RATING FACTOR 3.C.: CONTROL BOARD OPERATIONS, MANUAL CONTROL

1. Examiner comment on 303 form p. 21 of 32, related to Scenario 7, Event 3

A. FACTUAL SEQUENCE OF EVENTS

-During the simulator scenario, event 3 was initiated at time 07:54:54 with a TE-0130 failure low.
-As a result of this failure, TV-0130 will throttle shut, raising the actual Letdown Heat Exchanger outlet temperature.
-At time 07:55:46, examiner noted that Carla appeared to diagnose the failure correctly. The examiner also noted that [redacted] opened the ARPs, and Carla did not open any ARPs.
-At time 08:00:30, [redacted] referenced CVCS system P&IDs.
-At time 08:01:54, Carla pointed to the controller, looked at [redacted], and stated, "the only thing we can do is call C&T to get the TE fixed."
-At time 08:02:45, [redacted] directed Carla to take manual control of TIC-0130 and monitor VCT outlet temperature.
-When Carla initially attempted to manipulate the controller, she incorrectly pressed the "up arrow" button instead of the "down arrow" button.
-Shortly thereafter, [redacted] told Carla that the controller raises and lowers temperature, it does not open and close the valve.
-At time 08:05:00, the LETDOWN TEMP DEMIN DIVERT alarm cleared.
-During this sequence of events (approximately 10 minutes of simulator runtime), Carla was physically located in front of the panel with the TE-0130 controller (slightly to the "left" of the main OATC control station). As noted in a previous comment (related to scenario 7, event 1, rating factor 3.a.), P. Capehart and M. Bates held a discussion pertaining to the long duration of time that elapsed without Carla walking back to the OATC station to monitor key reactor plant parameters.

During post-scenario follow-up questions, the examiner asked what procedure guidance was used to manually control TE-130? Carla looked through the LETDOWN HX OUTLET HI TEMP ARP. During this discussion, Carla stated that she had initially pressed the "up" button, and then subsequently pressed the "down" button. The examiner asked "walk me through the diagnosis and the plant response?" Carla stated that demand goes down, causing flow through the heat exchanger to lower, it's a reverse-acting controller.

B. EXAMINER EVALUATION AND COMMENTS

The examiner downgraded the applicant in rating factor 3.c, which is related to the ability to take manual control of automatic functions. This competency is different from manual rod control or PORV valve operation (other errors placed in different rating factors) in that a plant parameter is controlled in automatic under normal circumstances.

The examiner considered that there were elements of rating factor 1.b demonstrated during this event. Rating factor 1.b. relates to the applicant's "...actions demonstrate an UNDERSTANDING of how the PLANT, SYSTEMS, and COMPONENTS OPERATE AND INTERACT (including set points, interlocks, and automatic actions)?" More specifically, during this event, Carla specifically stated, "there is nothing else we can do but call C&T...," demonstrating a lack of understanding that the controller could be operated in a manual mode. Furthermore, the SRO was then required to instruct the applicant in the correct operation of the controller, which demonstrated that the applicant had a deficiency in understanding how the controller operated.

Michael Maule Phil
SRO: [redacted] RO: Carla Smith BOP: [redacted]

07:24:14	Crew takes shift. They correctly discussed ΔO management
27:48	J-C: ↑ 2½ Steps
21:33	C-J: we have temp ↔, we can lower turbine load (mispoke ↑) #
32:10	J-R: ↑ 8-12 MWe
36:22	J-C: ↑ 3 Steps
3/ 43:47	Alarms
56	R-J: Failed Stm Flow Inst. Takes manual control of MFRV & Pmp
44:24	R-J: [redacted]A's done
52:11	J-R: MFP Speed Control returned to auto
52:36	R-J-R: Place MFRV #4 to auto.
3/	
54:52	C-J: C/D Demin Diint & High C/D Temp
55:46	C-J: TE-130 "Certainly appeared that Carla made correct diagnosis" [redacted] 3 running the AFP. Carla did not open any ARPs.
08:00:30	R: Pulls P#IDs J-C/T: CR, key, etc.
01:54	C-S: The only thing we can do is contact C/T to get TE fixed.
02:45	J-C: Take manual control of TIC and monitor VCT Outlet Temp?
	J-C: That raises & lowers temp it does not open & close valve. (The controller is reverse acting & she did not know how to operate it.) Carla actually set it at 51%.
05:00	C/D High Temp Demin Diint closed.
4/ 11:37	R-J: NSCW Cooling Fan 1 Tripped
	R-C/T: AO to Bkr J-R-C/T: Get W/B Temps while out there.

Bates

POST SCENARIO

Q: Walk me through Tave/Tref Control. (PW1 -2.4°F)
Q: What was your band? ± 2°F

Q: What was your max Δ? S/G Failure 1.8°F
then 2.3 F

E3: TE-0130 Failure
2 Q: What procedure guidance was used to manually control TV-0130? Initially pressed up, but then corrected his manipulation & pressed down.

