

Scenario Title: ATWS AND FUEL FAILURE WITH LOSS OF HIGH PRESSURE INJECTION

Scenario Duration: 1 hour

Scenario Number: 02-REQ-009-1DY-2-15

Revision Number: 3

Course: Licensed Operator Requal

Reviewed By:

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Operations Training Supervisor

1 4/25/90

Date

Reviewed By:

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Assistant Training Superintendent

1 4/26/90

Date

Approved By:

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SUPERINTENDENT OF OPERATIONS

1 4/26/90

Date

**CONTROLLED
DOCUMENT**

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Rev. 3

NRC2/263

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SCENARIO SUMMARY

ATWS AND FUEL FAILURE WITH LOSS OF HIGH PRESSURE INJECTION

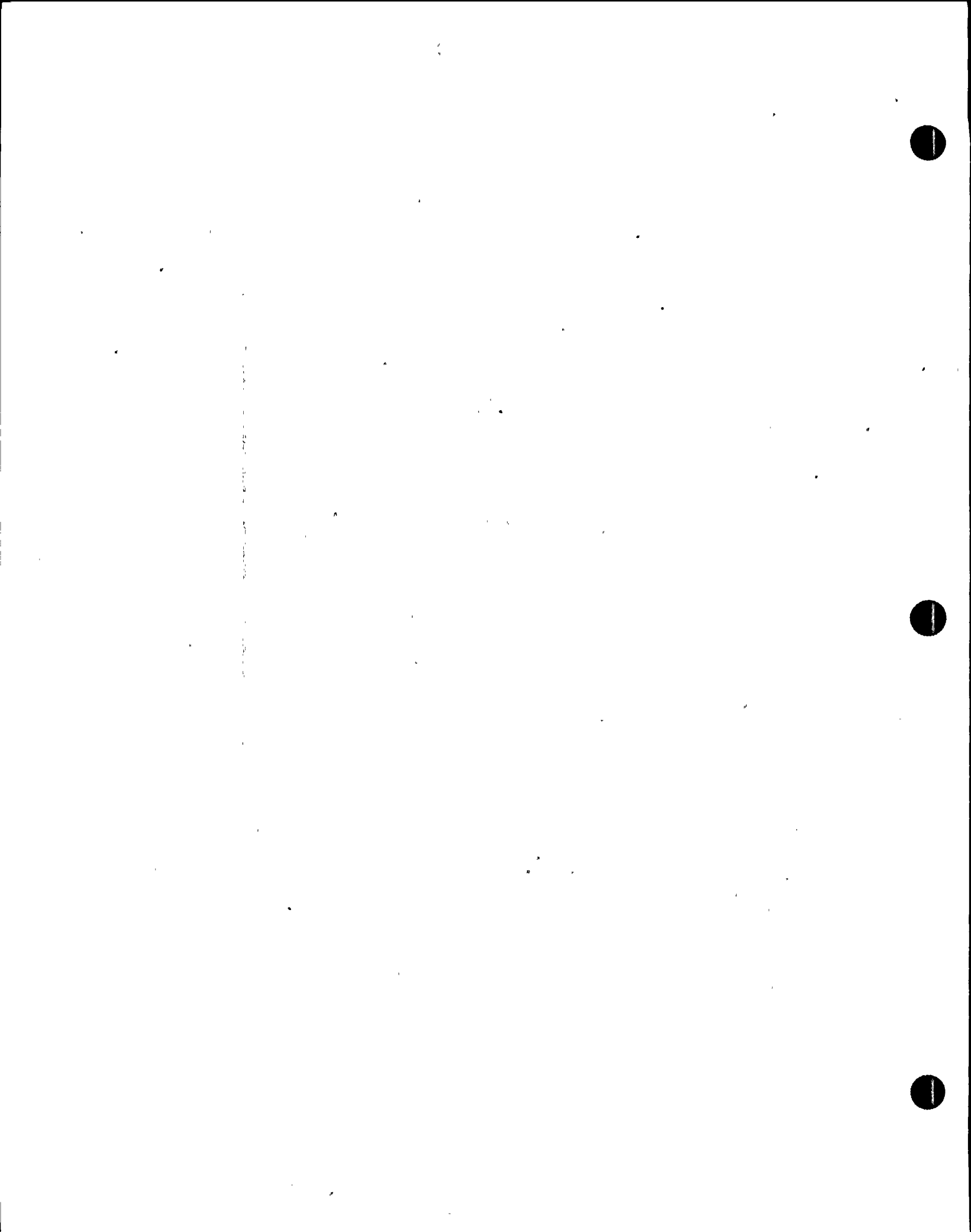
The scenario begins with a control rod drifting out. The drifting rod is the last rod to be pulled prior to increasing recirculation flow. The shift takes action to prevent its outward motion, including individual rod scram with the test switches.

