to Torus

E51-V8, Turbine Trip and Throttle Valve is closed

E51-V8 is re-opened

PF push button on the RCIC flow controller is depressed

Which one of the following identifies the indicated flow on the RCIC flow controller that would be observed for these conditions?

A. 0 gpm

B. 200 gpm

C. 400 gpm

D. 500 gpm

Answer: C

K/A:

217000 Reactor Core Isolation Cooling System

A1 Ability to predict and/or monitor changes in parameters associated with operating the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC) controls including: (CFR: 41.5 / 45.5)

01 RCIC flow

RO/SRO Rating: 3.7/3.7

Tier 2 / Group 1

K/A Match: This meets the K/A because it is testing the prediction of what RCIC flow will be when operating the RCIC system.

Pedigree: New

Objective: CLS-LP-016-A, Obj.16c

Describe how the following evolutions are performed during operation of the RCIC System:  
Adjusting RCIC flow in the Reactor Level Control mode.

Reference: None

Cog Level: high

Explanation: The RCIC Turbine is provided with a solenoid operated remote electrical tripping device, which when actuated (in this case by low suction pressure), will close the Turbine Trip and Throttle Valve, E51-V8. Resetting of the remote electrical tripping device may be accomplished from the RTGB. The RCIC system is restarted after auto initiation and turbine trip by fully closing the V-8, and re-opening the V-8. Located on the controller face is a PF (programmable function) pushbutton which when depressed an automatic transfer from manual to automatic at a predetermined setpoint of 400 GPM will result. This button (PF) has no function if the controller is already in automatic.

Distractor Analysis:

Choice A: This is plausible because this answer would be correct for these actions following a high RPV water level trip of RCIC

Choice B: Plausible because this would be correct if the operator did not depress the PF pushbutton.

Choice C: Correct Answer, see explanation.

Choice D: Plausible because the PF push button would raise RCIC flow to rated (400 gpm) and not maximum per procedure (500 gpm). Achieving 500 gpm would require the flow control setpoint to be manually raised.

SRO Basis: N/A

From SD-16:

Also located on the controller face is a PF (programmable function) pushbutton. When depressed an automatic transfer from MANUAL to AUTOMATIC at a predetermined setpoint of 400 GPM will result. NOTE: This button (PF) has no function if the controller is already in AUTOMATIC.

For various internal processing failures, the controller is designed to hold the last output and automatically switch to MANUAL giving the operator manual control capability. Barring operator intervention, this failure could result in rising or lowering RCIC flow and would be indicated by the red FAIL lamp on the controller face. Failure display code can then be checked using the side panel keypad. A down scale failure of the controller is possible and would result in turbine operation at well below the normal minimum speed of 2000 rpm. An upscale failure is highly unlikely but would result in turbine speed at or above the maximum running speed of 4600 rpm. Failures associated with the dynamic response are also highly unlikely but would produce either excessively sluggish responses or dynamic instability (full scale oscillations) when in the Automatic mode. Programmable settings internal to the controller are maintained during a loss of 24 Vdc power supply by a lithium battery. If this battery voltage drops to a pre-determined low value, the yellow ALARM light will flash. If the input signals are not within the limits of -6.3% to 106.3% or if the input or output signals are not intact, the Yellow ALARM light will come on solid.

<b>REACTOR CORE ISOLATION COOLING SYSTEM OPERATING PROCEDURE</b>	2OP-16
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ATTACHMENT 9

**<< RCIC Instructional Aid for EOPs >>**

**RESTARTING RCIC AFTER AUTO INITIATION AND TURBINE TRIP**

(2OP-16 Section 8.7)

1. **ENSURE THE E51-V8 (VALVE POSITION) AND E51-V8 (MOTOR OPERATOR) ARE CLOSED.** .....
2. **PLACE RCIC FLOW CONTROL IN MANUAL (M) AND ADJUST OUTPUT TO 0%.**.....
3. **JOG OPEN E51-V8 UNTIL THE TURBINE SPEED IS CONTROLLED BY THE GOVERNOR.**.....
4. **FULLY OPEN E51-V8.** .....
5. **SLOWLY RAISE TURBINE SPEED UNTIL FLOW RATE OF AT LEAST 120 GPM.** .....
6. **ENSURE E51-F019 IS CLOSED WITH FLOW GREATER THAN 80 GPM.**.....
7. **WHEN SYSTEM CONDITIONS ARE STABLE, THEN ADJUST SETPOINT, AND TRANSFER RCIC FLOW CONTROL TO AUTO (A).**.....
8. **SLOWLY ADJUST FLOW RATE USING RCIC FLOW CONTROL IN AUTO (A).**.....
9. **ENSURE THE FOLLOWING:**
  - BAROMETRIC CNDSR VACUUM PUMP HAS STARTED .....
  - SBGT STARTED (2OP-10).....
  - SGT-V8 AND SGT-V9 ARE OPEN.....

## FACILITY POST-EXAMINATION COMMENTS AND NRC RESOLUTIONS

A complete text of the licensee's post-examination comment can be found in ADAMS under Accession Number ML XXXXXXXX.

### Item

#### **RO QUESTION #15:**

##### **Comment:**

The licensee contended that only answer "A" is correct.

The question stated that following a loss of feedwater, Reactor Core Isolation Cooling (RCIC) initiated and then tripped on low suction pressure. Reactor water level was given at 150 inches and the flow controller was in Manual and set at 200 gpm. The question then stated that RCIC suction was transferred to the torus, the turbine trip and throttle valve was closed and then re-opened, and the PF push button on the RCIC flow controller was depressed. The question asked what the RCIC flow rate would be.

The licensee contended that the answer stated in the key (C. 400 gpm) was technically incorrect. The licensee stated the flowrate will not go to 400 gpm because the injection valve would not automatically re-open unless level was below Low Level 2 (105 inches). They stated that with the level at 150 inches, the injection valve would remain closed since the injection signal would not seal in. Therefore the injection flow would be 0 gpm (answer A).

##### **NRC Discussion:**

The licensee's recommendation was accepted.

The NRC agreed that for the conditions given in the question, the injection valve would not automatically open. Therefore the correct flowrate should be 0 gpm.

The answer key will be changed to identify A as the correct answer.