SOUTH CAROLINA ELECTRIC & GAS COMPANY

NUCLEAR OPERATIONS EDUCATION

AND TRAINING

# INSTRUCTOR LESSON PLAN

## SIMULATOR TRAINING FOR SRO's
## OPERATING PRACTICES TRAINING
## ACCIDENT ANALYSIS/ASSESSMENT TRAINING

Time: 40 hours

REVIEWED AND USED

PROGRAM: .....

DATE: .....

INSTRUCTOR: .....



Recommended _____ Date 5/15/84
Nuclear Operations Training Supervisor

Approved _____ Date 5/4/84
Associate Manager
Nuclear Operations Training

DAY 1

SOUTH CAROLINA ELECTRIC & GAS

PHASE III PROGRAM

PLANT CASUALTY TRAINING

Day 1 Power Operations, Malfunctions

Small RCS Leak, Rod Control System Malfunction, Turbine Trip, Stuck Rod

Overview

In the Nuclear power industry there have been several utilities that have experienced small amounts of leakage from the Reactor Coolant System (RCS). To prepare the operator to properly identify and isolate such a leak, the student will be exposed to a small RCS leak and will be required to identify and take proper corrective actions by following the Emergency Operating Procedures for an RCS leak.

Terminal Objective

The student will be able to disucss and describe indications of RCS leakage along with operator actions required to place the plant in a safe and stable condition.

## Enabling Objectives

Upon completion of this unit, the student shall be able to:

1) - discuss the Reactor Coolant System Abnormal Operating Procedure for reactor coolant leakage.
2) - describe indications of a small RCS leak.
3) - recall RCS leakage technical specifications limits and their bases.

## References

1. Virgil C. Summer Training Simulator
2. SCE&G Phase II Training Material
3. SCE&G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications
6. Abnormal Operating Procedures
7. STP 114.002

# INSTRUCTOR'S GUIDE

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

INTRODUCTION

A. UNIT TERMINAL OBJECTIVE:

The student will be able to recognize, diagnose, and respond correctly to various plant malfunctions. This ability will be evaluated by instructor observation and the student's oral response to questions.

B. OPERATIONS PLAN:

Maintain Full Power Operation.

Conduct the scheduled malfunctions.

C. MALFUNCTIONS SCHEDULED:

1. CVC-13-Letdown leak outside containment
2. CRF-8-T Ref failure in Rod Control
3. CRF-7- Stuck Rod
4. EPS-9-Loss of unit Auxiliary Transformer
5. PRS-5- Pressurizer Pressure Channel Failure (Protection)

STATE THE NEED TO ASK QUESTIONS AS THEY ARISE

STATE BASIC PRESENTATION FORMAT

REVIEW (Optional)

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

III. PROCEDURE

A. Initialize at 100% power and perform a shift turnover and explain plant conditions and objectives to students:
- System lineups
- Plant parameters
- Operational status
- Power history

B. STPs scheduled
- NONE

C. Initiate CVC-13, Letdown Leak outside containment, discuss:
- EOP-12 Actions
- T.S. Leak Rate LCO
- Limitations of continued operation with charging and letdown isolated
- Clear malfunction after a reasonable time for repair

Malf CVC-13 Set Leak Size =75% Set Ramp Time=300sec (caused by Leaking Flange on) Inlet Side of TCV-143

D. Initiate PRS-5, Pressurizer Pressure Channel Failure (Protection), Discuss:
- Functions provided by channel
- Tech Spec Requirements
- SOP-401 required actions
- Clear malfunction after a reasonable time for repair

Malf PRS-5 Select Channel =PT 456 Select Failed Value =1700 PSIG Set Ramp Time =0 (Caused by Bad Power Supply) Card

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

E. Initiate CRF-7, Stuck Rod

NOTE: Stuck Rod is in Shutdown Bank B and will not be noticed until Reactor Trip occurrs.