The shift has been assigned a RCIC valve operability surveillance to perform. When the first valve is stroked a ground fault appears on the DC switchgear that supplies power to the valve. The valve, suction from the CST, requires RCIC be declared inoperable.

Later, another rod drifts out causing an increase in power and induces fuel failure. The MSIVs close on the high radiation signal. RPS fails to generate a scram signal, but approximately 15 seconds after the isolation the rods go full in due to RRCS (ARI).

After the scram, the feed pumps trip, causing a loss of feedwater event. The HPCS injection valve will also fail to open. When the operators attempt to start RCIC, the turbine trips forcing them to lower pressure enough to feed with the condensate booster pumps.

The scenario ends when reactor level is being restored to the 159.3" to 202.3" range.



SCENARIO OBJECTIVES

The Licensed Control Room Reactor Operators (CSO and NAOE):

Perform the Actions Required for a Control Rod Drift
Task Number 2000490501 K/A Rating 3.20
Requal TIF 3.51 Class, Simulator

Scram the Reactor Manually and Take Immediate Actions
Task Number 2010130101 K/A Rating 4.10
Requal TIF 3.67 Class, Simulator

Perform Lineups on the RHR System
Task Number 2050010101 K/A Rating 3.80
Requal TIF

Manually Initiate the RCIC System from the Control Room and Monitor for Proper Operation
Task Number 2170030101 K/A Rating 3.50
Requal TIF 3.31 Class, Simulator

The Licensed Senior Reactor Operators (SSS and ASSS):

Direct the Actions Required per EOP-RPV Section RQ
Task Number 3449390603 K/A Rating 4.70
Requal TIF 4.40 Class, Simulator

Direct the Actions Required per EOP-RPV Section RL
Task Number 3449400603 K/A Rating 4.70
Requal TIF 4.33 Class, Simulator

Direct the Actions Required per EOP-RPV Section RP
Task Number 3449410603 K/A Rating 4.70
Requal IF 4.33 Class, Simulator

Direct the Actions Required per EOP-PC Section DWT
Task Number 3449420603 K/A Rating 4.70
Requal TIF 4.36 Class, Simulator

Direct the Actions Required per EOP-PC Section PCP
Task Number 3449430603 K/A Rating 4.70
Requal TIF 4.36 Class, Simulator

Direct the Actions Required per EOP-PC Section SPL
Task Number 3449440603 K/A Rating 4.70
Requal TIF 4.36 Class, Simulator

Direct the Actions Required per EOP-PC Section SPT
Task Number 3449450603 K/A Rating 4.70
Requal TIF 4.33 Class, Simulator



SCENARIO OBJECTIVES (Cont'd)

Respond to a Control Rod Drift
Task Number 3449740403 K/A Rating 3.70
Requal TIF

Classify Emergency Event Requiring Emergency Plan Implementation
Task Number 3440190303 K/A Rating 4.70
Requal TIF 4.28 Simulator

(*) Individual Simulator Critical Task
(**) Crew Simulator Critical Task



NMP 2 CONTROL ROOM REFERENCES

PROCEDURES:

