4179

Program: Licensed Operator Requalification Training	**Title: Loss of Instrument Air/CSP-H.1**
Author: Pat Murphy	**Revision Date:**
References: AOP-5B CSP-H.1	**Duration: 1.5 hours**

1.0 PURPOSE:

This will give the Licensed Operators and STAs practice addressing a loss of Instrument Air in the containment followed by a Main Feed line break in the turbine building and a loss of secondary heat sink.

2.0 SUMMARY:

2.1 Event/Malfunction

Loss of Instrument Air in Containment	IA Leak at node 2
Loss of Main Feed	Leaks at nodes 17 &19
Loss of secondary heat sink	P-38 motor trip, 1P29 overspeed trip

2.2 Scenario:

2.2.1 The first event will be a loss of Instrument Air inside the containment. This will cause a loss of letdown which will not be able to be reestablished. Excess letdown will also be unavailable. This will force the crew to shut down Unit 1.

2.2.2 After the decision to shut the plant down has been made, a feed break will occur in the turbine building. In conjunction with this a loss of secondary heat sink will occur caused by P-38A and 1P-29 tripping with P-38B tagged out to start the scenario. The crew should address whether they will send someone into containment to align the N_2 backup to the PORVs since this will be needed to establish bleed and feed if that becomes necessary.

3.0 PREPARATION:

PREPARE and **START** the video equipment, if required

3.1 **INITIALIZE** the simulator:

LOAD IC 2

MODIFY the initial conditions as follows:

PLACE a red tag on P-38B

Initiator	Unit	Failure	Component	Option	Delay	Act	Cond
Setup	1	MAL	AFW1	N/A	10	C	JCRFTR
Setup	1	PMP	AFW1	2	30	C	JCRFTR

3.2 **VERIFY** the simulator setup for training:

- Rod counters reset
- Status boards updated
- All books in proper places
- Sim 20 lighting breakers closed
- Training signs installed
- Horns on
- Instrument noise on
- Video tapes available
- Replace burnt out light bulbs as required
- All magnetic mimic bus positions in proper positions
- RMS grid sheets in place
- Main control board and instrument racks doors shut, lights off

3.3 **ENTER** the malfunctions and set to enable as follows:

Initiator	Unit	Failure	System	Node	Value	Ramp	Delay	Act	Cond
When directed	1	LEAK	CAU	2	2100	90	0	D	

3.3.1 This will cause an instrument air leak in containment on the common line. The AOs will be sent to investigate the low air pressure.

3.3.2 When sent to the IA compressors report that they are all working fine and that you have high air flow on both headers.

3.3.3 When sent to the PAB report that the air flow meter in the PAB to Unit 1 containment is pegged high and that you can't see any evidence of an air leak in the PAB.

3.4 **ENTER** the malfunctions and set to enable when directed by the lead instructor as follows:

FILE SG0027 or

Initiator	Unit	Failure	System	Node	Value	Ramp	Delay	Act
When directed	1	LEAK	CFW	17	8000	90	0	D
When directed	1	LEAK	CFW	19	8000	90	0	D
When directed		OVR ANN	MSC20	N/A	1	N/A	0	D

3.4.1 This will cause a main feed line break in the turbine hall. In conjunction with the malfunctions in the setup this will also cause a loss of secondary heat sink. The AOs will be sent to investigate the problems with the aux feed pumps. Report that 1P-29 has oversped. When asked to reset it report that you are unable to get it latched. Report that P-38A tripped on overcurrent and has an 86 lockout. Also report that the turbine hall is filled with steam.

3.4.2 If sent into the containment to align N_2 to the PORVs, use the auto exercise file **UPHATCH** to enter containment. When leaving containment type **FILE EXITCNMT.**

4.0 PRE-SCENARIO ACTIVITIES

4.1 Tell the crew that this is training. If any of the crew members want to discuss, explain or clarify any issue, they may ask the instructor to take the watch. As long as the crew has the watch, they have the normal responsibilities of monitoring and operating the control boards unless told otherwise. If the instructor has the watch, they have no operating responsibilities. The intent of this session is to promote understanding of the event and to practice doing it right. We can back up if necessary to accomplish this. The DSS's primary role is to observe and improve crew performance. The DSS will lead the post-event critique with assistance from the instructor. The DSS will conclude this session by updating the areas for improvement with the help of the crew liaison and develop an action plan to address them. Remind the DSS to assign activities to the STA as appropriate during the scenario. The instructor's role is to support the DSS in the training of his crew.

4.2 Present session objectives as appropriate.

4.3 DSS assign roles based on individual needs ensuring crew rotation occurs so all operators have an opportunity to practice.

4.4 Discuss the differences between the plant and the simulator, if necessary.

5.0 OPERATING EXPERIENCE:

OE 9330 Loss of Service Air Results in Unplanned ESF Actuation and Manual Reactor Scram at the Clinton Power Station.