MALF CRF - 7
Select variation -2=untrippable
Select ROD = G7 (SD Bank B)

F. Initiate CRF-8, TREF failure in Rod Control
Discuss:

- EOP-10 Required Action
- Rod Control System Control Signals and Response
- Response of Plant if no action was taken IE: Pressurizer Level and Pressure, SG Level, Steam Pressure, Turbine Load
- Clear malfunctions after a reasonable time for repair

MALF CRF - 8
Select Failed Valve = 557°F
Select Ramp Time = 0

G. If not Cleared, Clear Malf CVC-13 and have Charging and Letdown restored

H. Initiate EPS-9, Loss of Unit Auxiliary Transformer, Discuss:

- Reactor Trip investigation, cause of trip
- EOP-5 Required Actions
- EOP-6 Required Actions
- Tech Spec Requirements
- ONO Preparation and Reporting Requirements

MALF EPS - 9

I. Terminate exercise after plant is stable, SDM is verified, and all required Reporting and paperwork is completed.

J. Discuss with students plan of attack for dealing with Transformer Failure and Stuck Rod.

K. Students conduct shift turnover to instructor

IV. CRITIQUE

A. Review overall operations conduct.
B. Review malfunction responses

DAY 2

SOUTH CAROLINA ELECTRIC & GAS

PHASE III PROGRAM

PLANT CASUALTY TRAINING

Day 2 Power Operations, Malfunctions
Inadvertant Safety Injection Actuation,
Loss of Site Power and Recovery, Establish
Natural Circulation

## Overview

Although it is unlikely for a major accident to occur in a nuclear plant, the possibility does exits. Therefore, operators have to be knowledgeable of accident conditions, responses and procedures in order to place the plant in as safe and stable a condition as possible without causing further damage or public hazard.

A loss of site power requires the control room operator to verify a safe shutdown condition and actuation of all required emergency components. In addition the operator will have to establish conditions which enhance natural circulation and monitor core conditions to ensure that core heat removal is adequate.

## Terminal Objective

Upon completion of this unit the student will be able to describe the symptoms and automatic actions during a loss of site power (blackout). The student will also be able to perform and justify the immediate operator action required of a control room operator for a loss of site power and other plant malfunctions. In addition, the operator will be able to recognize an Inadvertant Safety Injection Actuation and take the proper actions to terminate it.

## Enabling Objectives

Upon completion of this unit the student will able to:

1)- List the symptoms or indications associated with a loss of site power (blackout).

2)- describe plant response to a station blackout (loss of site power) including all automatic actions that will occur.

3)- list the immediate operator actions required following a loss of site power (blackout).

4)- demonstrate an ability to perform the immediate actions during control room operations.

5)- perform the subsequent operator actions while using the applicable procedures for a loss of site power (blackout).

6)- discuss conditions which enhance natural circulation.

7)- Recognize an Inadvertant Safety Injection Actuation

8)- Perform the proper actions to terminate an Inadvertant Safety Injection.

## References


1. Virgil C. Summer Training Simulator EOP-4, SOP-306, STP 102.003
2. SCE & G Phase II Training Material
3. SCE & G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications

# INSTRUCTOR'S GUIDE

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

INTRODUCTION

A. UNIT TERMINAL OBJECTIVE:

The student will be able to describe the symptoms and automatic actions during a loss of site power. The student will also be able to perform and justify the immediate action required of a control room operator for a loss of site power and other plant malfunctions. Successful completion of this unit will be based on satisfactory evaluation by the program instructor based on observation and the student's oral responses to questions.

B. OPERATIONS PLAN:

Initiate at 100 percent power equilibrium conditions and complete a shift turnover. Initiate minor malfunctions as scheduled. Have the load dispatcher inform the control room of a severe weather watch involving the possibilities of tornados. Initiate a station blackout. Respond to the blackout including observation and discussion of natural circulation flow in the RCS. Continue with subsequent plant recovery as time permits.