OP-30, H.5.0, Control Rod Drive

OP-73A, I.10.0, Normal DC Distribution

OP-31, E.7.0, Residual Heat Removal System (SP Cooling)

OP-101C, H, Scram and Scram Recovery

OSP-ICS-Q001, RCIC Valve Operability Test

EOP-RP, RPV Power Control

EOP-RL, RPV Water Level Control

EOP-SPT, Suppression Pool Temperature Control

EAP-2, Classification of Emergency Conditions

EPP-20, Emergency Notifications

EPP-25, Emergency Reclassification and Recovery

TECHNICAL SPECIFICATIONS:

3.1.3.1

3.3.1 and Table 3.3.1-1, Note C

3.5.1

Table 3.6.3-1

3.7.4



TIME

EVENT

INSTRUCTOR ACTIVITY

PLANT RESPONSE

OPERATOR ACTIONS

EVALUATOR COMMENTS

Special Instructions:

None

Simulator Operation:

Initialize: IC-20

100%, BOL

Operator Actions:

None

Preset Malfunctions:

1,CS04

HPCS Inj Valve Fail

2,RP03

Failure to Scram

3,RD051431,,,0004

Rod 14-31 Drift Out

Preset Remote Functions:

None

Preset Overrides

None

Distribute and discuss

Turnover sheets

Initial Conditions:

100%, BOL, maintaining
power in accordance with
OP-101D RWM GR-147
above the 100% rod line



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
		Out-of-service equipment: None Surveillances scheduled: OSP-ICS-Q001 "RCIC Valve Operability Test" Allow not more than five minutes for panel walk down.		Walk down the panels.	
T = 0	1	Begin the scenario		Assume the shift; continue power operation and perform assigned surveillance test.	
T = 4	1	Malfunction 3 is effective	Rod 14-31 drifting out	Respond to alarm	1a
				TEAM	
				(*) CSO/E	Sat/Unsat
				1. Identifies rod	4a
				2. Selects rod for display	5a,b
				3. Drives 1 notch in opposite direction	5a,b
				Task # 2000490501	
				K/A Rating 3.20	
				4. Verify action using Op-30 H.5.0	
		Note: The following two events may be occurring simultaneously			



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SSS/ASSS

Role Play: Remove malfunction when rod full in and as AOE report isolation after a minute or two.

1. Directs RD to continuously insert rod 6a
2. Directs AOE to shut 101; insert riser isol 102; withdraw riser isol 4b;6a
3. Reviews TS (3.1.3.1) 3d
4. Notifies reactor analyst Task # 3449740403 6b
K/A Rating 3.70

- (*) 5. Declares rod inop Task # 3410320303 2b;3d Sat/Unsat
K/A Rating 3.7

Role Play: As Ops. Superintendent inform crew to hold off on troubleshooting the control rod until an evaluation is performed.

Role Play: As Reactor Analyst, report that no fuel thermal limits have been violated.

T = 20

2

Call the Control Room and prompt the crew that the surveillance on RCIC is approaching its drop dead time very soon and must be performed. Monitor Control Room activity; When OSP is being performed



TIME EVENT INSTRUCTOR ACTIVITY PLANT RESPONSE OPERATOR ACTIONS EVALUATOR COMMENTS

Set I/O override for bus ground
 IO; 1,AN852101-08,,ON
 when MOV-129 closes
 Tell the CR operator the
 computer printed (Comp Pt
 BYSIC05) "DIV I DC BUS 2A GRND"
 when someone
 looks at the printer or
 when an operator goes to the
 back of panel 852, go with
 the operator and state that
 a ground is indicated on the
 test meter for Div. I
 (100 volts positive)

Annunciator 852108

BATTERY BREAKER OPEN
AN 852301-45,,CN

Role Play: As electrician
 report back after several
 minutes that there is a ground
 on the bus, and not the
 battery. Ask if they have
 noticed any equipment starting
 or tripping at about the same
 time as the ground.