She walked through HX out Temp ARP.

~~Did not know correct procedure guidance.~~

1 Q: Walk me thru the diagnosis & plant response.
Demand goes down causing flow through H.X. to lower.
Reverse acting controller.

E5: PT-456 Failure:
Q: What were your Im Op Actions.
She went the wrong direction on PORV H.S.
Q: What actions did you take. (Master P Control in Auto?)
Sprays were still in Manual - so no impact.
Q: What was the position were spray valves in when Master to auto?
Spray valves were in manual.
Q: Was the PORV BV inoperable? → Not operable due to not auto closing.

~~Q: What was your P Control Band?~~

Q: Walk me thru Δ Φ Control. What was your max ΔΦ?
What was your target? ±3 AFD Units (+0.2) Started @ -0.7
Did target change - stayed at 0.2.

Appendix D	Required Operator Actions	Form ES-D-2

Op-Test No.: 2012-301 **Scenario No.:** 7

Event No.: 3

Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.

Time	Position	Applicant's Action or Behavior
	OATC	**SUBSEQUENT OPERATOR ACTION**
	0751	1. Attempt to balance charging and letdown flow.
		2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position.
		3. IF instrument or equipment failure has occurred, initiate maintenance as required.
		COMPENSATORY OPERATOR ACTIONS
		NONE
	F⇒A	Take Manual Control of TV-130 & lower temp by adjusting Temp. setpoint.
		Note to examiner: The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on SS throne). It is expected the OATC will take manual control of TV-0130 to control cooling flow.
		End of 17007-F04 actions.
	0805	Up on Temp Alarm Cleared
	OATC	**ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)**
		PROBABLE CAUSE
		1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.
		2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT).

Mats

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Time	Position	Applicant's Action or Behavior
	OATC	Diagnose TE-0130 has failed low. Symptoms / alarms: ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT ALB07-B04 (VOLUME CONTROL TANK OUTLET TEMP HI (delayed, or may not come in) Indications: • TE-0130 reading down scale low. • TE-0130 red UP arrow – LIT. (indicates attempting to raise letdown temperature). • Amber light on 1HS-129 LETDOWN TO DEMIN / VCT – LIT.
	OATC	**ALB07-F04 response actions:** **AUTOMATIC ACTIONS:** Letdown flow is diverted away from the Mixed Bed Demineralizers directly to the Reactor Coolant Filter.
	OATC	**INITIAL OPERATOR ACTIONS** 1. Check letdown temperature on 1-TI-0130 on the QMCB. **(failed)** 2. IF necessary, initiate 18007-C, "Chemical Volume Control System Malfunction". **(not necessary, letdown is not lost)** 3. Check for ACCW normal operation. **(TV-0130 not normal)**

Miles

07 54(54) fault in

56(08) [redacted] goes through ARP

Meeks

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Time	Position	Applicant's Action or Behavior
	OATC	**SUBSEQUENT OPERATOR ACTION** 1. Attempt to balance charging and letdown flow. 2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position. 3. IF instrument or equipment failure has occurred, initiate maintenance as required. **COMPENSATORY OPERATOR ACTIONS** NONE **Note to examiner:** The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on SS throne). It is expected the OATC will take manual control of TV-0130 to control cooling flow. **End of 17007-F04 actions.**
	OATC	**ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)** **PROBABLE CAUSE** 1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger. 2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT).

Meeks

lots of talk between ATC/SS

ATC: there's nothing we can do with this besides call C&T (pointing to controller)

02(10) SS directs ATC to manually control TIC-130 and lower output to contol the temperature

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. what procedural guidance to control TV-0130?

. TI-130, TE failed low, which caused ACCW valve to go shut, which raised L/D temp. evident by DIVERT valve

. conduct of ops → controller not functioning properly

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Time	Position	Applicant's Action or Behavior
	OATC	**AUTOMATIC ACTIONS** NONE **INITIAL OPERATOR ACTIONS** Check normal operation of ACCW and, if necessary, initiate 18022-C, "Loss of Auxiliary Component Cooling Water".
	OATC	**SUBSEQUENT OPERATOR ACTIONS** NOTE Seal water injection flow to the Reactor Coolant Pumps (RCPs) should be maintained less than 130°F. 1. Monitor VCT outlet temperature using 1-TI-0116 on the QMCB. 2. Check letdown flow using 1-FI-0132 and temperature using 1-TI-0130 on the QMCB. 3. Adjust the charging or letdown flow if necessary to reduce the letdown temperature. 4. Return to normal operation as soon as possible per 13006-1, "CVCS Startup and Normal Operation." 5. IF equipment failure is indicated, initiate maintenance as required. **COMPENSATORY OPERATOR ACTIONS** NONE – **End of 17007-B04 actions.**

Meeks

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Time	Position	Applicant's Action or Behavior
	SS	**AOP-18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER symptoms and steps.** Symptoms / alarms: • High temperature on any heat exchanger serviced by ACCW. **Note to examiner:** The SS may look at 18022-C due to the reference from ALB07-B04 if received.
	OATC	NOTES • ACCW pumps are removed from the 4.16KV Class 1E buses following simultaneous loss of offsite power and safety injection. • ACCW flow to the Seal Water Heat Exchanger is not required if RCS temperature is less than 150°F and Seal Water Heat Exchanger Return Temperature remains less than 135°F.