C. MALFUNCTIONS SCHEDULED:

1. NIS-3 Power range channel failure
2. PCS-15 Inadvertent Safety Injection
3. CRF-9 DRPI loss of voltage
4. PCS-15 DG Load Sequencer fails to complete
5. EPS-1 Station Blackout

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

NOTE: In addition to the above listed malfunctions, any of the malfunctions scheduled on previous sessions may also be used.

STATE THE NEED TO ASK QUESTIONS AS THEY ARISE

STATE BASIC PRESENTATION FORMAT

II. REVIEW (Optional)

III. PROCEDURE

A. Set up the plant in (LATER) and conduct a shift turnover emphasizing the current conditions - steady state 100 percent power; STP 345.037 SSPS Train A Actuation Logic Test in progress

- Power history
- Systems status
- Test/evolutions in progress
- Equipment inoperability

Override X604C2 R6 SSPS A Train TRBL Annunciator To ON

B. STPs scheduled

- NONE

C. Initiate a power range channel failure (NIS-3), such that the channel fails to a minimum output.

- Have the students explain how the channel signal is utilized in Rod Control, SGWLC and Rx Protection.
- Review tech specs limitations for PR channel failures
- Discuss differences in indication between failure.
- Trip the associated bistables and initiate repairs.

MALF NIS - 3
Select Channel -N42
Failed Value= 0
Ramp Time = 0

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |
| D. Initiate a RPI loss of voltage (CRF-9), due to failed power supply to Group B.<br>- Review RPI system to include non-urgent failure alarm, Data B failure, and General Warning lights.<br>- Discuss RPI system accuracy after a failure<br>- Review tech specs limitations for continued operation<br>- When (If) requested to switch power supplies, clear the malfunction. Otherwise continue plant operations with the failure as allowed by tech specs. | MALF CRF - 9<br>Select Coil Group B |
| E. Initiate PCS-5, Inadvertent SI Actuation, Discuss:<br>- Reason for Actuation (IC Tech had STP that was missing a page)<br>- Termination Criteria<br>- Reporting Requirements<br>- EOP-1 Directions for Recovery | |
| F. Allow students to stabilize plant, calculate SDM, and complete Administrative Requirements. | |
| G. Initiate PCS-15, DG Load Sequencer Fails to complete (will not be noticed until blackout) | |
| H. Initiate a Station Blackout (EPS-1), due to inclement weather.<br>- Discuss blackout recovery actions<br>- Review vital loads which should start on a blackout. | MALF EPS - 1<br>Select - Without Delay |
| I. Continue subsequent recovery actions from the blackouts as time permits.<br>- Review tech specs for electrical power system.<br>- Restore Plant Power if time permits | Clear Malf EPS - 1 |

DAY 3

SOUTH CAROLINA ELECTRIC & GAS

PHASE III PROGRAM

PLANT CASUALTY TRAINING

Day 3 Power Operations, Malfunctions
Steam Generator (S/G) Tube Leak which escalates to Tube Rupture, Pressurizer Steam Space Leak.

## Overview

Identification of nuclear plant faults, as evidenced in the past few units, requires the use of several interrelated indications. This unit is a continuation of the same type of faults. One indication or annunciator will be a symptom of the problem, but the identification of the specific problem requires operator awareness and knowledge of system interrelations. A steam generator (S/G) tube leak is one fault which will be identified by the association of several different indications.

## Terminal Objectives

The student will be able to discuss indications of steam generator tube leakage or tube rupture along with operator actions required to place the plant in a stable condition. In addition he will be able to identify this type of fault as a control room operator and use the proper procedure as guidance in further plant operations.
The student will also be able to describe the symptoms and automatic actions during a pressurizer steam space leak.

## Enabling Objectives

Upon completion of this unit the student shall be able to:

1)- describe indications of a steam generator tube leak.
2)- identify the particular steam generator involved.
3)- describe operator actions in response to a steam generator tube rupture.
4)- demonstrate an ability to perform actions as a control room operator during a steam generator tube rupture.
5)- Demonstrate an ability to perform actions as a Control Room Operator during a pressurizer steam space leak.