TEAM
 1. Respond to alarms 1a
 2. Verify system response 1c

SSS/ASSS
 1. Enters OP-74A
 2. Contacts electrical 6b
 maintenance to check
 SHG002A

TEAM
 Report closing ICS 6a
 MOV 129



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
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Role Play: As electrician, report after several minutes that the motor for MOV 129 has an acrid odor and that you want to secure power to MOV 129 and prepare a mark up request.

Set I/O for de-energizing MOV 129
 (With a 2 min. TD from the current time. Time must use 00:00 format)
 IO;2,E51A-S10-C,,OFF (Green)
 IO;3,E51A-S10-D,,OFF (Red)
 IO;4,AN601301-19,,ON (Motor Overload)
 IO;5,E51A-DS29-A,,ON (Amber Status light)
 Clear I/O;1 when circuit de-energized

SSS/ASSS

Direct actions to restore DC bus to normal

- | | | |
|--|----|-----------|
| 1. CSO to markup suction valve | 6a | |
| 2. Electrician to deenergize circuit | 6a | |
| 3. Review Tech Specs (Table 3.6.3-1; 3.7.4) | 3d | |
| 4. Review Technical Specifications Interpretation Manual | 3d | |
| (*) 5. Determine RCIC inoperable (logic ckts)
Task # 3410320303
K/A Rating 3.7 | 2c | Sat/Unsat |



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
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Role Play: As electrician report that the circuit breaker is open and 125 VDC bus 2A is restored to normal.

T = 30

Set Malfunctions for fuel failure due to another rod drift.

- MF; 4,RD053815,,0035
- MF; 5,RX01,100,60,0036
- MF; 6,FW03,,0040

T = 35

3

Malfunction 4 effective.

Rod 38-15 drifts out

- | | |
|----------------------------|-----------|
| (*) CS0/E | Sat/Unsat |
| 1. Respond to alarm | 1a |
| 2. Identifies rod | 4a |
| 3. Selects rod for display | 5a,b |
| 4. Drives IN 1 notch | 5a,b |
| 5. Per OP-30 H.5.0 | |
| Task # <u>2000490501</u> | |
| K/A Rating <u>3.2</u> | 6a |