6.0 POTENTIAL OPERATOR ERRORS:

6.1 The inability to get excess letdown in service may not be immediately recognized. this may delay the decision to shut down the unit.

6.2 The crew may believe a reactor trip is imminent when they see the low pressure alarm on the MSIVs and decide to perform a manual reactor trip. If that occurs the simulator should be reset and the scenario restarted.

6.3 The crew may not recognize the concern associated with getting N_2 lined up to the PORVs. If they do not the instructor should prompt the DSS to get the crew thinking about the potential concern with no bleed and feed.

7.0 IMPROVEMENT AREAS:

Procedural use and adherence.

8.0 TRAINING:

8.1 Loss of Instrument Air

8.1.1 The only way to isolate the leak is to close IA valves 3047 & 3048. The crew may be reluctant to do so but it is a procedural requirement. The instructor may need to emphasize this point.

8.1.2 It is not possible to establish excess letdown without continuously lifting the relief valve associated with the RCP seal return. The crew may not immediately recognize this.

8.1.3 The pressurizer will be filling up continuously due to the loss of letdown and continued charging. The crew should take steps to minimize the rate of rise but they will not be able to stop it altogether. This should force a decision to shut down the plant although they may choose to delay the decision until they have made a containment entry to ascertain whether they can fix the leak quickly.

8.2 Loss of Main Feed

8.2.1 A large feed line break will result in the loss of feed to both SGs. The crew should recognize this and manually trip the reactor.

8.2.2 After the reactor trip a total loss of secondary heat sink will occur when both the available AFW pumps trip.

8.2.3 The STA should promptly inform the DOS of the red path on the Heat Sink Status Tree. The DOS should immediately transition to CSP-H.1.

8.2.4 The DSS should contact the maintenance crew working on the B AFW pump to get that work expedited.

8.2.5 The crew should also be pushing for a containment entry to line up N_2 to the PORVs in the event that we are forced to use bleed and feed to remove our decay heat.

The Instructor will conduct a shift turnover using information on the Shift Turnover Information sheet.

During evolutions **REINFORCE** demonstrations of attention to detail and self-evaluation, (identify specific items for the topic).

During evolutions **REINFORCE** demonstrations of conservative decision-making.

Place the simulator in **RUN.**

During the scenario **ENSURE** that all communications are done in accordance with the communications standard and that all crew members perform self

2×10^{-5} chance with procedure

pr. $4E^{-5}$

$6E^{-5}$ ← new baseline w/procedure guidance

$6E^{-4}$ ← would have been w/o procedure guidance

Event 1: Loss of Instrument Air

Brief Description: An air line in containment breaks causing letdown isolation and loss of air to the PORVs.

Position	Expected Response		Instructor Notes
All	1.1	Recognize the loss of instrument air.	Alarms and indications on the control boards should reveal the low air pressure. The loss of letdown should help them diagnose that the leak is in containment.
CO1, 3rd, DOS	1.2	Use AOP-5B to address the loss of IA.	The procedure eventually will direct the isolation of the air line break. By that time the crew should have determined the leak location. There may be a reluctance to follow the procedure. The instructor should work with the DSS to overcome any reluctance to perform the isolation. If necessary, point out that they have already lost everything in containment that they would lose by isolating the leak.

Event 2: Loss of Secondary Heat Sink
Brief Description: A feed line break occurs in the turbine building and then all Feedwater is lost.

Position	Expected Response		Instructor Notes
All	1.3	Large loss of feed.	A manual trip is warranted but due to the leak size an automatic trip may occur before the crew has completely formulated their strategy.
CO1, 3rd, DOS	1.4	Use EOP-0 to respond to the reactor trip. SI should not be actuated so the crew will be directed to transition to EOP-0.1.	
STA	1.5	Recognize the red path on Heat Sink.	The STA should start monitoring the CSFSTs as soon as the crew transitions to EOP-0.1. Subcriticality and Core Cooling will both be satisfied but Heat Sink will be red path. The STA should then immediately (before monitoring the remaining trees) tell the DOS of the red path for Heat Sink.
DOS	1.6	Transition to CSP-H.1. Perform the actions of H.1 until step 8 at which point you will be in a continuous loop until either an AFW pump becomes available or SG WR level drops to < 55".	The crew has two options that they should be pursuing. They should contact maintenance to expedite the repair to P-38B and they should be sending a team into containment to align N_2 to the PORVs since they will be needed if bleed and feed becomes necessary.

9.0 **TERMINATION:**

* **TERMINATE** the scenario at the direction of the Instructor or when the crew has reestablished the heat sink to Unit 1.
* **STOP** the video equipment if in use.
* **Brief the DSS on the simulator session**

10.0 **POST SIMULATOR EXERCISE CRITIQUE:**

The DSS (or his designee) or the Instructor will lead the critique.