## References

1. Virgil C. Summer Training Simulator
2. SCE & G Phase II Training Material
3. SCE & G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications
6. Abnormal Operating Procedures
7. STP - 204.001

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

INTRODUCTION

A. UNIT TERMINAL OBJECTIVE:

The student will be able to recognize, diagnose and respond correctly to various plant malfunctions. This aiblity will be evaluated by instructor observation and the student's oral response to questions.

B. OPERATIONS PLAN:

Maintain 100 percent power. Conduct the scheduled malfunctions.

C. MALFUNCTIONS SCHEDULED:

1. TUR-12 - First stage pressure transmitter failure
2. PRS-8 - Pressurizer Steam Space Leak
3. RCS-2 - Steam generator tube leak

NOTE: In addition to the above listed malfunctions, any of the malfunctions scheduled on previous simulator sessions may also be used.

STATE THE NEED TO ASK QUESTIONS AS THEY ARISE
STATE BASIC PRESENTATION FORMAT

III. PROCEDURE

A. Initialize at 100% power and perform a shift turnover. Explain plant conditions and objectives to students:

- System lineups
- Plant parameters
- Operational status
- Power history

B. STPs scheduled
- NONE

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

C. Initiate TUR-12, first stage pressure transmitter failure, discuss:
- Effect on all associated systems, i.e., P-13, P-7, C-5-, C-7, auto rod control
- Clear malfunction after proper bistables have tripped and request for repair has been made

MALF TUR-12 (Select Channel not being used) for Rod Control Failed Value = 0 Ramp Time = 0

D. Initiate PRS-8, Pressurizer Steam Space Leak, Discuss:
- Accident Symptoms
- EOP-12 Required Actions
- EOP-1 Required Actions
- EOP-01, Emergency Plan Requirements

Allow transient to continue until stable, subcooled condition is established and cooldown has started using natural circualtion or forced circulation (if available).

MALF PRS - 8 Failed Value = 500 GPM Ramp Time = 300 seconds

E. Re-initialize at 100% power explain plant conditions
- System lineups
- Plant parameters
- Operational status
- Power history

F. Initiate RCS-2 steam generator tube leak, discuss:
- First indications versus determining indications, i.e., radiation alarms in conjunction with flow changes, and apparent difficulties
- Leak-rate determination
- Proper procedure (EOP-12)
- Initiation of SI and subsequent EOP-1 Actions
- Emergency Plan EPP-01 Actions
- Continue Malfunction to end of class session

MALF RCS - 2 Leak Flow = 400 GPM Ramp Time = 3600 Sec. Select SG = B or C

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

CRITIQUE

A. Review overall operations conduct.

B. Review malfunction responses

Enabling Objectives

Upon completion of this unit the student will be able to:

1)- discuss the symptoms of a pressurizer steam space leak.

2)- describe operator actions for a S/G Tube Leak

3)- describe what is meant by Condition III faults.

4)- list the types of faults considered to be Condition III faults.

5)- Perform the subsequent operator actions while using the applicable procedures(s) for S/G Tube Leak.

References

1. Virgil C. Summer Training Simulator EOP-1, EOP-2, EOP-5, EOP-12, SOP-404, SOP-403, STP 108.001
2. SCE & G Phase II Training Material
3. SCE & G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications

DAY 4

SOUTH CAROLINA ELECTRIC & GAS
PHASE III PROGRAM
MAJOR PLANT CASUALTY TRAINING

Day 4 Loss of Secondary Coolant Inside the reactor building, Accident Analysis Review - Part 3

Overview

In previous units, faults of increasing severity have been discussed. The remaining accident events to be considered are those included in Condition IV Events - Limiting Faults. These are the most drastic events. Although not expected to occur, these accidents are postulated because their consequences include the potential for radioactive material release. It is the Condition IV accident which the plant is designed to protect. The plant's protection and safeguards systems will automatically provide initial safe shutdown; however, the operator is relied upon to correctly diagnose the accident and perform the required actions specified in the emergency procedures.