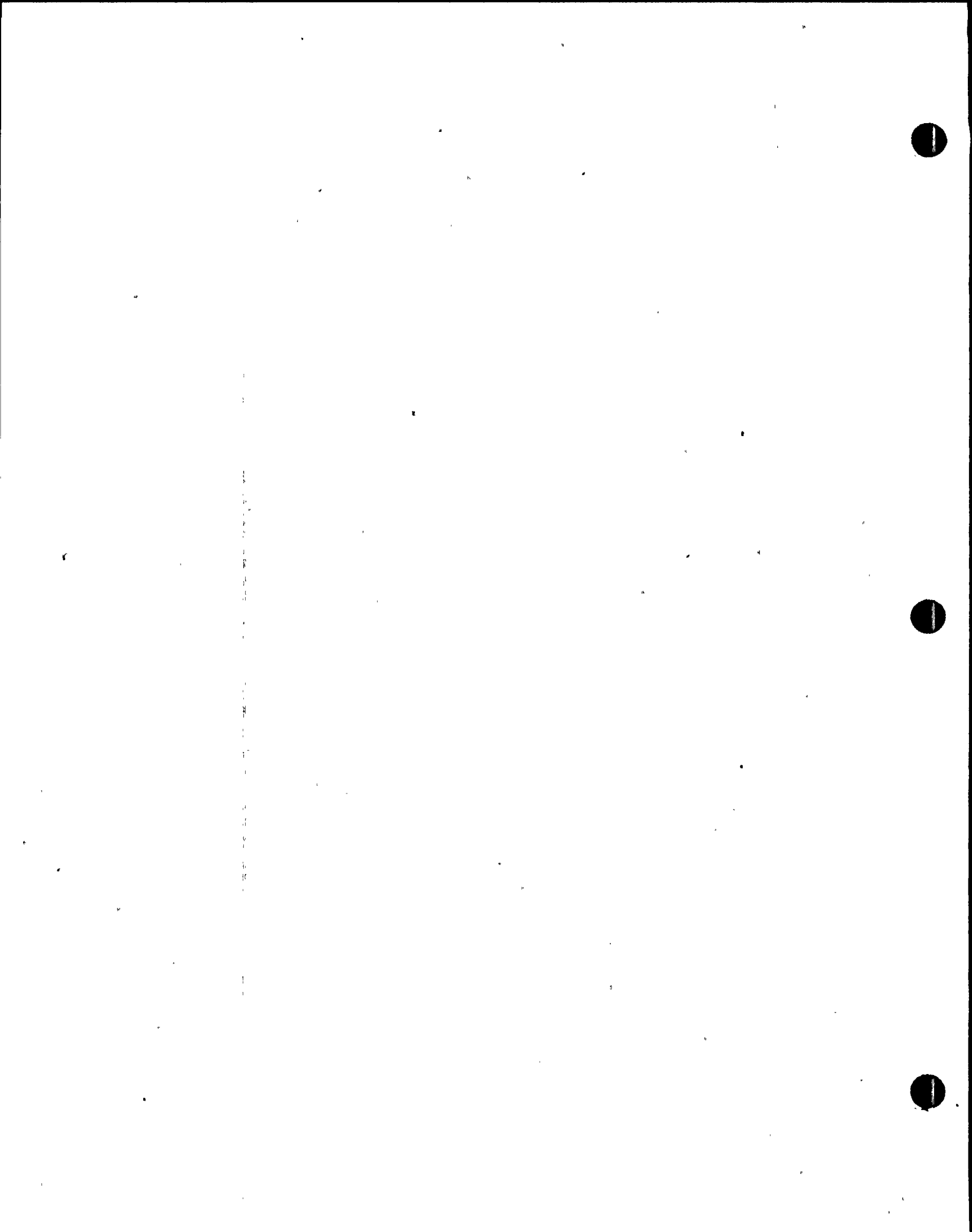
TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
				(*) CSO/E 1. Identify/respond to offgas/ ARM alarm Task # <u>2000610501</u> K/A Rating <u>3.3</u>	Sat/Unsat
T = 36		Malfunction 5 effective.	603-133 alarms, MSL high radiation	SSS/ASSS 1. Directs RO to contin- uously insert rod	
				(*) 2. Enter EOPSC Task # <u>3449390603</u> K/A Rating <u>4.70</u>	Sat/Unsat/NA
T = 39	4	Set Malfunction MF;7,RX03,75 if power was reduced (to force the Hi MSL rad scram and isolation)	MSL isolation & failure to scram	CSO/E 1. Performs actions of OP-101C, H.1.0 a. Mode switch to S/D b. Ensure scram Full core display RSCS RHM OD-7	5a,b 4a
				(*) 2. Reports Failure to Scram Task # <u>2010130101</u> K/A Rating <u>4.0</u>	6a Sat/Unsat/NA



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
				(*) SSS/ASSS Direct actions per EOP-RPV control section RQ (Note: rods will insert on ARI) Task # <u>3449390603</u> K/A Rating <u>4.70</u>	Sat/Unsat
		Clear HF; 7, following scram		CSO/E	
				1. Initially take actions as directed by SSS.	3b
				2. Identify/report rods full in following ARI.	4a,6a
				3. Verify/report APRMs decreasing	4a,b
				4. Monitor/maintain: Level 178" to 187" Press < 1076 psig	4a;6a
				5. Insert SRM/IRM	5a,b
				6. Verify/trips turbine	4a,b
				7. Verify/transfer house loads	4a,b
				8. Verify/report SDV vents/drains shut	4a,b;6a
				9. Verify/report recirc. pumps at low speed.	4a,6a