***Distribute** the Training Objectives (Attachment 1) to the crew members if they were not distributed during the pre-exercise turnover.
***Facilitate** the Crew Self Critique:

DID THE INDIVIDUALS:	YES/NO	DID THE CREW:	YES/NO
Recognize off-normal trends		Diagnose the event	
Interpret alarms and annunciators		Understand plant response	
Diagnose events		Comply with procedures/Tech Specs	
Demonstrate understanding of plant response		Function as a team	
Adhere and use plant procedures		Perform briefs	
Operate Control Room equipment properly		Set clear goals and resolve any conflicts	
Communicate and interact with the crew		Communicate in accordance with the communication standard	
Direct shift operations/Make conservative decisions		Maintain proper control room conduct	
Perform EOP implementation enhancements			
Use Pre-action feedback			
Minimize the use of two-handed operation			

* **DOCUMENT** comments on the Instructor Comment sheet and forward to the LOR Program Administrator

* **REVIEW** instructor comments and any scenario attachments, as applicable

* **REVIEW** video, as applicable

* **PREVIEW** the next session, as applicable

11.0 TASKS:

CONTROL OPERATOR:

P000.028COT	Respond to loss of secondary heat sink.
P000.036COT	Respond to loss of Instrument Air.
P061.007COT	Operate the turbine-driven auxiliary feed pump.
P000.006COT	Respond to a reactor trip or safety injection.
P000.007COT	Manually trip the reactor.

SENIOR REACTOR OPERATOR:

P119.304.SRO	Direct personnel to mitigate emergency/abnormal events.

SHIFT TECHNICAL ADVISOR:

C000.002STA	Provide independent assessment of off-normal plant conditions.
C000.003STA	Provide assessment of the crew's response to abnormal plant conditions.
C000.004STA	Advise the crew on actions needed to terminate to mitigate the consequences of an off-normal event.
C000.005STA	Perform monitoring of critical safety function status trees.

12.0 COMMITMENTS INCLUDED IN THIS LESSON PLAN

None

13.0 EVALUATION AND MAKEUP:

12.1 Evaluation will be done during the scenario by the DSS and the instructor.

12.2 If feasible, makeups shall be completed by attending another simulator session. If not, the makeup should consist of an instructor-led, simulator walk-through of the applicable procedures and Technical Specifications for each event in the Simulator Guide.

14. 0 LOR SAMPLE PLAN INFORMATION

Lesson plan setting	Hours	Topic areas	Hours
Classroom	0.0	Systems	0.0
Simulator	1.5	AOPs	0.5
		TS/Admin/DCS	0.0
		EOPs/SEPs	0.0
		OPs/OIs/RPs	0.0
		Outage	0.0
		Industry Events	0.0
		ECA/CSP	1.0
		Fundamentals	0.0
Total hours	1.5		1.5

SHIFT STAFFING (Forward to LOR Program Administrator)

Scenario Title:	Crew:	Cycle:	Date:
DSS			
DOS			
OS			
STA			
CO1			
CO2			
THIRD LICENSE			

INSTRUCTORS COMMENTS: (Forward to LOR Program Administrator)

Include as a minimum the following items:

- Any simulator fidelity problems
- Any crew procedural problems
- Any equipment operation problems or systems knowledge weaknesses exhibited by the crew

ATTACHMENT 1
TRAINING OBJECTIVES

RECOGNIZE and DIAGNOSE the effects of a loss of the Instrument and Service Air Systems on the following:
CVCS
Pressurizer Control
Overall Plant Operation (025.LP0338.007)
RECOGNIZE when a loss of Heat Sink occurs. (043.LP1998.002)
APPRAISE and PRIORITIZE each operator-initiated recovery technique in its ability to restore the Heat Sink Critical Safety Function. (043.LP1998.007)

ATTACHMENT 2
SHIFT TURNOVER INFORMATION

1.0 **PLANT CONDITIONS: Enter information as necessary**

UNIT 1		UNIT 2	
Time in core life:	**MOL**	Time in core life:	**BOL**
Reactor power:	**100%**	Reactor power:	**100%**
Boron concentration:	**594 ppm**	Boron concentration:	**1310 ppm**
Rod height	**D @ 220 steps**	Rod height	**D @ 220 steps**
Day of week, support staff	**Normal day shift**		

2.0 **LCO/TECHNICAL SPECIFICATIONS IN EFFECT:**

TS Number	Description	Reason
15.3.4.C.1	7 days to restore pump to operable, both units	Motor replacement

3.0 **EQUIPMENT OUT OF SERVICE:**

P-38B for both units

4.0 **PLANNED EVOLUTIONS:**

None

5.0 **TURNOVER INFORMATION**

P-38B has been out of service for 18 hours to replace its motor. Maintenance expects it to be available to test within about 4 hours. This time estimate includes the time needed to remove all tags and release it to Ops for testing.