The unit is designed to review the accidents in the Condition IV category and allow students to experience selected faults as control room operators.

Terminal Objectives

Upon completion of this unit, the student will be able to describe the symptoms and automatic actions during a loss of secondary coolant (inside the reactor building) and other Condition IV events. The student will also be able to perform and justify the immediate operator actions required of a control room operator for a loss of secondary coolant accident and other plant malfunctions. Successful completion of this unit will be based on a satisfactory evaluation by the program instructor based on observation and the student's oral response to questions.

## Enabling Objectives

Upon completion of this unit, the student shall be able to:

1)- describe what is meant by Condition IV events.

2)- list faults included in the Condition IV category.

3)- describe indications of a feedline break inside the reactor building.

4)- discuss assumptions used in the feedwater break analysis.

5)- describe operator actions for a loss of secondary coolant.

6)- describe plant response to a steam line rupture.

7)- describe the major indication differences between steam and feed breaks inside the reactor building.

8)- perform the subsequent operator actions while using the applicable procedures for a loss of secondary coolant.

## References


1. Virgil C. Summer Training Simulator
2. SCE&G Phase III Training Material
3. SCE&G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications

# INSTRUCTOR'S GUIDE

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

I. INTRODUCTION

A. UNIT TERMINAL OBJECTIVE:

The student will be able to describe the symptoms and automatic actions during a loss of secondary coolant (inside the reactor building). The student will be able to perform and justify the immediate operator actions required of a control room operator for a loss of secondary coolant accident and other plant malfunctions. Successful completion of this unit will be based on a satisfactory evaluation by the program instructor based on observation and the student's oral response to questions.

B. OPERATIONS PLAN:

Initiate at 50 percent power and complete a shift turnover. Initiate minor malfunctions as scheduled. Major accidents will include a steam break and a feed break inside the reactor building, with each event involving safety injection system actuation. Discuss emergency plans with students for each major accident.

C. MALFUNCTIONS SCHEDULED:

1. CCW-1 Letdown Heat Exchanger Tube Leak
2. MSS-3 Steam break inside containment
3. FWM-8 Feedwater Line Break inside containment

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

4. RC3-8 RTD failure ($T_H$ - control)
5. FWM-3 Emergency feed pump trip

NOTE: In addition to the above listed malfunctions, any of the malfunctions scheduled on previous simulator sessions may also be used.

STATE THE NEED TO ASK QUESTIONS AS THEY ARISE
STATE BASIC PRESENTATION FORMAT

III. PROCEDURE

A. Set up plant in (Later)(50 percent power).

B. Conduct a shift turnover emphasizing the current conditions 50 percent power; no testing in progress.
- Power History
- System Status
- Test/Evolutions in Progress
- Equipment Inoperability
  The instructor may initiate with equipment inoperable as long as applicable surveillance requirements are being met for continued plant operations.

C. Initiate plant loading toward 100 percent power

D. Initiate A LD Heat Exchanger Tube Leak (CCW-1), Discuss — MALF CCW-1; Select Leak Rate=20%; Select Ramp Time= 300 Sec
- EOP-9 Required Actions
- EOP-12 Required Actions
- Determination of Leak Location
- Determination of Leak Rate

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

- When leak is isolated, continue operation with charging and letdown isolated

E. Continue plant loading; initiate a steamline break inside the reactor building (MSS-3) Recommend 6 x $10^6$ lb/Hr over a 10 minute ramp.

- Observe operator actions; diagnostics
- When students are in subsequent actions of EOP-2 freeze the conditions and critique the evolution.