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Time	Position	Applicant's Action or Behavior
	OATC	1. Check ACCW pumps – AT LEAST ONE RUNNING. (YES) 2. Check ACCW SPLY HDR PRESS PI-1977 – GREATER THAN 135 PSIG. (YES) 3. Check if ACCW flow exists through the letdown heat exchanger. **(YES)** • TV-0130 OPEN. • ALB07-D03 LTDN HX OUT HI TEMP – EXTINGUISHED.
	OATC UO	4. Initiate the Continuous Actions Page.
	OATC	5. Check ACCW Surge Tank Level (IPC L2700) – GREATER THAN 20% AND STABLE OR RISING. **(YES)**

Nicks

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Time	Position	Applicant's Action or Behavior
	OATC	6. Check if RCPs should be stopped: a. Check the following RCP parameters (using plant computer): • Motor bearing (upper or lower radial or thrust) – GREATER THAN 195°F. • Motor stator winding – GREATER THAN 311°F. • Seal water inlet – GREATER THAN 230°F. • Loss of ACCW – GREATER THAN 10 MINUTES. **Note to examiner:** All parameters listed are met, the RCPs do NOT require stopping. a. Perform the following. 1) IF any parameter limit is exceeded, THEN perform step 6.b. 2) Go to Step 7.

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Time	Position	Applicant's Action or Behavior
	OATC	7. Check RCP thermal barrier outlet valves – OPEN. **(YES)** • HV-19051 ACCW RCP-1 THERMAL BARRIER RTN VLV • HV-19053 ACCW RCP-2 THERMAL BARRIER RTN VLV • HV-19055 ACCW RCP-3 THERMAL BARRIER RTN VLV • HV-19057 ACCW RCP-4 THERMAL BARRIER RTN VLV • HV-2041 ACCW RCPS THERMAL BARRIER RTN VLV **Note to examiner**: All the above listed valves are open as required.
	OATC	8. Check ACCW heat exchangers outlet temperature (IPC T2701) - LESS THAN 120°F. **(YES)**
	OATC	9. Check ACCW containment isolation valves – OPEN. **(YES)** • HV-1979 ACCW SPLY HDR ORC ISO VLV • HV-1978 ACCW SPLY HDR IRC ISOL VLV • HV-1974 ACCW RTN HDR IRC ISO VLV • HV-1975 ACCW RTN HDR ORC ISO VLV **Note to examiner**: All the above listed valves are open as required.

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Time	Position	Applicant's Action or Behavior
	OATC	10. Check if ACCW is restored to service. a. Components cooled by ACCW – TERMPERATURES RETURNING TO NORMAL. **(YES)** b. Restore charging and letdown using 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. **(N/A)**
	SS	c. Return to procedure and step in effect.
		END OF EVENT 3, proceed to EVENT 4.

Michael SRO: [redacted] Maude RO: Carla Smith Phil BOP: [redacted]

07:24:14	Crew takes shift They correctly discussed ΔΦ management
27:48	J-C: ↑ 2½ Steps
21:33	C-J: we have temp ↔, we can lower turbine load (misspoke) *
32:10	J-R: ↑ 8-12 MWe
36:22	J-C: ↑ 3 Steps
43:47	Alarms
56	R-J: Failed Stm Flow Inst Takes manual control of MFRV & Pmp
44:24	R-J: [redacted]A's done
52:11	J-R: MFP Speed Control returned to auto
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	J-C: That raises & lowers temp it does not open & close valve. (The controller is reverse acting & she did not know how to operate it.) Carla actually set it at 51%.
05:00	L/D High Temp Demin Diint closed.
11 37	R-J: NSCW Cooling Fan 1 Tripped
	R-C/T: AO to Bkr J-R-C/T: Get W/B Temps while out there.

Capehart

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		COMPENSATORY OPERATOR ACTIONS
		NONE
	S→A	Take man control of TV-130 & lower temp by adjusting temp. setpoint.
		Note to examiner: The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on SS throne). It is expected the OATC will take manual control of TV-0130 to control cooling flow.
		End of 17007-F04 actions.
	0805	LD Hi Temp Alarm Cleared
	OATC	**ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)**
		PROBABLE CAUSE
		1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.
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