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
T = 40		Malfunction 6 effective.	All feed pumps trip	(**) Team Identify/report loss of feed pumps and HPCS injection. Task # <u>2009100501</u> K/A Rating <u>3.6</u>	4a,6a Sat/Unsat
				SSS/ASSS (*)Enter EOP RPV control and PC control (if req) Task # <u>3449390603</u> K/A Rating <u>4.70</u> Task # <u>3449400603</u> K/A Rating <u>4.70</u> Directs RCIC inj, HPCS inj. Task # <u>3449410603</u> K/A Rating <u>4.70</u> Task # <u>3449420603</u> K/A Rating <u>4.70</u> Task # <u>3449430603</u> K/A Rating <u>4.70</u> Task # <u>3449440603</u> K/A Rating <u>4.70</u> Task # <u>3449450603</u> K/A Rating <u>4.70</u>	3b,c Sat/Unsat



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
				TEAM	
				RL	
				1. Level maintained 159.3" to 202.3" using condensate (after lowering RPV pressure).	3b,c
				SPT	
				2. SP cooling initiated	2a;6a
				CSO/E	
				1. Reports level decreasing	4a;6a
				2. Initiate RCIC per OP-35, F.2	4a;5a,b
				a. Arm and depress	
				(*) b. Recognizes RCIC turbine trip	Sat/Unsat
				Note: May manually start RCIC per OP-25, F.3.	
				Task # <u>2170030101</u>	
				K/A Rating <u>3.50</u>	
				3. Feeds with condensate booster pump when pressure is low enough	
				SSS/ASSS	
				1. Record/track parameters	
5		Set Malfunction MF; 8,RC06 RCIC Turbine Trip when RCIC initiated			



TIME	EVENT	INSTRUCTOR ACTIVITY	PLANT RESPONSE	OPERATOR ACTIONS	EVALUATOR COMMENTS
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Role Play: (If requested) As chemistry report 400 microcuries gram total : iodine following a 5 minute wait after they request sample.

- | | | |
|----|---|-------|
| 2. | Determine if fuel has failed | 3b |
| 3. | Directs pressure reduction to allow feeding with condensate booster pumps. (Per EOP RP) | 4a,6a |
| 4. | Direct level restoration to 159.3"-202.3" | 4a;6a |

CSO/E

Places RHS B in Supp Pool cooling

- | | | |
|----|--|---------|
| 1. | SHP to RHS HX
Open SHP MOV 90
Throttle SHP MOV 33 to 7,400 gpm | 4a;5a,b |
| 2. | Start RHS pump
Task # <u>2050010101</u>
K/A Rating <u>3.80</u> | 4a;5a,b |
| 3. | Throttle RHS FV 38 to 7,450 gpm (Return to SP)
Task # <u>2050010101</u>
K/A Rating <u>3.80</u> | 4a;6a |

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TIME

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INSTRUCTOR ACTIVITY

PLANT RESPONSE

OPERATOR ACTIONS

EVALUATOR COMMENTS

Termination Cues: Reactor water
level being restored with
condensate booster pumps.

4. Throttle IX Bypass RHS 5a,b
MOV 8 to vary cooling

5. Monitor/report SP temp- 4a;6a
erature

SSS

(*1. Classifies event as an 3b, Sat/Unsat
Alert or higher (if
time permits; followup
question may be
required).

Task # 3440190303

K/A Rating 4.70

2. Makes notifications



SUMMARY OF CRITICAL EVENTS

<u>EVENT</u>	<u>CRITICAL STEP</u>	<u>POSITION</u>
1	Identify rod drift/take corrective action Declare rod inop	CSO SSS
2	Declare RCIC inop	SSS
3	Identify second rod drift/take corrective action Identify/respond to offgas and ARM alarms Enter EOPSC	CSO E1/E2 SSS
4	Report failure to scram Enter EOP-RPV	CSO SSS
6	Identify loss of feedwater and HPCS Reenter EOP RPV and enter EOP PC (if req)	Team SSS
5	Recognize RCIC trip Classification of event	E1/E2 SSS/SPEC