MALF MSS-3
Select Leak Rate=$6 \times 10^6$ LB/HR
Select Ramp Time = 600 sec

F. Reinitialize at 50 percent power or a backup SNAP >50 percent power if desired to maintain previous plant conditions.

NOTE: Remove the steamline break if inserted with time delay.

G. Continue plant loading; initiate a RTD failure such that loop 3 $T_H$ RTD fails low (RCS-8).

- Discuss indications of failure ($T_{avg}$, $\Delta T$ analysis)
- Discuss affects on Rod Control, pzr Level Control, RIL circuitry ($\Delta T$)
- Review Tech Specs operability requirements
- Trip selected bistables and initiate repairs.

H. Initiate an Emergency Feed Pump Failure (FWM-3) due to a feed breaker failure. (Motor Pump Failure)

| OUTLINE | KEY AIDS |
|---|---|
| - This failure should be noticed during subsequent SI and corrective action taken to attempt to start the pump locally. | |
| I. Continue plant loading; initiate a feedline break inside the reactor building (FWM-8); break is downstream of check valve inside the reactor building. Leak rate of 6 x $10^0$ lb/hr and a ramp of 10 minutes are recommended. | MALF FWM-8<br>Select any S/G<br>Select Leak Rate=6x$10^6$ LB/HR<br>Select Ramp Time=600 sec |
| - Observe operator actions; diagnostics | |
| - When students are in subsequent actions of EOP-2, discuss overall operations | |
| - Review Emergency Feed Pump operability requirements (Tech Specs) | |
| J. Continue subsequent actions as time permits. | |
| K. Students conduct shift turnover to instructor. | |
| Note to Instructor: The simulator session should be conducted with as many questions as possible being asked of the operators regarding plant systems, procedures, Tech Specs, etc. The sessions should be representative of the fuel audit operational exam. | |
| IV. CRITIQUE | |
| A. Review overall operations conduct. | |
| B. Review malfunction responses | |

DAY 5

SOUTH CAROLINA ELECTRIC & GAS

PHASE III PROGRAM

MAJOR PLANT CASUALTY TRAINING

Day 5 Loss of Coolant Accident - Inadequate Core Cooling

Overview

The final major nuclear plant fault that must be discussed in detail and actually performed is a loss of primary coolant accident (LOCA). Although this particular accident and small Reactor Coolant System (RCS) leaks have been previously observed, the required actions for a loss of coolant accident have not been performed. During this unit, the Emergency Core Cooling Systems (ECCS) and operator actions during a loss of coolant accident will be discussed.

Terminal Objective

Upon completion of this unit, the student will be able to describe the symptoms and automatic actions during a loss of coolant accident (LOCA) including systems used and mechanisms of heat removal. The students will also be able to perform and justify the immediate operator actions required of a control room operator for a LOCA and other plant malfunctions. Successful completion of this unit will be based on a satisfactory evaluation by the program instructor based on observations and the student's oral response to questions.

## Enabling Objectives

Upon completion of this unit, the student will be able to:

1)- list indications of a loss of reactor coolant accident.

2)- distinguish between primary and secondary loss of coolant accidents.

3)- describe operator immediate actions for a LOCA.

4)- demonstrate an ability to perform immediate and subsequent actions as a control room operator during a LOCA.

5)- describe ECCS flow paths, flow rates, and injection pressures for each ECC system.

6)- describe the basic steps required to shift ECCS from injection mode to recirculation mode.

7)- discuss conditions that enhance natural circulation.

8)- discuss the problems associated with inadequate core cooling and how to combat those problems.

## References


1. Virgil C. Summer Training Simulator EOP-1, SOP-115
2. SCE& G Phase II Training Material
3. SCE& G Phase III Training Material
4. Westinghouse Phase III Training Material
5. Technical Specifications

# INSTRUCTOR'S GUIDE

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

I. INTRODUCTION

A. UNIT TERMINAL OBJECTIVE:

The student will be able to describe the symptoms and automatic actions during a loss of coolant accident (LOCA). The students will also be able to perform and justify the immediate operator actions required of a control room operator for a LOCA and other plant malfunctions. Successful completion of this unit will be based on a satifactory evaluation by the program instructor based on observation and the student's oral response to questions.

B. OPERATIONS PLAN:

Initiate at 100 percent power and complete a shift turnover. Initiate minor malfunctions as scheduled. The objective of this unit is to have the students identify and carry out the emergency procedure for a large LOCA including shiftover to recirculation mode of operation. Discuss emergency plans for each major accident.

C. MALFUNCTIONS SCHEDULED:

1. RCS-5 - Large LOCA (DBA)
2. PCS-15-DG Sequencer fails to complete
3. PCS-9 - Rx Trip breakers fail to open-at WS event
4. MSS-4 - Stm line break outside containment (Optional)

| OUTLINE | KEY AIDS |
|---|---|
| 5. FWM-16-FW line break outside containment (Optional) | |
| NOTE: In addition to the above listed malfunctions, any of the malfunctions scheduled on previous simulator sessions may also be used. | |
| STATE THE NEED TO ASK QUESTIONS AS THEY ARISE | |
| STATE BASIC PRESENTATION FORMAT | |
| II. PROCEDURE | |
| A. Set up the plant in (LATER) (100 percent power, Equilibrium Xenon). | |
| B. Conduct a shift turnover emphasizing the current conditions - 100 percent load, equilibrium Xenon. | |
| - Power History | |
| - Systems Status | |
| - Tests/Evolutions in Progress | |
| - Equipment Inoperability | |
| NOTE: The instructor may initiate with equipment inoperable as long as applicable surveillance requirements are being met for continued plant operations. | |
| C. Initiate PCS-15, DG load sequencer fails to complete | MALF PCS-15<br>Select Train A or B<br>Select Failed Step = Step 2 |
| - Malfunction of sequencer and failure and failure or RHR Pump to auto-Start will not be noticed until SI actuation | |

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

D. Initiate a Large LOCA (DBA) in Loop 1 (RCS-5). This evolution should take 1.5 - 2 hours. — MALF RCS-5 Select Leak Rate = DBA

- Carry out the immediate and subsequent actions to the point of waiting for shiftover to hot leg recirculation.
- Simulate time lapse of 24 hours and shift to hot leg recirculation mode.
- Discuss procedures, notes, and precautions as you handle this accident.
- Discuss loss of all emergency feedwater system and alternate methods of feeding S/G's providing cooling for the RCS.
- Use system drawings/CRT's for emphasis during system realignment.
- Discuss failure of RHR Pump to start and consequences if pump could not be manually started

E. Reinitialize at 100 percent power; stabilize plant conditions instructor can backup.

F. Initiate PCS-9, Rx Trip Breakers fail to open — MALF PCS-9 Select both Trip Breakers Select-Fail to open Manual and Auto

G. Initiate TUR-1. inadvertent turbine trip or other malfunctions, at the instructor's discretion, to initiate the ATWS event

- Discuss plant response to ATWS, Rod Rod Control, Steam Dump
- Terminate exercise when all Rods are inserted and stable hot standby conditions are reached.

| LESSON PLAN | REVISION |
|---|---|
| OUTLINE | KEY AIDS |

H. If time permits, reinitialize at 100% power conditions and initiate FWM-16, FW Line Break outside containment, discuss

- Indications of Leak Location
- Required actions PER EOP-2

I. If time permits, reinitialize at 100% power conditions and initiate MSS-4 Stm Break outside containment, discuss

- Indications of Break Location-IRB vs ORB

CRITIQUE

A. Review overall operations conduct.

B. Review malfunctions response

MALF FWM-16
Select Leak Location= Optional
Select Leak Rate= $6x10^6$ LB/HR
Select Ramp Time = 300 secs

MALF FWM -4
Select S/G - Optional.
Select Leak Rate = $6x10^6$ LB/HR
Select Ramp Time= 300 secs